

# Toward Ecosystem-based Coastal Areas and Fisheries Management in the Coral Triangle: *Integrated Strategies and Guidance*



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This publication was prepared to support the implementation of the CTI-CFF Regional and National Plans of Action using an ecosystem-based approach. The primary target audience is the CTI-CFF Thematic Working Groups, National Coordinating Committees, and Priority Geographies (also called Integration Sites).

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# Foreword

Coastal communities and local governments in the Coral Triangle face a common challenge. The challenge includes the ways to sustain or improve fisheries, protect biodiversity, ensure community and ecological resilience, improve livelihoods, and sustain food security at the same time. Ecosystem-based management (EBM) is recommended as a guiding principle to respond to the challenge in the Coral Triangle Initiative for Coral Reefs, Fisheries and Food Security (CTI-CFF) Regional Plan of Action (RPOA), released in May 2009. EBM provides a framework for integrated coastal management that balances human needs with what is required to maintain important ecosystem services.


The CTI-CFF was founded on the commitment of the six Coral Triangle countries (Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste) to accelerate efforts to safeguard the coastal and marine resources and ensure food security for coastal communities. The RPOA puts forward five goals, calling on partner countries to designate and manage seascapes, manage fisheries effectively using an ecosystem approach, establish marine protected areas (MPAs) to conserve habitat and biodiversity, provide for appropriate and needed adaptations to climate change, and improve the status of threatened species.

The US CTI Support Program has focused its support on three of five goals related to MPAs, ecosystem approaches to fisheries management (EAFM) and climate change adaptation (CCA). As tools for these individual goals were developed, and then integrated as individual tools and modified for integrated application, the process gave rise to the CTI Integrated Toolkit.

This Integration Guide uses an EBM framework to guide CTI priority geographies to improve natural resource management through integrated and coordinated management of MPAs, fisheries management, and climate change adaptation. This guide is a cornerstone of the CTI Integrated Toolkit. The Integrated Toolkit includes all of the tools that have been developed to help CTI priority geographies fill important gaps towards achieving EBM. These single-sector and integrated tools have been developed or are highly recommended by the CTI with the support of the US CTI Support Program. A full list of the tools that currently comprise the CTI Integrated Toolkit is provided in Appendix 3 of this guide.

The use of the CTI Integrated Toolkit should help us advance within the region towards comprehensive, ecosystem-based management. We look forward to its use and adaptation to improve management systems, sustain healthy fisheries, and ensure sustainable livelihoods.

We thank all involved in developing and piloting the CTI Integrated Toolkit and each of its component tools. We give special thanks to the US CTI Support Program and partners for providing the technical assistance in developing this Integration Guide, which supports the five goals of our Regional and National Plans of Action.



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When the CTI Priority Geographies began to support the Regional and National Plans of Action and associated National Plans of Action, it became clear that a more integrated approach would facilitate improved and efficient management. In response to this need, the content and ideas for the integration Guide were collaboratively developed by participants of three US CTI workshops on the “Thematic Integration of Climate Change Adaptation, Ecosystem Approaches to Fisheries Management, and Marine Protected Area Tools and Strategies in the Coral Triangle.” These meetings were held in Honolulu, Hawaii, USA, in February 2011, October 2011, and February 2013. The workshops were hosted by Conservation International and facilitated by John Parks of Marine Management Solutions. Significant additional support was provided by each of the CTI priority geographies, including developing and contributing integration profiles, commenting on various drafts of this guide, and assisting with pilot testing of some components of the guide.

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The guide was copy-edited by Debora Gowensmith of Groundswell Services Inc., and design and layout were provided by Ysolde Jatulan.

# About This Guide

This Integration Guide was written for local, district, provincial, and national governments; marine and coastal resource managers; and conservation practitioners who want to integrate a variety of management approaches in their coastal areas in their efforts to work toward ecosystem-based management (EBM). It is also intended to support the integrated implementation of the goals of the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) Regional Plan of Action (RPOA). The RPOA highlights EBM as an approach to achieving these goals. The RPOA Commitments to Action states, “Our countries will promote agreed approaches to managing marine and coastal ecosystems and resources, including the ecosystem approach and the precautionary principle” (CTI-CFF, 2009).

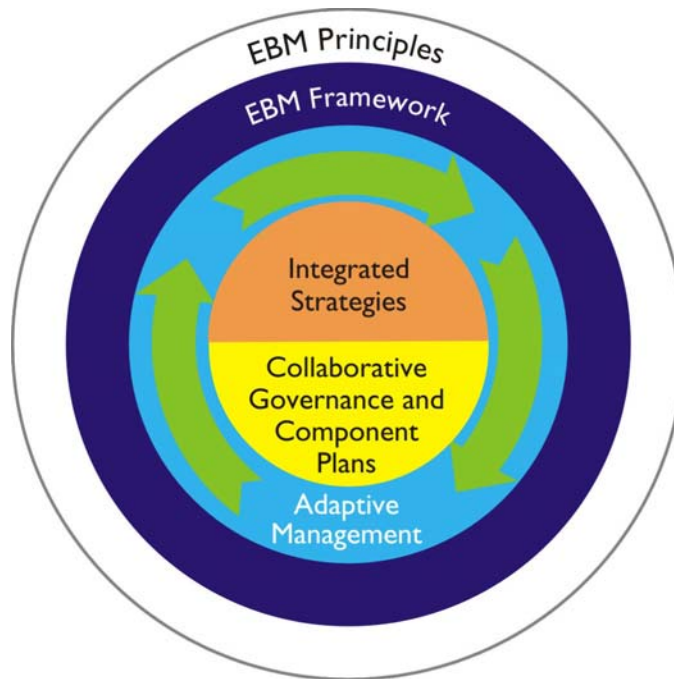
This guide is part of the CTI Integrated Toolkit. Developed with the support of the US CTI Support Program, the CTI Integrated Toolkit helps improve coastal natural resources management by supporting the integrated application of thematic tools within Integration Sites. The toolkit includes all the tools developed with the support of the US CTI Support Program. These tools, listed in Appendix 3 of this guide, have gone through a process of alignment and harmonization to ensure that they are appropriate for simultaneous use within management areas.

EBM is defined as an “integrated approach to [natural resources] management that considers the entire ecosystem, including humans” (McLeod et al., 2005). EBM considers the cumulative impacts of different sectors (Pollnac & Christie, 2009; UNEP, 2011). The goal of EBM is to “maintain an ecosystem in a healthy, productive, and resilient condition” (McLeod et al., 2005).

Throughout the guide, we describe management integration as a process by which sectors, agencies, stakeholder groups, and levels of government are brought together to coordinate activities that contribute to EBM. The vehicle for implementing these activities are the management plans already developed for a site by all the involved agencies and groups. Under an EBM framework, these plans are coordinated according to the guiding principles of EBM. Through this process of management integration at and across multiple levels and sectors, and through incorporation of integrated activities into existing management plans, management practitioners within a management area will best work toward achieving EBM.

This guide describes the key elements of EBM and how they can support integrated management. This is done through the development of an EBM Framework. The Framework is a living, strategic document that describes your vision for EBM and how you will integrate your activities according to EBM principles. The Framework includes three major elements: Integrated Strategies, Collaborative Governance, and Adaptive Management. The relationship of these elements to each other is illustrated in Figure 1. This guide is organized according to these key elements of EBM.

- **Integrated Strategies:** Which strategies and activities are integrated in nature and fundamental EBM. A diagnostic tool is included in this section to help you identify activities underway, flag any gaps, and prioritize needs.
- **Collaborative Governance:** Who will be involved in management integration, and how they will work together. Which government agencies and local stakeholders will work together through interagency cooperation and co-management? How will they collaborate?
- **Adaptive Management:** How work plans will be implemented, taking advantage of shared objectives and common resources. It also describes how integrated management plans can be monitored, evaluated, and adapted to best achieve EBM.



**Figure 1.** The EBM Framework is comprised of three major elements: integrated strategies, collaborative governance arrangements, and adaptive management. Each of these are developed in accordance with the guiding principles for EBM through an EBM Framework. The framework and elements can be supported with an EBM Workplan, described in Section 4.

Once you have developed the key elements for your site, they can be incorporated into existing management plans and planning processes. Additional work to fill gaps can be planned and managed using an EBM Work Plan. Outputs from these activities will advance your efforts toward integration and, ultimately, EBM.

This guide is divided into five sections, with three appendices.

Section 1 describes the EBM Framework. This Framework is a living, strategic document that includes the integrated strategies being implemented, the collaborative governance arrangements that will be used to manage the area, and the adaptive management process that will be used to guide implementation and make course corrections as needed.

Section 2 details the seven integrated strategies for moving toward EBM and provides a diagnostic tool to assess progress toward each of these strategies. These seven strategies have been synthesized from a comprehensive review of scientific studies and field-based experiences of management interventions most likely to be effective when applied as an integrated ecosystem-based approach in the Coral Triangle.

Section 3 describes ways in which provincial or local-level government and non-government management authorities may coordinate their management strategies and incorporate new activities into existing management plans.

Section 4 illustrates an adaptive management cycle for the creation, implementation, and management of the EBM Framework. There are five key steps for this process: (1) Assemble the EBM Framework, (2) get ready for implementation, (3) implement EBM, (4) prepare to adapt, and (5) implement adaptation activities.

Section 5 provides simple case studies to illustrate management integration toward EBM in the Coral Triangle. Case studies are drawn from the Philippines, Papua New Guinea, Indonesia, Malaysia, and Timor-Leste. Each case study highlights activities to develop one or more of the key elements of an EBM approach.

Appendix 1 details the activities that are recommended to achieve the seven integrated strategies. Appendix 2 is the full US CTI Support Program Integrated Glossary. Appendix 3 describes the “US CTI Support Program Integrated Toolkit” and provides a list of tools that were developed or recommended specifically for use in the Coral Triangle for implementation of activities within the RPOA.

This guide can be used at a variety of geographic scales, ranging from large seascapes or ecoregions to medium-sized marine protected areas (MPAs) or fisheries management units (FMUs). We recommend that you consider the largest possible geographic area, including both the ocean and coastal lands, when using this guide. However, the coastal area in which you apply this guide does not necessarily already need to be designated as a managed area. It may have several managed areas within it, including MPAs, FMUs, *Territorial Use Rights Fisheries (TURFs)*, locally managed marine areas (LMMAs), and others. The managers of these areas will be important stakeholders, and possibly key strategic partners, in management integration and EBM.

This guide does not provide advice or instruction on how to increase management effectiveness. Many guides and training programs can help address a site’s management needs, including managed area design, governance, and evaluation; community engagement and stakeholder involvement in management efforts; measuring success and conducting socioeconomic and biological monitoring; public outreach and education; and law enforcement.

## HOW TO USE THIS GUIDE

This guide is not a step-wise process or workbook. Instead, it is a collection of the key elements that were determined to be of critical importance to undertake EBM within a management area in a way that is successful and sustainable. We recommend that you read through the entire guide before moving forward with any of the activities to ensure that you understand how all the pieces fit together. Then, once you have identified the strategies and activities you will pursue, you can develop your own path for management integration and moving toward EBM.



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**The integrated management of marine and coastal terrestrial systems is essential for maintaining healthy reefs and productive coastal fisheries.**



# Acronyms

BHS	Bird's Head Seascape (Indonesia)
CCA	Climate change adaptation
CCEF	Coastal Conservation and Education Foundation (Philippines)
CI	Conservation International
CRMP	Coastal Resource Management Project (Philippines)
CT6	The six countries of the CTI-CFF: Indonesia, Malaysia, Philippines, Papua New Guinea, Solomon Islands, and Timor-Leste
CTI-CFF or CTI	Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security
CTMPAS	Coral Triangle Marine Protected Area System
CTSP	Coral Triangle Support Partnership
DGMC	Davao Gulf Management Council (Philippines)
EAFM	Ecosystem approach to fisheries management
EBM	Ecosystem-based management
FMU	Fisheries management unit
ICM	Integrated coastal management
IFARMC	Integrated Fisheries and Aquatic Resources Management Councils (Philippines)
IUCN	International Union for the Conservation of Nature
LEAP	Local early action planning for climate change adaptation
LMMA	Locally managed marine area
MOA	Memorandum of agreement
MOU	Memorandum of understanding
MPA	Marine protected area
NIPAS	National Integrated Protected Areas System Act (Philippines)
NKS	Nino Konis Santana Park (Timor-Leste)
NOAA	US National Oceanic and Atmospheric Administration
NPOA	National Plan of Action (CTI)
PNG	Papua New Guinea
RPOA	Regional Plan of Action (CTI)
TNC	The Nature Conservancy
TURF	Territorial use rights fishery
US CTI	US Coral Triangle Initiative Support Program
USAID	US Agency for International Development
WCPA	World Commission on Protected Areas
WWF	World Wildlife Fund



COASTAL VILLAGES IN THE SOLOMON ISLANDS © TRIGGERFISH IMAGES COURTESY OF THE NATURE CONSERVANCY

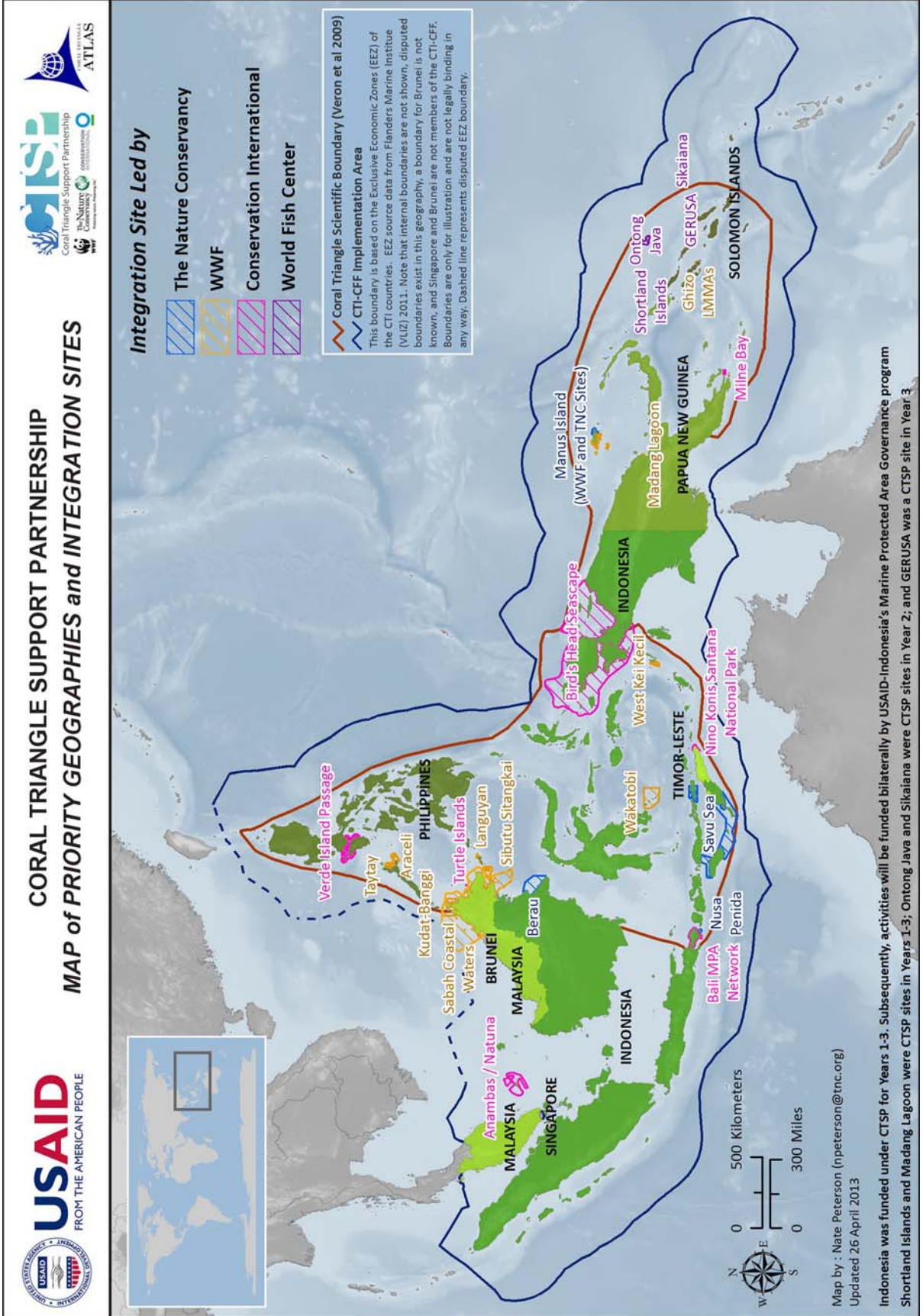
# Introduction

The Coral Triangle is among the most biologically and economically valuable marine ecosystems on the planet. To ensure the long-term sustainability of coastal and ocean resources within the Coral Triangle, careful and coordinated management is needed to address multiple issues and impacts. Overlapping authority and mandates, fragmented jurisdictions, insufficient coordination, and institutional conflict have become dominant characteristics of ecosystem governance within the region. For example:

- Coastal planners work to address land-use issues, land-based pollution, and climate change.
- Fisheries managers encourage the sustainable exploitation of marine resources and monitor fisheries production.
- Conservation professionals and environmental ministries protect threatened species and critical habitats such as coral reefs and mangroves.
- Local government and economic development agencies focus on basic services and livelihoods including tourism and other revenue-generating mechanisms.
- Disaster management agencies develop early warning systems and community preparedness to natural and climate-related hazards.

Most of the time, these sectors act independently so that sectoral strategies and actions are done in relative isolation from one another. An integrated and coordinated approach to management is needed to address the multiple impacts of these uses and to ensure the long-term sustainability of oceans and coasts and the people that depend on them in the Coral Triangle.

The six Coral Triangle countries (Indonesia, Malaysia, Philippines, Solomon Islands, Timor-Leste, and Papua New Guinea) came together in 2007 to form the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF), a multilateral partnership that aims to safeguard the marine and coastal resources of the Coral Triangle region (see Figure 2 for a map of the Coral Triangle and its priority geographies).



The CTI-CFF RPOA and each country's National Plan of Action (NPOA) set forth regional and national priorities to achieve five long-term goals:

Goal 1: Priority seascapes are designated and effectively managed.

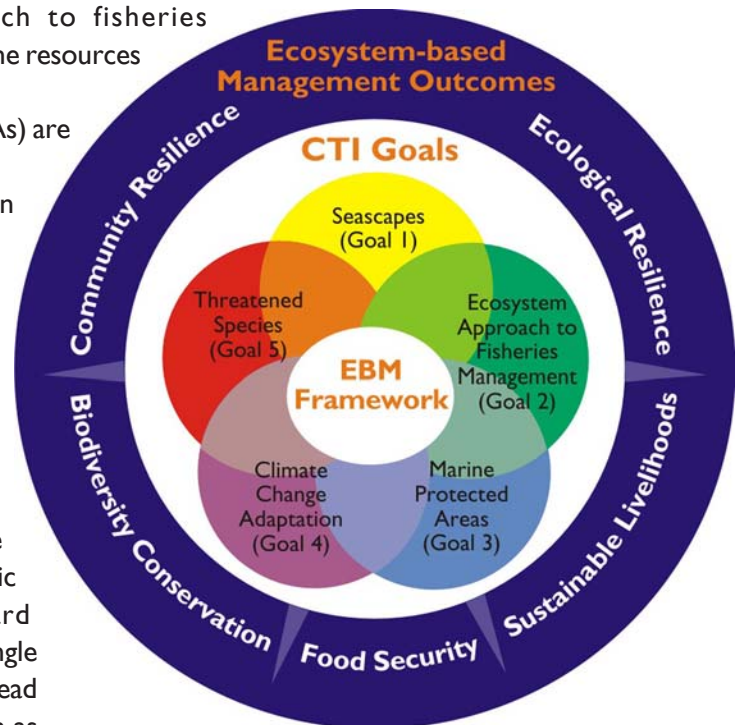
Goal 2: An ecosystem approach to fisheries management (EAFM) and other marine resources is fully applied.

Goal 3: Marine protected areas (MPAs) are established and effectively managed.

Goal 4: Climate change adaptation (CCA) measures are achieved.

Goal 5: The status of threatened species is improving.

With their adoption of the RPOA in 2009, Coral Triangle countries committed to managing marine and coastal ecosystems and resources using an ecosystem-based approach. Integrating the work being done to achieve the five goals of the RPOA in specific coastal areas is an excellent step toward achieving successful EBM in the Coral Triangle (Figure 3). Implemented effectively, EBM will lead to outcomes beyond the five CTI goals such as food security, biodiversity conservation, and community resilience.



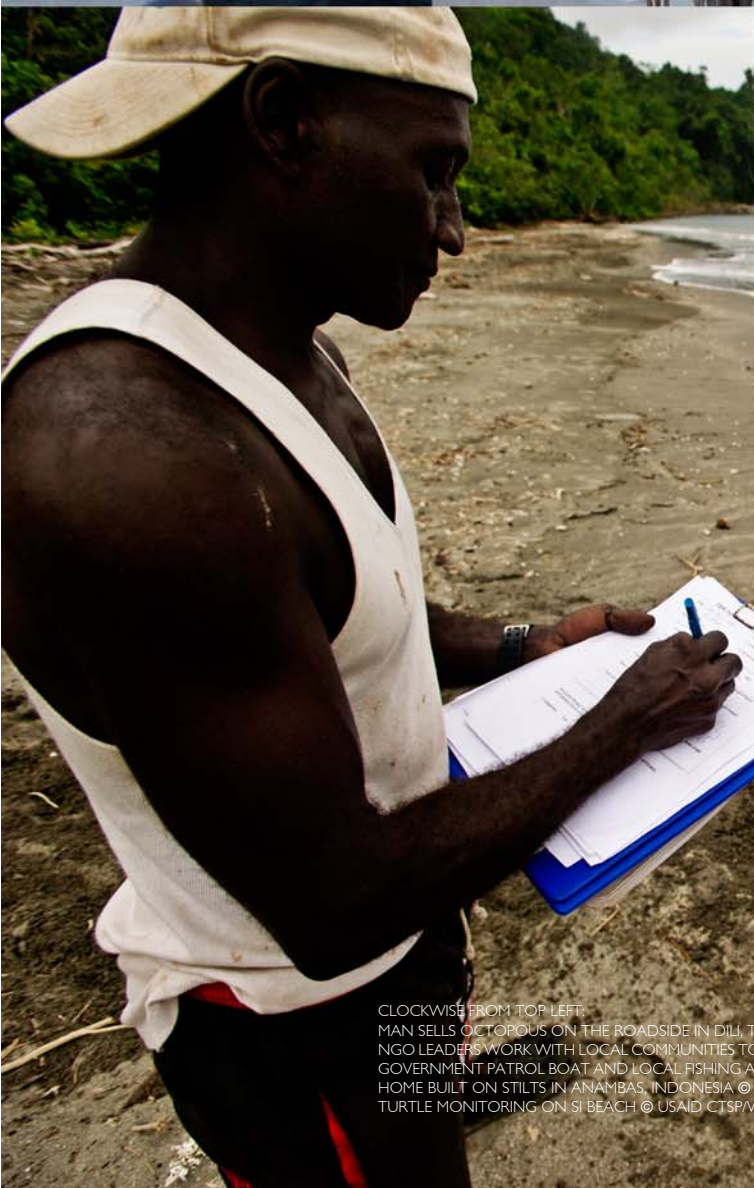
**Figure 3.** Alignment of ecosystem-based management (EBM) outcomes and the five CTI-CFF RPOA goals.

## PRINCIPLES OF ECOSYSTEM-BASED MANAGEMENT

EBM differs from management efforts that focus primarily on a single approach, threat, or concern. Single-approach strategies – which can include single-species fisheries management, MPA or MPA Network management, or climate change adaptation (CCA) projects – may operate in a way that isolates planning, implementation, and outcomes from other strategies. Although each strategy adds an essential building block toward ecosystem-based marine and coastal resource management, a lack of integration can lead to competing objectives and conflicts, and away from an ideal comprehensive management system.

EBM is science-based and has the following set of core principles that differentiate it from other other management approaches. Specifically, EBM:

- Uses ecologically relevant boundaries rather than political or administrative boundaries, and involves management at larger geographic scales or longer time frames.
- Views marine resources as elements of complex systems, and seeks to employ strategies that acknowledge and use complexity in management.
- Seeks to balance and integrate the needs of multiple human user groups while maintaining the health of the underlying system that supports those needs.
- Is participatory, collaborative, and involves a diverse set of organizations and individuals in thinking about and making decisions.
- Seeks to be adaptive through monitoring and evaluation tied to changes in future management directions.



CLOCKWISE FROM TOP LEFT:  
MAN SELLS OCTOPOUS ON THE ROADSIDE IN DILI, TIMOR-LESTE © USAID CTSP/WWF/DONALD BASSON;  
NGO LEADERS WORK WITH LOCAL COMMUNITIES TO MAP RESOURCE USE IN THE BALI MPA NETWORK, INDONESIA © CONSERVATION INTERNATIONAL;  
GOVERNMENT PATROL BOAT AND LOCAL FISHING AND TRANSPORT BOAT DOCK ALONGSIDE FISH PENS FOR THE LIVE REEF FISH TRADE AND A PRIVATE HOME BUILT ON STILTS IN ANAMBAS, INDONESIA © USAID CTSP/CONSERVATION INTERNATIONAL/KATHLEEN FLOWER);  
TURTLE MONITORING ON SI BEACH © USAID CTSP/WWF/JAMES MORGAN)

- Involves the dynamic interplay between terrestrial, marine, and freshwater systems.
- Integrates ecological, social, and economic objectives and recognizes humans as part of a linked social-ecological system.
- Recognizes interactions within and across ecosystems.

## BENEFITS OF EBM

Integrated management following EBM principles will benefit the Coral Triangle in many ways. These include increased efficiency and cost effectiveness; expanded management success; reduced conflict; building of resilient communities and resources; and opportunities to secure new financial resources and increase private sector investment.

Integrated management under EBM principles will also harmonize work on the five goals of the RPOA as opposed to having them compete with one another for limited human and financial resources. It is most efficient to implement multiple management strategies in an integrated, rather than incremental or piecemeal, manner.

Management integration encourages managers to complete similar activities in a coordinated manner, thereby eliminating or reducing redundancy and increasing the speed with which intended project outputs are achieved. Because of this coordination, costs, effort, and time are maximized. Integration encourages decisions about management activities to be made holistically. This helps to reduce conflicts between user groups and outcomes, including maladaptations to climate change.

Integrated management helps to boost the resiliency of marine ecosystems and coastal communities by applying the latest scientific management principles. Integrated management opens new cross-sectoral funding and donor opportunities. This is particularly true for climate change adaptation activities, for which international financing is becoming increasingly available.

Finally, businesses and economies benefit from transparent rules and predictable authority. Place-based integration can streamline and simplify rules and regulations; identify and remove perverse incentives; and stimulate economic development via effective management.

## CHALLENGES TO EBM

There are several challenges to successful integrated management using EBM principles. These include the current policy and institutional systems, limited political will, leadership challenges, the possibility of unintended negative impacts, limitations in financing, and limitations in capacity.

Existing legal and institutional mandates often promote sector-based approaches. Reforming these laws and policies to enable greater inter-sectoral collaboration can be difficult but is fundamental to success.



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**Capacity-building at all levels is critical to supporting EBM. In Timor-Leste, capacity-building in villages can include evening movies, as well as discussions with government and NGO partners.**

High-level and mid-level support for integrated management and EBM is essential to success but may not always be easy to achieve. Support is most often lacking when leaders are not aware of the benefits. Therefore, it is important that all benefits of integrated management be effectively communicated.

Integrating new strategies with ongoing work must be timed appropriately to minimize overburdening human and financial resources and to ensure social acceptance. Integration must be championed by a lead agency and supported by a crosscutting team that is focused on managing change appropriately and effectively.

Care must be taken to avoid unintended negative impacts of integrating new strategies. For example, activities to minimize climate impacts on important infrastructure (e.g., roads, homes, or hotels) could negatively affect shoreline integrity in the medium term to long term.

Initial costs for site-based integration may increase because additional human and financial resources are needed. However, management costs will ultimately decrease as efficiencies are achieved. Likewise, the costs of not adequately addressing climate change and other impacts will be very great. In some cases, practitioners may not have the capacity or experience to implement activities from other management strategies (e.g., CCA).

Integration may require team members to acquire new skills and/or technical assistance. Initially, it may be difficult to find funding to support integrated management. However, growing recognition of the need for and utility of holistic and comprehensive planning will hopefully attract increased funding in the future.

Although there are undoubtedly challenges to integrated management applying EBM principles, each year there are new examples of sites, provinces, nations, and multinational bodies that have overcome these challenges to integrate their natural resource management activities on land, in coastal areas, and at sea.

## THE CORE TEAM: LEADERSHIP FOR EBM WITHIN A MANAGEMENT AREA

A multi-disciplinary, diverse, and well-connected core team that shares a vision for the need for integrated management and EBM within a management area can successfully create positive change. Ideally, your core team should contain about five to ten people — small enough to work efficiently, but large enough to absorb changes in membership and distribute tasks among the members so that everyone has an appropriately sized role. Members should include representatives from local, district, provincial, and national governments; marine and coastal resource managers; conservation practitioners who want to integrate a variety of management approaches in their coastal areas in their efforts to work toward ecosystem-based management (EBM); and members from the private sector and civil society with an interest in improving natural resource management within a management area.

Before initiating activities, all core team members should have a complete understanding of (1) the nature and purpose of management integration and EBM; (2) any jurisdictional and legal mandates that apply to any processes you will undertake as a team; and (3) a rough timeline and scope of activities to which each team member will commit.

The core team should start by developing a shared vision for your work. This will guide the team and ensure that all of the members share an understanding for what success will look like. Guidance for developing a shared vision within a team is provided in Section 3.

As you establish your group, additional questions to discuss as a team include the following:

- How will your team work together? How often will you meet?
- How will you handle absences? How will you replace a team member that wishes to leave the group?
- How will you resolve disputes and disagreements?
- Is there a budget to support your activities? Where will that budget come from and how will it be spent? Who will be responsible for managing it?
- How long will you work together? What is the length and type of the commitment from each individual?

You may wish to provide formal guidelines for your work and some accountability for your team. We recommend asking each team member to sign on to a membership sheet that includes each team member's names, professional affiliation and contact information, the components of the work that this team member will work on, and each member's role in and responsibilities to the team. Then ask each team member to sign the sheet to signify their agreement and authority to be an active, responsive, and supportive team member.

Be sure that your team membership includes a team leader, a secretary to keep records and help write any necessary reports, and a logistician to plan the arrangements for each of your team's meetings and outings. You may want to assign additional roles as needed for the process you envision.

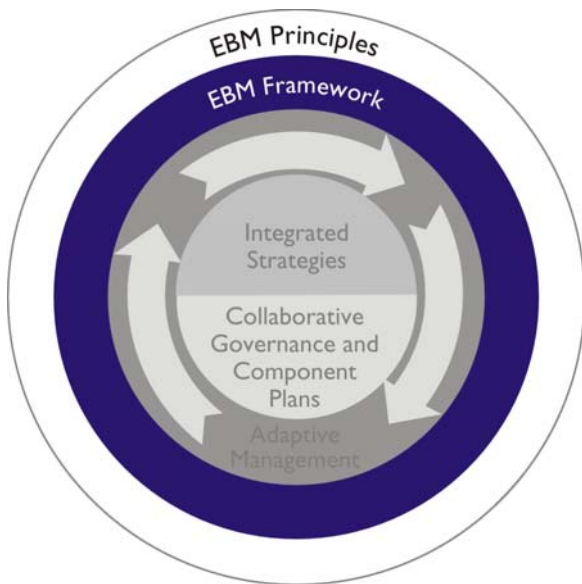




# Section 1. The EBM Framework

The EBM Framework is a living, strategic document that guides your team’s work. This section describes an EBM Framework and how it can be developed for use in your management area.

An EBM Framework is central to implementing EBM in a purposeful, coordinated way. The Framework document articulates and links together



- a vision for EBM in your management area (a process for developing a collective vision for EBM is outlined in Section 3);
- the integrated strategies and activities that will be initiated and supported to move toward EBM (see Section 2);
- the collaborative governance arrangements that are established to manage the area effectively and cooperatively (see Section 3);
- the natural resource and other management plans that already exist and are to be included in the integration process and a description of how information and data will be shared (when existing plans are modified to align with EBM principles and support EBM outcomes, they will become component plans within the EBM Framework, see Section 3); and
- provisions for work planning, implementation, joint monitoring and evaluation, and adaptive management to facilitate course corrections for improving EBM along the way (see Section 4).

The EBM Framework should be reviewed and adapted as needed, but usually over longer periods of time (for example, every five to ten years).

When indicating the arrangements for collective management of shared or interagency systems, describe how agencies and stakeholders will work together to integrate management sectors and implement EBM. You may also want to include guidelines for how collaborative activities will be managed and how disputes will be resolved. For

example, you may want to make provisions for integrated planning or budgeting. You may also want to describe specific collaborations, such as the collective enforcement of the management area or shared work to encourage compliance with your managed area’s laws and regulations. These can be described as shared activities in which multiple agencies and stakeholder groups have specific roles and work with a commitment to collaboration.

Ultimately, the principles of EBM and integration processes and actions should be “mainstreamed,” or adopted into the mandates, documents, and actions of the strategic partners, co-management bodies, and component plans. At that point, the role of the core team and the EBM Framework should likely diminish over time. Instead, integrated and adaptive management, collaborative governance, and EBM outcomes will be achieved and maintained within the mandates of the co-managing agencies and other stakeholders.

## EBM WORK PLAN

We recommend that your core team develop an EBM Work Plan to direct your work. A work plan is used to set roles and responsibilities, guide work with strategic partners and stakeholders, identify desired outcomes, set management objectives and targets, develop a budget and timeline, measure and evaluate progress, and establish a framework for adaptive management. More information on developing an EBM Work Plan can be found in Section 4.



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**Capacity-development activities are important to support integration. Here, government and NGO leaders from the Philippines and Malaysia learn about CCA, including how to mainstream new adaptation activities into existing plans and planning processes.**



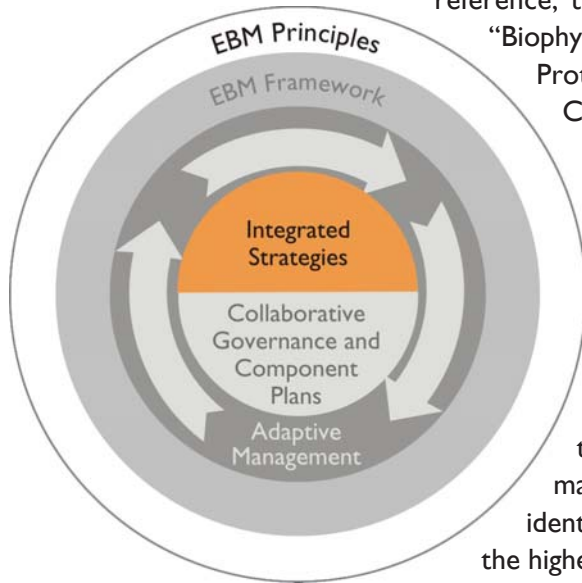
MPA MANAGEMENT PRACTITIONERS AND STAKEHOLDERS IN A GROUP DISCUSSION IN INDONESIA © USAID CTSP/CI/KATHLEEN FLOWER

## Section 2. Integrated Strategies and Diagnostic Tool for EBM

Seven key strategies and corresponding management activities have been identified as critical for EBM in marine and coastal areas of the Coral Triangle (Table I). These strategies have been synthesized from a comprehensive review of scientific studies and field-based experiences of management interventions most likely to be effective when applied as an integrated ecosystem-based approach in the Coral Triangle. As a primary

reference, this guide relies on a recent comprehensive report titled

“Biophysical Principles for Designing Resilient Networks of Marine Protected Areas to Integrate Fisheries, Biodiversity, and Climate Change Objectives in the Coral Triangle” (Fernandes et al., 2012). These principles were then modified by the authors of this guide, using recent publications and reports, to meet the needs of MPA managers, fisheries managers, land-use planners, and other coastal resource management practitioners that are the intended users of this guide.



The seven strategies presented here are in no particular order. You will need to work within your team to identify the strategies that you are already working on (and the existing management plans these activities fall within, where possible), identify any gaps, and identify which strategies and activities are the highest priority to pursue. These decisions will be based on your unique situation, resources, and needs.

The seven strategies for integrating the implementation of the goals of the CTI-CFF RPOA and managing coastal resources according to the principles of EBM are provided on the next page. A list of recommended activities that are important for achieving these strategies are provided in Table I. Further descriptions of each of these activities, and indicators of progress for achieving them, are provided in Appendix I.

- A. *Governance of management areas* Manage coastal and marine areas based on ecological boundaries, resource use patterns, and governance jurisdictions.

The legal establishment and effective, comprehensive management of marine and coastal areas is essential to improving the condition and services of important natural resources and coastal ecosystem services, including fisheries, coral reefs, and coastal integrity. Managed areas may fall under the jurisdiction of one or more local communities, local governments, provincial or national governments, or a combination of all of these. Managed areas are preferably large and are ideally defined by ecological boundaries, resource use patterns, and governance jurisdictions. Examples of managed areas include seascapes, MPA networks, and FMUs. The activities listed in this strategy reflect principles of community co-management, align with the basic tenets of ecosystem-based fisheries management, promote marine spatial planning, and encourage zoning plans that consider observed and anticipated effects of climate change on the coastal zone (Fernandes et al., 2012).

- B. *Fisheries managed for sustainability* Manage multiple fisheries and their associated ecosystems for sustainable use and human benefit under an ecosystem approach to fisheries management (EAFM).

Sustainably managed fisheries are fundamental to sustaining food security in the Coral Triangle. Following the principles of ecosystem-based fisheries management, the activities that support this strategy draw from best practices for the management of coastal fisheries in the Coral Triangle. The activities also encourage the assessment of climate change vulnerability and the development and implementation of adaptation plans in order to support the resilience of fishery stocks and coral reefs (U.S. CTI Support Program, 2011).



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**Managing fisheries for sustainability through an ecosystem approach involves engaging stakeholders in fisheries management activities. Here, an aquaculturist and live reef fish trader in Anambas, Indonesia explains his operation to a visiting team of government officials and NGO staff.**

- C. *Protected habitats and their connectivity* Protect representative and critical habitats (and their connectivity) through MPA networks and other means.

Abundant fisheries, robust economic development, and human well-being all depend on the species and habitats that support the natural resources and environmental services upon which the Coral Triangle depends. This strategy draws directly from the principles established by Fernandes et al. (2012), and the activities listed for this strategy in the table below are in prioritized order according to the authors' recommendations. Activities include the designation and zoning of protected areas to safeguard fisheries and biodiversity, and they include recommendations for increasing the resilience of both protected areas and no-take reserves to climate change.

- D. *Threatened species, critical species and functional groups* Protect and restore species and functional groups that maintain ecosystem integrity.

Most threatened and endangered species have been proven to be critical components of their ecosystems. Their demise could forever alter food webs upon which we depend. Many threatened species such as turtles, marine mammals, and seabirds are also iconic species that draw tourists from across the world to witness them in the wild. Still other species are fundamental to food security in the Coral Triangle. This strategy for the protection of threatened and endangered species provides a framework of activities for protecting species identified by each Coral Triangle country as being top priorities for ecological, economic, and social resilience. Threatened groups of species addressed by these provisions typically include sharks, turtles, birds, mammals, reef fish, and selected invertebrates (Fernandes et al., 2012).

- E. *Community and economic development* Diversify and sustain coastal communities' livelihoods.

Economic growth and access to economic opportunity are important for all aspects of human well-being for individuals, families, and communities. However, to ensure balanced development that considers both humans and the environment upon which they depend for both natural resources and essential services, coastal leaders should encourage the growth of livelihoods that are both economically viable and minimally impactful to the natural environment. The activities listed for this strategy encourage cooperation between economic leaders and natural resource managers to identify diverse activities that are economically robust and, ideally, considered resilient to climate change impacts that are predicted for that area (USAID and URI-CRC, 2012).

- F. *Watershed management* Effectively manage watersheds and freshwater resources.

A growing body of evidence demonstrates that upland and watershed management have important and significant impacts on the health and productivity of the coastal zone including important resources such as fisheries and coral reefs. The activities for this strategy are intended to involve those responsible for planning, regulating, and/or managing upland activities such as forestry, water use, and agriculture, as well as impacts such as pollution, erosion, and sedimentation.

- G. *Hazard risk reduction* Reduce risk to communities from coastal hazards, including those associated with climate and ocean change.

Climate change will impact the built environment, natural resources, livelihoods, and safety of coastal populations through long-term environmental change punctuated by disaster events. The vulnerability of social and ecological systems is linked especially in communities highly dependent on natural resources. Hazard risk reduction involves assessing vulnerability and managing risk through climate adaptation and disaster management plans and programs. Planned adaptation helps communities anticipate changes in order to minimize impacts and increase social and ecological resilience. The activities for this strategy address the social component of vulnerability and are intended to be implemented together with the other strategies. Supporting references for this strategy include U.S. Indian Ocean Tsunami Warning System Program (2007), USAID (2009), and U.S. CTI Support Program (2013).

**Table I.** Integrated strategies and corresponding management activities for integrating management toward EBM in your management area. Detailed descriptions of each management activity, including indicators of progress, are provided in Appendix I.

INTEGRATED STRATEGIES	MANAGEMENT ACTIVITIES
<p>A. Governance of management areas: Manage coastal and marine areas based on ecological boundaries, resource use patterns, and governance jurisdictions.</p>	1. Participatory processes for decision-making (such as co-management) are used effectively to govern a management area.
	2. Governance of the management area includes coordination and cooperation between government agencies.
	3. Boundaries of the management area are identified and, if appropriate, legally established for management area governance.
	4. Spatial management is applied across the management area to achieve EBM outcomes.
	5. Compliance and enforcement systems support implementation of the EBM Framework and component plans.
	6. An EBM Framework integrates the implementation of all seven strategies and all component plans.
	7. Monitoring and evaluation support adaptive management and improve effectiveness of the EBM Framework.
<p>B. Fisheries managed for sustainability: Manage multiple fisheries and their associated ecosystems for sustainable use and human benefit under an ecosystem approach to fisheries management (EAFM).</p>	8. Ecosystem boundaries are established for EAFM.
	9. Information co-produced by fishers, managers, agencies, and external agents (scientists and non-governmental organizations) supports EAFM.
	10. Fisheries management measures ensure the conservation of target species as well as species and habitats belonging to the same ecosystem.
	11. Improved human well-being and equity are addressed through EAFM.
	12. Fishing overcapacity is reduced using integrated mechanisms.
	13. Critical fisheries habitats are protected and rehabilitated.
	14. The vulnerability of fish stocks and their associated ecosystems to threats including the impacts of climate and ocean change is assessed.
	15. An EAFM plan guides sustainable fisheries management.
<p>C. Protected habitats and their connectivity: Protect representative and critical habitats (and their connectivity) through MPA networks and other means.</p>	16. Multiple-use MPAs (large is better) and MPA networks are established to protect habitats and their connectivity.
	17. Activities that damage or destroy habitat are stopped throughout the management area.
	18. Marine reserves are designated to include at least 20 percent of each habitat type.
	19. Marine reserves are designated to include multiple examples of each habitat type.
	20. Key reproduction areas (for example, spawning, feeding, and nursery areas) are protected in marine reserves.
	21. Marine reserves are sized to balance ecological and human needs.
	22. MPAs and MPA networks incorporate marine reserves that are separated by a minimum of 1 km and a maximum of 20 km.
	23. Areas of each habitat type known or thought to be resistant to climate and ocean change impacts are protected.
	24. MPAs, including marine reserves, are in place for the long term, preferably permanently.
	25. The status and need for protection of threatened species, critical species, and functional groups are assessed.
<p>D. Threatened species, critical species, and functional groups: Protect and restore species and functional groups that maintain ecosystem integrity.</p>	26. Laws and regulations are in place to adequately protect threatened species, critical species, and functional groups.
	27. Fisheries laws are in place to reduce the bycatch of threatened species, critical species, and functional groups.

INTEGRATED STRATEGIES	MANAGEMENT ACTIVITIES
D. Threatened species (continued)	28. Laws that protect threatened species, critical species, and functional groups are enforced.
	29. Critical areas for threatened species, critical species, and functional groups are protected.
	30. The vulnerability of threatened species, critical species, and functional groups to climate and ocean change and other threats is assessed for all life-history stages.
E. Community and economic development: Diversify and sustain coastal communities' livelihoods.	31. Improved basic public services are provided to households and communities by social and community development.
	32. A sustainable livelihoods strategy is developed for households and coastal communities.
	33. Coastal economies and markets are linked to larger subnational and national economies and economic development activities.
	34. Environmentally friendly, enhanced, alternative, and supplemental livelihood opportunities are developed and available to households and coastal communities.
	35. The vulnerability of community and economic development to threats, including climate and ocean change, is assessed.
	36. Climate and ocean change adaptation measures are implemented to reduce vulnerability of community and economic development to threats including climate and ocean change.
F. Watershed management: Effectively manage watersheds and freshwater resources.	37. Freshwater systems are healthy.
	38. Estuarine and brackish systems are healthy.
	39. Erosion and sedimentation are managed.
	40. Land-based sources of pollution (air, water, soil, solid waste, and others) are managed.
	41. The vulnerability of estuaries and watersheds and freshwater resources to climate and ocean change and other threats is assessed.
	42. Adaptation and mitigation measures are implemented to reduce the vulnerability of watersheds and freshwater resources to emerging threats, including climate and ocean change.
	43. Management of watersheds and freshwater resources is undertaken cooperatively by relevant government agencies and participating stakeholders.
G. Hazard risk reduction: Reduce risk to communities from climate impacts and coastal hazards.	44. The vulnerability of the social, economic, and ecological systems to climate threats and coastal hazards is assessed.
	45. Development plans incorporate measures to reduce risk from climate impacts and coastal hazards.
	46. Land-use zones and building standards are developed to reduce risk from climate impacts and coastal hazards.
	47. Coastal habitats are protected and rehabilitated to buffer communities from climate impacts and coastal hazards.
	48. Early warning systems are established or strengthened, and communities know how to respond.
	49. Community-based disaster management plans and programs are in place and functional.
	50. Adaptation actions are implemented and monitored for effectiveness to reduce risks from climate impacts and coastal hazards.

Notes on activities: Vulnerability assessments can be conducted individually at an activity level or holistically across all strategies to assess the climate vulnerability of the entire community, natural resources, and infrastructure. Effective management indicates management for which effectiveness has been assessed using a standardized management effectiveness tool. Management effectiveness requires that several pieces function well, including capacity development for MPA managers and co-management bodies, high levels of compliance with MPA rules and regulations, and effective enforcement.

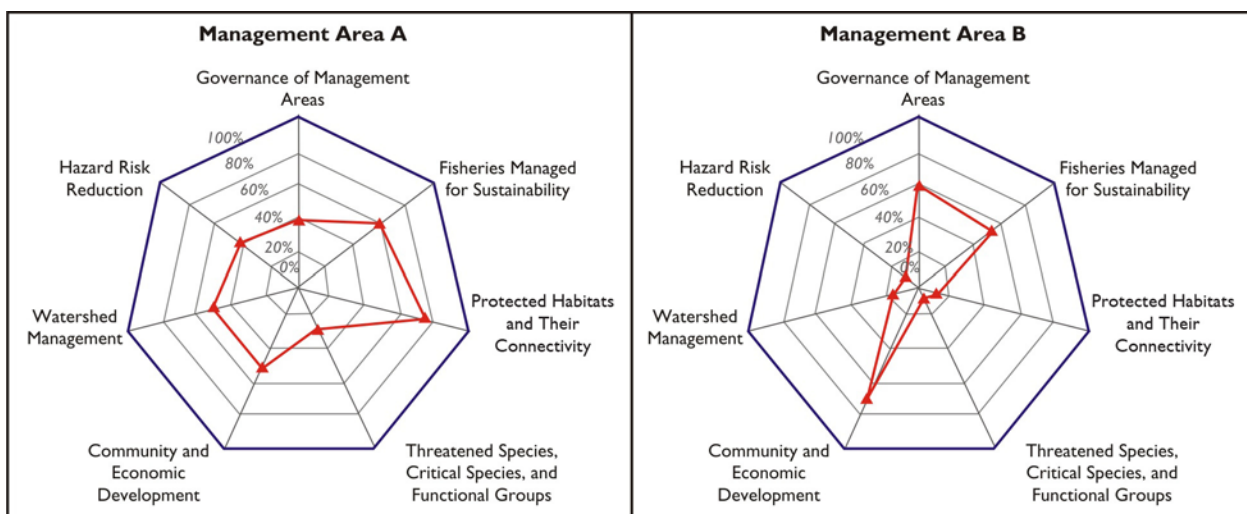
## THE EBM DIAGNOSTIC TOOL

If you are a coastal planner or natural resource manager in the Coral Triangle, it is likely that you and your colleagues are currently focused on at least one of the strategies listed in Table I. The goal for integrated management in a coastal area is to strengthen existing management and add new strategies and management activities to improve the management of natural resources upon which you and your community depend. In preparing for integration, it is helpful to complete a quick assessment of the strategies currently being implemented in your coastal area. This assessment will help to identify gaps in the existing management approach and opportunities to enhance the integration of key management strategies.

## HOW TO USE THE DIAGNOSTIC TOOL

Ideally, you should be able to identify activities being conducted in your coastal area that contribute to each of the seven strategies in Table I. In order to be considered successful at EBM, sites should be able to demonstrate substantial progress toward each of the strategies. The management of these activities also should be supported with enabling policies and cooperative agreements between agencies and stakeholder groups, as discussed in the section on intersectoral cooperation (Section 3).

A radar diagram is a useful assessment and communications tool that illustrates the percentage of management activities being implemented for each of the seven management strategies listed in Table I. This type of diagram can be used to compare progress across coastal areas or to compare sites within a coastal or managed area. This assessment can help to identify gaps, strategies, and management activities to achieve more comprehensive, integrated coastal management. You can communicate your progress on integration by developing a new radar diagram annually, illustrating progress in each of the seven key strategic areas.



**Figure 4.** Illustrative assessments of the percentage of management activities under each strategy (based on Table I) being planned or implemented in two hypothetical coastal areas (red line). As described in the text above, both areas are achieving integrated management within their target strategies; however, Management Area A is making more progress toward EBM by pursuing all seven strategies in an integrated way.



Figure 4, above, illustrates example radar diagrams for two hypothetical management areas. The level of achievement for each strategy and the number of strategies can be assessed along each spine of the diagram. Movement toward EBM can be measured according to the evenness of achievement across all the sectors. For example, Management Area A has achieved moderate progress in all seven strategies. Meanwhile, Management Area B has achieved considerable progress in only three of the strategies. Although both sites may be doing an effective job of integrating management in their target areas, Management Area A is making more progress toward EBM.

You can work individually or with a team to complete a diagnostic for your site. Follow the instructions and complete worksheets 1 and 2. When you have finished, use Figure 5 to interpret your results. Then discuss the questions in the activity and debrief with your team to plan any next steps based on your results and learning.



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**Mapping a management area with stakeholder input is an important step in finalizing boundaries and developing a spatial management plan. Here, practitioners review collaborative mapping in Port Moresby, PNG.**

## WORKSHEET I. Integrated Strategies and Management Activities for Moving Toward EBM in the Coral Triangle

Work individually or with your team to read through the following management activities associated with each of the seven strategies. Consider the status of each activity across your entire management area. For each activity, determine whether or not substantial progress has been made on that activity. "Substantial progress" indicates that either (1) there is a lead group or agency responsible, they have a budget and capacity to operate, and they have made clear and demonstrated progress toward the indicators of progress for achieving this activity (listed in Appendix 1); or (2) the activity is complete. In the fourth column, describe what has been accomplished to date and identify what other activities are needed to make substantial progress and/or complete the activity. Also, identify whether this activity fits within an existing management plan and who is responsible for carrying out this activity. If no progress has been made, identify any barriers that may be hindering progress. Then, in the fifth column, indicate whether this activity is a priority for your team. Actions that are high priority should be those that are both urgent and achievable, given resources and capacity in your area today or in the near future. Once you have gone through all the activities and made your notes, determine which completed or not-yet-completed ("gap") activities and/or strategies are a priority for your team, and indicate their priority in the fifth column.

Management area: \_\_\_\_\_

Contributors to this activity: \_\_\_\_\_

Date: \_\_\_\_\_

Integrated Strategies	Management Activities	Substantial progress? (Y/N)*	What's been done and what's left to do? Who is responsible? Is the activity part of an existing management plan?	Is this activity high priority? (Y/N)
A. Governance of management areas: Manage coastal and marine areas based on ecological boundaries, resource use patterns, and governance jurisdictions.				
	1. Participatory processes for decision-making (such as co-management) are used effectively to govern a management area.			
	2. Governance of the management area includes coordination and cooperation between government agencies.			
	3. Boundaries of the management area are identified and, if appropriate, legally established for management area governance.			
	4. Spatial management is applied across the management area to achieve EBM outcomes.			
	5. Compliance and enforcement systems support implementation of the EBM Framework and component plans.			
	6. An EBM Framework integrates the implementation of all seven strategies and all component plans.			
	7. Monitoring and evaluation support adaptive management and improve effectiveness of the EBM Framework.			

\*Your team may want to assess progress toward this activity on a finer scale—for example, "not started, initiated, well underway, near completion, completed." However, pilot tests of this tool demonstrated that the diagnostic illustration in Worksheet 2 did not do as well to emphasize relative strengths and weaknesses among strategies and between sites. Therefore, we recommend using "Y/N" for this preliminary assessment.

Integrated Strategies	Management Activities	Substantial progress? (Y/N)*	What's been done and what's left to do? Who is responsible? Is the activity part of an existing management plan?	Is this activity high priority? (Y/N)
B. Fisheries managed for sustainability: Manage multiple fisheries and their associated ecosystems for sustainable use and human benefit under an ecosystem approach to fisheries management (EAFM).				
	8. Ecosystem boundaries are established for EAFM.			
	9. Information co-produced by fishers, managers, agencies, and external agents (scientists and non-governmental organizations) supports EAFM.			
	10. Fisheries management measures ensure the conservation of target species as well as species and habitats belonging to the same ecosystem.			
	11. Improved human well-being and equity are addressed through EAFM.			
	12. Fishing overcapacity is reduced using integrated mechanisms.			
	13. Critical fisheries habitats are protected and rehabilitated.			
	14. The vulnerability of fish stocks and their associated ecosystems to threats including the impacts of climate and ocean change is assessed.			
	15. An EAFM plan guides sustainable fisheries management.			
C. Protected habitats and their connectivity: Protect representative and critical habitats (and their connectivity) through MPA networks and other means.				
	16. Multiple-use MPAs (large is better) and MPA networks are established to protect habitats and their connectivity.			
	17. Activities that damage or destroy habitat are stopped throughout the management area.			
	18. Marine reserves are designated to include at least 20 percent of each habitat type.			
	19. Marine reserves are designated to include multiple examples of each habitat type.			
	20. Key reproduction areas (for example, spawning, feeding, and nursery areas) are protected in marine reserves.			
	21. Marine reserves are sized to balance ecological and human needs.			
	22. MPAs and MPA networks incorporate marine reserves that are separated by a minimum of 1 km and a maximum of 20 km.			
	23. Areas of each habitat type known or thought to be resistant to climate and ocean change impacts are protected.			
	24. MPAs, including marine reserves, are in place for the long term, preferably permanently.			

Integrated Strategies	Management Activities	Substantial progress? (Y/N)*	What's been done and what's left to do? Who is responsible? Is the activity part of an existing management plan?	Is this activity high priority? (Y/N)
D. Threatened species, critical species, and functional groups: Protect and restore species and functional groups that maintain ecosystem integrity.				
	25. The status and needs for protection of threatened species, critical species, and functional groups are assessed.			
	26. Laws and regulations are in place to adequately protect threatened species, critical species, and functional groups.			
	27. Fisheries laws are in place to reduce the bycatch of threatened species, critical species, and functional groups.			
	28. Laws that protect threatened species, critical species, and functional groups are enforced.			
	29. Critical areas for threatened species, critical species, and functional groups are protected.			
	30. The vulnerability of threatened species, critical species, and functional groups to climate and ocean change and other threats is assessed for all life-history stages.			
E. Community and economic development: Diversify and sustain coastal communities' livelihoods.				
	31. Improved basic public services are provided to households and communities by social and community development.			
	32. A sustainable livelihoods strategy is developed for households and coastal communities.			
	33. Coastal economies and markets are linked to larger subnational and national economies and economic development activities.			
	34. Environmentally friendly, enhanced, alternative, and supplemental livelihood opportunities are developed and available to households and coastal communities.			
	35. The vulnerability of community and economic development to threats, including climate and ocean change, is assessed.			
	36. Climate and ocean change adaptation measures are implemented to reduce vulnerability of community and economic development to threats including climate and ocean change.			

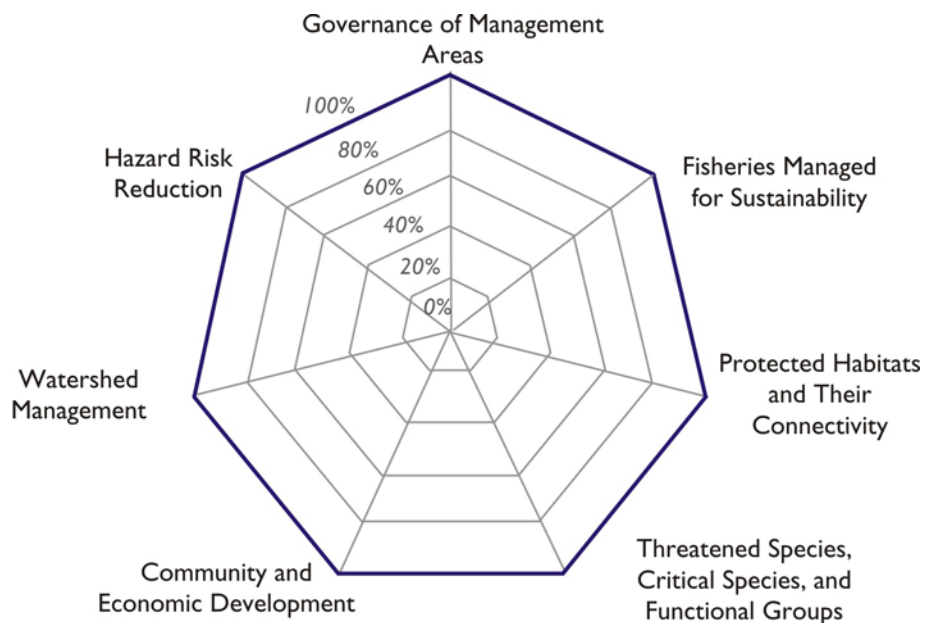
Integrated Strategies	Management Activities	Substantial progress? (Y/N)*	What's been done and what's left to do? Who is responsible? Is the activity part of an existing management plan?	Is this activity high priority? (Y/N)
F. Watershed management: Effectively manage watersheds and freshwater resources.				
	37. Freshwater systems are healthy.			
	38. Estuarine and brackish systems are healthy.			
	39. Erosion and sedimentation are managed.			
	40. Land-based sources of pollution (air, water, soil, solid waste, and others) are managed.			
	41. The vulnerability of estuaries and watersheds and freshwater resources to climate and ocean change and other threats is assessed.			
	42. Adaptation and mitigation measures are implemented to reduce the vulnerability of watersheds and freshwater resources to emerging threats, including climate and ocean change.			
	43. Management of watersheds and freshwater resources is undertaken cooperatively by relevant government agencies and participating stakeholders.			
G. Hazard risk reduction: Reduce risk to communities from climate impacts and coastal hazards.				
	44. The vulnerability of the social, economic, and ecological systems to climate threats and coastal hazards is assessed.			
	45. Development plans incorporate measures to reduce risk from climate impacts and coastal hazards			
	46. Land-use zones and building standards are developed to reduce risk from climate impacts and coastal hazards.			
	47. Coastal habitats are protected and rehabilitated to buffer communities from climate impacts and coastal hazards.			
	48. Early warning systems are established or strengthened, and communities know how to respond.			
	49. Community-based disaster management plans and programs are in place and functional.			
	50. Adaptation actions are implemented and monitored for effectiveness to reduce risks from climate impacts and coastal hazards.			

## WORKSHEET 2. Assessing Progress Toward Integrated Strategies

In this second table, enter the number of activities substantially completed for each strategy. Use the formula in the third column to calculate the percentage of activities completed or substantially underway.

Strategies	Number of activities demonstrating substantial progress	Percentage underway
A. Governance of management area	n=	$n \div 7 \times 100 = \underline{\quad\quad}\%$
B. Fisheries managed for sustainability	n=	$n \div 8 \times 100 = \underline{\quad\quad}\%$
C. Protected habitats and their connectivity	n=	$n \div 9 \times 100 = \underline{\quad\quad}\%$
D. Threatened species, critical species, and functional groups	n=	$n \div 6 \times 100 = \underline{\quad\quad}\%$
E. Community and economic development	n=	$n \div 6 \times 100 = \underline{\quad\quad}\%$
F. Watershed management	n=	$n \div 7 \times 100 = \underline{\quad\quad}\%$
G. Hazard risk reduction	n=	$n \div 7 \times 100 = \underline{\quad\quad}\%$

Following the examples provided in Figure 4, plot the percentages from the third column of the second table of Worksheet 1 on the radar diagram below to communicate your progress toward integrated and comprehensive coastal management in your coastal area. The results of this assessment will help you to identify gaps in your current management approach and opportunities and expertise needed to address these gaps.



### *Diagnostic Tool Debrief*

Discuss the following questions with your team. Be sure to record your group's answers to these questions, as they will provide a good basis for developing your EBM Work Plan (described in Section 4).

1. Is your management area successfully achieving EBM? Why or why not?
2. What activities and strategies have been substantially completed? Are these activities implemented through management plans? If so, who develops and implements these plans? What has contributed to these successes?
3. What high-priority strategies and activities are being implemented but are not yet substantially completed? Are these activities implemented through management plans? If so, who develops and implements these plans? What barriers or challenges have you observed?
4. What additional high-priority activities or tasks need to be initiated under each strategy? Who might be responsible to plan and implement these activities? Is there an existing management plan they could contribute to? How do you think you could incorporate these new activities or tasks into existing management plans and planning processes?
5. Are there high-priority strategies and activities that are not yet initiated that would require the participation of agencies or community groups not yet actively participating in managing your area? If so, how could you work to get them involved and committed to integrated management or EBM?
6. Are there high-priority strategies and activities that are not yet initiated that will require you to explore using new tools? (Review Appendix 3 to identify some tools that have been developed for use in the Coral Triangle.)



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**Enforcement outpost at Tubbataha Reef in the Philippines. Enforcement and compliance are essential activities to support effective governance of management areas.**



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Participants at a training in the Philippines illustrate pathways for incorporating new activities into existing resource management plans.

## INCORPORATING NEW ACTIVITIES INTO EXISTING MANAGEMENT PLANS

The results of the Diagnostic Tool should support your team’s identification and prioritization of the seven integrated strategies and contributing activities, an assessment of the work toward them at your management area, identification of existing management plans that relate to these strategies, and identification of any gaps (high-priority activities or integrated strategies that you hope to initiate) can become the core of EBM.

The results of your EBM diagnostic should also inform the selection of government agencies and stakeholders to be included in the collaborative governance arrangements, which are addressed in Section 3. Then, once you have your collaborative governance arrangements in place, we recommend that you use the Diagnostic Tool again to help engage all the participating groups and individuals. Completing the Diagnostic Tool will assist them to understand their relationship to, and the groups’ progress toward, your overall objectives and goals for management integration and EBM. Of course, completing the Diagnostic Tool a second time with new strategic partners and key stakeholders for EBM may also result in a different assessment and a different prioritization of current and new activities. In almost all circumstances, this new assessment with the full stakeholder group should override the initial assessment conducted by the core team.

Ideally, high priority activities to pursue EBM will be adopted by strategic partners and incorporated into existing management plans. Those management plans will therefore need to be modified to accommodate the new activities. More information on this type of “mainstreaming” new activities is provided in Section 3. Where new, high-priority activities are not clearly aligned with any of the existing management plans, the core team and strategic partners may choose to undertake these jointly through your EBM Work Plan (described in Section 4). However, implementation through an EBM Work Plan should be seen as a short-term solution until these activities are able to be incorporated into other management plans.

The strategies and activities listed in Table 1 will guide implementation and adaptive management of EBM (Section 4). The EBM Diagnostic Tool in Worksheets 1 and 2, along with the indicators of progress for each activity listed in Appendix I, can be used to develop the EBM Work Plan. These indicators can also be used as a basis for the development of a monitoring and evaluation plan to track progress toward EBM and adaptively manage as needed.

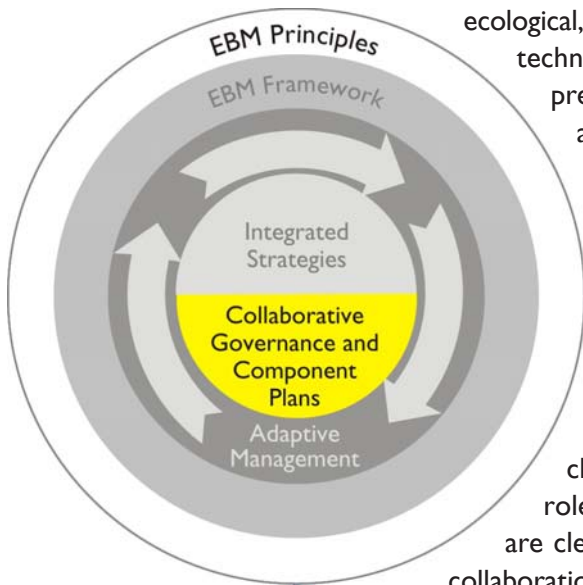




MPA PATROLLERS ON GUARD IN BALIBAGO, PHILIPPINES © USAID/WWF/TORY READ

# Section 3. Collaborative Governance Arrangements for EBM

Integrated management following EBM principles requires “collaborative governance” – working in cooperation with multiple government agencies, community leaders, NGOs, and economic interests. Such collaboration engages all sectors (public, private, and civic) to work together to achieve solutions to public problems that go beyond what any one sector could achieve on its own. Collaboration offers opportunities to balance ecological, social, and economic objectives; solve complex problems; leverage technical and financial resources; and catalyze change. This section presents a pathway for your core team to bring together stakeholders and coordinate management.



Ideally, collaboration is a mutually beneficial and well-defined relationship that builds consensus while retaining the separate identities of the organizations involved. This collaboration can be difficult for some institutions. It includes a commitment to joint decision-making. It requires flexibility, as change to one institution can intentionally or unintentionally produce change in a partner institution. Collaborative governance is successful when clear objectives are established and the institutional arrangements, roles and responsibilities, and processes to achieve these objectives are clearly defined and agreed upon. When this happens, the costs of collaboration are reduced and the benefits increase.

To collaborate successfully, EBM should be pursued within a larger framework of enabling policy, voluntary cooperation and alignment, and, in the best cases, joint planning and budgeting. Activities and expectations need to be consistent with the scale of the management area and the entities involved. For example, there is often a disconnect between national planning and policy goals and management area goals and activities taken on by local governments and communities. To deal with this, actions of the management institutions at each level of government need to be harmonized with one another. They should also be consistent with agreed-upon EBM goals and policies.

Key steps in fostering effective collaboration among key stakeholders and partners are as follows:

1. Use results from the EBM Diagnostic Tool to identify key strategic partners who work on priority ongoing activities or would be able to fill priority activity gaps. Identify additional stakeholders who are invested in your vision for EBM, as well as those who have needed knowledge and expertise. Understand how these groups relate to one another formally and informally and how best to engage them in the process.
2. Identify any management plans that are used by strategic partners and should be incorporated into the collaborative governance arrangement. This could include plans for MPA management, land use, water use, agricultural development in the coastal zone, climate change adaptation, fisheries management, and any other relevant plans.
3. Work with stakeholders to develop a shared vision, goals, and objectives for the collaboration with the group of strategic partners. This process should use advanced participatory methods and should identify the barriers to effective collaboration, solutions to those barriers, roles and responsibilities of partners, and measures of success.
4. Identify or develop appropriate models for collaborative governance, including interagency cooperation and participatory co-management, which are formalized through arrangements such as memorandums of agreement, memorandums of understanding, or covenants that articulate outcomes of step 2, above.
5. Monitor, evaluate, and refine collaborative governance arrangements and the implementation of existing plans as they contribute to EBM and your EBM Framework. This activity can be part of an overall adaptive management process for the EBM Framework and Work Plan. The adaptive EBM process is described in Section 4.

## IDENTIFYING STRATEGIC PARTNERS AND KEY STAKEHOLDERS

The EBM Diagnostic Tool exercise is essential to the strategic identification of the partners and stakeholders who are instrumental in building broader collaboration in pursuit of EBM. Strategic partners should include the government agencies that will work together and the additional non-government stakeholders who will be involved in management decision-making. Key stakeholders should include non-government groups that will also be involved in a co-management arrangement. Many of these agencies and stakeholder groups may have management plans and planning processes that you will want to be aware of. Plans that are relevant to the seven integrated strategies (presented in Section 1) could be included as component plans of the collaborative governance arrangement. In this way, actions and decisions taken by the group can be incorporated into each collaborating agency or stakeholder group's plans and planning processes.

Table 2 is provided as an example to assist you in strategically identifying the partners you would like to invite into your core team, which will then help to identify or create collaborative governance arrangements. Consider including the following representatives:

- protected area managers with jurisdiction in your area;
- freshwater and marine fisheries managers with jurisdiction in your area;
- natural resource managers from the relevant watershed(s), including forestry, grassland, water resources, and protected area managers;
- local mayor(s) and town council representatives;
- community leaders including women's groups and religious groups;
- youth leaders;
- local, national, and international nonprofits doing humanitarian or environmental work in your area;

- local, national, and international business interests that are invested in your community (consider, for example, aquaculture, tourism, fishers and fish buyers, extractive industries, and environmentally sustainable businesses);
- university researchers with expertise and/or research interests in this topic;
- national, provincial, and local land-use planners with jurisdiction in your area; and
- other members as you see fit.

Table 2, or a similar document, is to be completed by your core team. Review the results of your EBM Diagnostic Tool (Worksheets 1 and 2), as well as any decisions made during your debrief, to identify strategic partners and other key stakeholders to engage in EBM. In the first column, place a checkmark in the boxes next to the strategies you hope to strengthen. Then, in the second column, write the name and affiliation of the individuals that will represent your strategic partners (those directly involved in management related to this strategy) and key stakeholders (additional groups or individuals with an interest in this strategy or its outcomes). You may wish to identify representatives within these groups who are well-positioned to help you strengthen this strategy. Finally, in the third column, indicate any management plans that are implemented by these groups that should become part of EBM. If possible,

**Table 2.** Example structure for identifying strategic partners, key stakeholders, and existing management plans that are important for each of the seven integrated strategies in your management area.

✓	Integrated Strategies	Strategic Partners and Key Stakeholders	Existing Management Plans
<input type="checkbox"/>	A. Governance of management areas		
<input type="checkbox"/>	B. Fisheries managed for sustainability		
<input type="checkbox"/>	C. Protected habitats and their connectivity		
<input type="checkbox"/>	D. Threatened species, critical species, and functional groups		
<input type="checkbox"/>	E. Community and economic development		
<input type="checkbox"/>	F. Watershed management		
<input type="checkbox"/>	G. Hazard risk reduction		
		<i>Additional Partners or Stakeholders for EBM</i>	<i>Additional Management Plans</i>

note any plans that could be modified or expanded to incorporate new activities within that strategic area. In the last row, note any additional strategic partners, key stakeholders, and management plans that should be included in EBM that weren't listed for any specific strategy.

Once your core team has completed your list of potential partners and stakeholders, reach out to the relevant people and agencies. In your communications with them, you will probably want to provide some preliminary information that includes (1) the nature and purpose of the activity; (2) any jurisdictional and legal mandates that apply to this process, under which you will be working; and (3) a rough timeline and scope of activities to which you are asking each team member to commit. These partners and stakeholders can help you learn more about their plans and planning processes.

Once this larger group of strategic partners and stakeholders has been assembled, we recommend that you lead them through the EBM Diagnostic Tool activity (Section 2) and a visioning exercise (next section) to help establish the group's common identity and purpose.

## COLLABORATIVE GOVERNANCE MODELS

For effective implementation of EBM, collaborative governance arrangements should bring together government agencies at different levels in addition to stakeholders from different sectors. We present two models of collaborative governance arrangements below: interagency cooperation and participatory co-management (Box 1). In some countries or provinces, these governance models will require separate arrangements. In other countries or provinces, both types of collaborative models can be captured within a single arrangement.

### BOX 1. COLLABORATIVE GOVERNANCE ARRANGEMENTS

In this guide, we describe two types of collaborative governance arrangements: interagency cooperation and participatory co-management. Depending on the laws, policies, and norms of the country and province, these can be established as two separate systems or a single body for cooperative natural resources management.

**Interagency cooperation** This type of collaborative governance arrangement will oversee activities operating in the same geographical area and will coordinate among sectors that interact with each other. The arrangement will assist in highlighting interrelationships that contribute positively and negatively to governance, and it will increase accountability across stakeholder groups. This can include the cooperative management of each agency's plans – for example, fisheries, MPAs, coastal forestry, and water resources management plans.

**Participatory co-management** Co-management is an approach to implementing EBM with stakeholder involvement. The co-management approach can be applied at any scale, from that of a single component (for example, a community fishery), to multistakeholder, multiresource, multiuse situations such as those that arise within the context of integrated management. Implementation of EBM thus can utilize a co-management approach, albeit with potentially greater challenges than might be faced in a simpler one-sector context. These challenges may arise through the need to develop suitable policy for cooperative management within an enlarged forum (for example, between sectors rather than only within a single sector), as well as suitable institutions within which this can occur.

There are a number of different models and frameworks, from informal to very formal, which can be used to support collaborations. These include working groups, advisory councils, and management councils. These groups can be defined through work plans, memorandums of agreement, or more formal charters. A basic requirement of any model is defining roles and responsibilities of the team members. Although EBM implementation is based on the plan and agreements, the quality and effectiveness of implementation are shaped by a number of governance issues or the "ability to achieve," which can be identified and ensured through an EBM agreement.

## ESTABLISHING THE APPROPRIATE COLLABORATIVE GOVERNANCE MODELS

**Interagency cooperation** To encourage interagency cooperation, the core team must start with a list of government agencies at different levels that will need to work together. You will also need to understand the law or policy (such as in Integrated Coastal Management law) you will use to develop this collaborative interagency arrangement. Where a law or policy does not exist, the arrangement can take the form of an interinstitutional memorandum of understanding that describes who will be involved and how the agencies will work together. When developing a list of government agencies and policies/laws to include in an interagency arrangement, consider these questions:

- Which government agencies at local, provincial, and national scales have authority over implementation of the seven strategies for EBM within the boundaries of your management area?
- Which plans do each of these government agencies use to manage within their sector and across sectors? For each plan, include details such as the title of the plan; the geographic and temporal scope; and the types of activities that are managed through this plan.
- What are the ways in which these agencies already work together to cooperatively implement the seven strategies for EBM?
- Which policies or laws facilitate or mandate interinstitutional collaboration among different agencies or ministries for efforts relating to the seven strategies for EBM?
- Which policies or laws facilitate or mandate cooperative governance across levels (for example, from local to provincial to national) relating to the seven strategies for EBM?
- Which laws or policies are missing or need to be modified to cooperatively implement the seven strategies for EBM?

**Participatory co-management** The motivation for co-management initiatives includes their potential (1) to reduce conflict between stakeholders and government, as well as between stakeholders themselves, by clearly defining rights and responsibilities, by providing an institutional forum for discussion among decision-makers, and by encouraging support for the management process; and (2) to build a conservation ethic, by bringing resource users and others into the decision-making process so that they share responsibility for sustaining resources.

Participatory co-management can be initiated by developing a list of stakeholders and government agencies that will be involved in a co-management arrangement and an indication of the law or policy (such as a co-management law) that will be used to develop this co-management arrangement. Where a law or policy does not exist, this can take the form of an interorganizational written agreement or policy that describes who will be involved and how the stakeholder groups will work together. To create the arrangement, consider the following steps:

- List the economic, cultural, social, and other non-governmental stakeholders who should be or want to be involved in the implementation of the seven strategies for EBM in your management area.
- List the plans that any of these stakeholders use to manage within their sectors and across sectors. For each plan, include details such as the title of the plan; the geographic and temporal scope; and the types of activities that are managed through this plan.
- Describe the ways in which these stakeholders already work with each other and with government agencies to cooperatively implement the seven strategies for EBM.

- List any policies or laws that facilitate or mandate the involvement of non-governmental stakeholders in decision-making for efforts relating to the seven strategies for EBM.
- List any laws or policies that are missing or that need to be modified to better involve stakeholders in the implementation of the seven strategies for EBM.

## DEVELOPING A SHARED VISION FOR COLLABORATIVE GOVERNANCE

A vision statement is a short statement that defines the future desired outcome of collaborative governance. It helps point the way to where your group of strategic partners should be headed. A mission statement defines why the collaborative arrangement exists. It defines the purpose of the collaboration. Once you have identified and met with the core team, it is valuable to develop a shared vision and mission. It is helpful to have a facilitator who will assist your team to move through these questions and analyze and prioritize your collective responses.

Questions to help the team develop a shared vision for the collaborative arrangement(s) may include the following:

- What laws and policies will you use to bring government agencies and stakeholders to the table?
- What plans will be included in this arrangement?
- What kind of arrangement will you develop?
- Who will lead the development of the arrangement? Where will their authority come from? Will they have a budget to do their work?
- Who will lead the implementation of the arrangement? Where will their authority come from? Will they have a budget to do their work?
- How will the collaborators work together to inform and integrate the management of each individual plan?

Questions to help the team communicate a shared vision for the collaborative arrangement(s) include the following:

- How will the establishment of the arrangement(s) help your team arrive at its vision for integrated management and EBM?
- What will be the short- and long-term benefits of the collaborative arrangement(s) to communities and natural resources?
- What will be the value of this arrangement to the collective members?
- How will collaborative and integrated activities improve the implementation of each of the individual plans?

## ADAPTING EXISTING PLANS TO ACHIEVE EBM

Once a framework, vision, and priority strategies and activities are identified and agreed upon, the strategic partners will probably need to revise or update their existing management plans to reflect the EBM Framework and coordination with other agencies and the existing management plans that will be included as component plans of the EBM Framework. This process, sometimes called “mainstreaming,” may require formal modification of current management plans, including a public review process and/or approval from a management authority or government agency. Management area objectives should be edited or rewritten to integrate and reflect at least two and ideally all five goals of the RPOA. Working within an EBM Framework to achieve integrated coastal management should be cited as a core focus of your site management efforts, and discussion should be included in your management

plan on how your team intends to move toward integrated and comprehensive coastal management and its outcomes over the long term.

There are several critical components that should be reflected within updated management plans. Some of these components may serve as sections or chapters within your area's management plans. These components include the following:

- **Conceptualization:**
  - Identification of threats and causes of the threats.
  - Identification of strategies or solutions used to address the threats and their underlying causes. A spatial and regulatory plan will provide one set of solutions. You may need additional solutions including outreach and education, building political will, effective compliance and enforcement, and biological and socioeconomic monitoring.
  - Articulation of management outcomes you want to achieve. These can be crafted into management objectives if this fits with your site-planning approach.
- **Plan actions and monitoring:**
  - Based on Diagnostic Tool results, identification of all priority management activities that are necessary to achieve the outcomes (or objectives). Identify both ongoing activities that contribute to EBM, as well as high-priority activities that have not yet been initiated. Include roles, responsibilities, and a timeline for pursuing the activities.
  - Development of a plan for monitoring the implementation of all activities.
- **Plan operations and budget:**
  - Development of a financial budget for the managed area, along with sources of financing and revenue.
  - Identification of the necessary human and financial resources, roles, and responsibilities of participating stakeholders and partner organizations in addition to staffing and equipment/supply needs.



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**Gleaning is an important fishing activity for costal communities in Timor-Leste.**

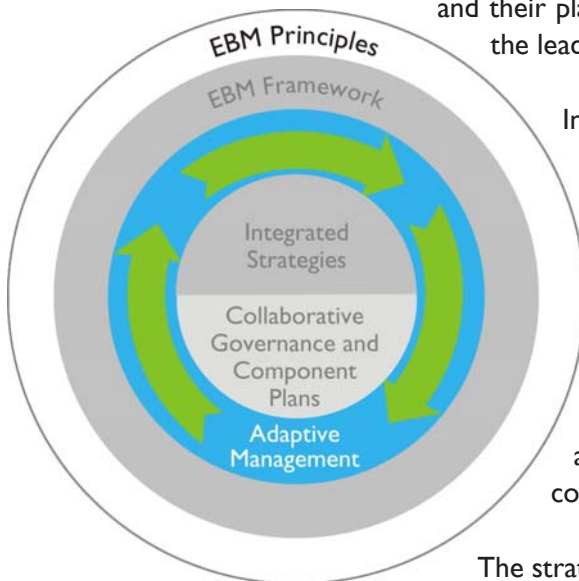


TURTLE HATCHLINGS FOUND ON THE SHORES OF INDONESIA © USAID CTSP/CONSERVATION INTERNATIONAL/KATHLEEN FLOWER

## Section 4. Work Planning, Implementation, and Adaptive EBM

### DEVELOPING AN EBM WORK PLAN

At its essence, coastal and marine resource management is about managing people and the ways they use and interact with coastal and marine resources and their supporting ecosystems. To integrate management activities and move closer to EBM, different sectors and their plans must be well coordinated. This can be achieved through the leadership of the core team.



In most management areas, existing management plans will not be sufficient to achieve all seven integrated strategies for EBM. In this case, the core team may wish develop an EBM Work Plan that guides the implementation of new strategies and activities, with the intention of having them eventually be adopted by existing or new government or non-government management groups. An EBM Work Plan should be developed only *after* collaborative governance measures and component plans are identified, a shared vision is established, and integrated strategies and activities are agreed upon by the co-managing bodies.

The strategies and activities contained within the work plan should be high-priority for the core team, partners, and stakeholders. This should be determined using the outputs of the Diagnostic Tool. For each high-priority activity that has not yet been substantially completed, the core team should identify the remaining tasks required to complete or make substantial progress toward it. For each activity and task listed, the work plan should also indicate the responsible individual(s) and group(s), the amount of time and resources (money, tools, and technical support) required, any management plans that currently govern the activity, and how that plan may need to be modified to support EBM principles and outcomes.



An EBM Work Plan should be time-bound in scope. Eventually, any activities undertaken by the core team under an EBM Work Plan should be maintained by EBM strategic partners and key stakeholders into their coordinated and integrated management plans.

An EBM Work Plan contains the components listed in Box 2, many of which are described in further detail in Sections 2 through 4 of this guide. It should be noted that this guide does not provide information for some of the more standard work plan components, such as the development of a budget and timeline for implementation, as there are already many good references available on these topics.

## BOX 2. SUGGESTED COMPONENTS OF AN EBM WORK PLAN

These components are recommended for inclusion in your EBM Work Plan. Additional components may be needed based on legal requirements, work-planning norms, or other needs in your management area.

- A description of the management area, including boundaries and important social and natural features.
- A strategy for communicating with stakeholders about the guiding principles of EBM, your vision and desired outcomes, and the integrated strategies and activities that you will pursue.
- Establishment of legal authority for collaborative governance and EBM Work Plan implementation.
- A description of the collaborative governance arrangements that exist or are planned for the management area and how they will function to support the work toward high priority activities and strategies.
- Identification of activities to be undertaken, based on your results from the EBM Diagnostic Tool exercise. At this point, any high priority activities that are not yet showing substantial progress should be described in detail, including
  - any tasks that have been completed to date;
  - required tasks that are still to be completed;
  - identification of any known barriers to progressing on this activity;
  - responsible groups and individuals;
  - existing work plans that govern the implementation of this activity, as well as any desired modifications to the existing work plan; and
  - tools and resources that will be used to complete these activities, and any technical assistance that may be required to use or access them.
- Monitoring plan to measure progress toward EBM principles, desired outcomes, strategies, and activities.
- Establishment of an evaluation and adaptive management process, including provisions for learning by doing.
- Timeline for work plan implementation that is based on the list of tasks identified for each activity and a realistic timeline for completing them.
- Budget for work plan implementation, monitoring, evaluation, and adaptive management.
- Identification of adequate and dedicated resources (personnel, funding, equipment) for management; staff skills and commitments to this project.

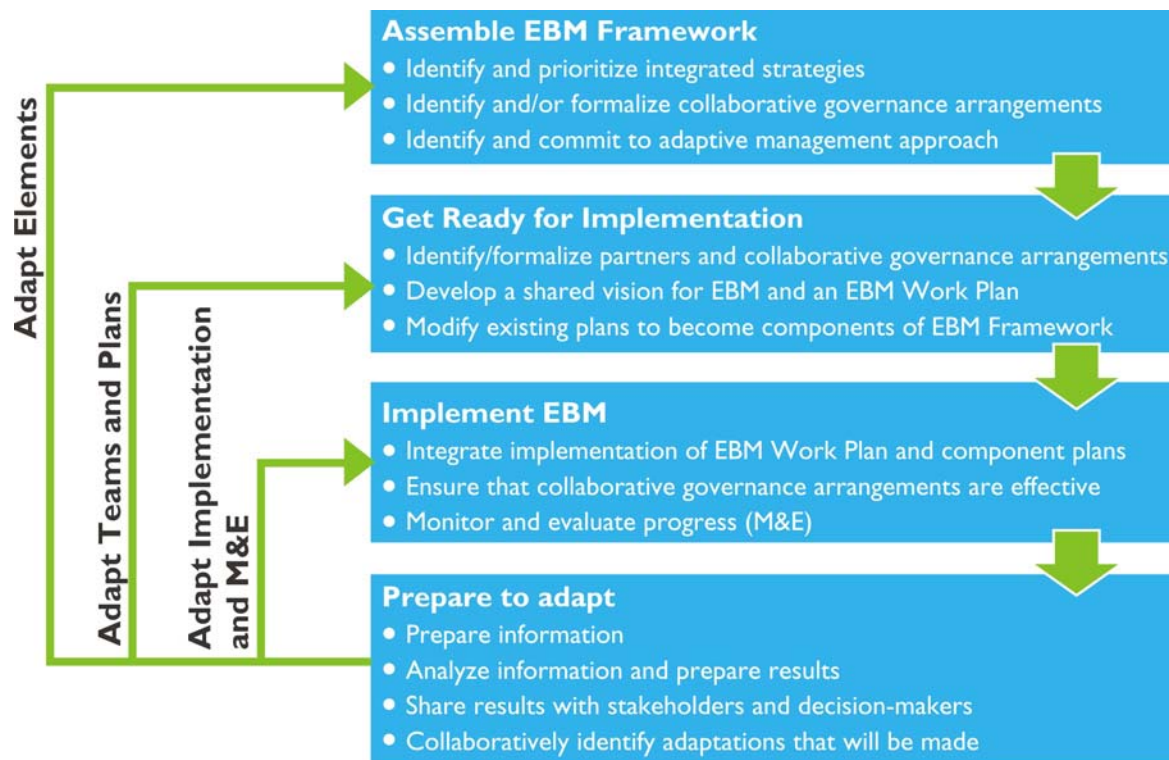
There are several excellent guides about EBM for marine and coastal environments that already exist. These can help you develop your EBM Work Plan. Some of these are listed in Box 3.

### BOX 3. ADDITIONAL TOOLS AND REFERENCES FOR EBM

- Bermas-Atrigenio, N.A., & Chua, T.-E. (2012). Utilizing science in advancing marine ecosystem-based management. *Ocean & Coastal Management*.
- Clarke, P., & Jupiter, S. (2010). Principles and practice of ecosystem-based management: A guide for practitioners in the Western Tropical Pacific.
- Ehler, C., & Douvère, F. (2009). Marine spatial planning: A step-by-step approach toward ecosystem-based management.
- McLeod, K., Lubchenco, J., Palumbi, S., & Rosenberg, A. (2005). Scientific consensus statement on marine ecosystem-based management.
- Pollnac, R., & Christie, P. (2009). Scaling up to ecosystem-based management: Case studies and comparative analysis.
- United Nations Environment Programme (2011). Taking steps toward marine and coastal ecosystem-based management: An introductory guide.
- US CTI Support Program (2013). Coral reefs, fisheries, and food security: Integrated approaches to address multiple challenges in the Coral Triangle.

### ADAPTIVE EBM

Implementation of EBM, including an EBM Work Plan and its components (strategies and activities, collaborative governance arrangements, and component plans), should occur within an adaptive management cycle (Figure 5).



**Figure 5.** The recommended steps for adaptive ecosystem-based management in your coastal area. The core team should provide the leadership for this process.

## **Assemble the EBM Framework and Its Three Key Elements**

At this point, strategic partners, stakeholders, and other important collaborators should be brought in through formal collaborative governance arrangements. These arrangements include both interagency collaborations and stakeholder co-management. This broader group should be brought in to repeat many of the activities, facilitated by the core team: coming to a common understanding of EBM principles; developing a shared vision for EBM; identifying priority strategies and activities that should be achieved to move toward EBM; understanding and starting to work within collaborative governance; and modifying or validating, and agreeing to contribute to, and adaptive management approach. This step is undertaken by the core team, in preparation for bringing in additional partners and stakeholders. To complete the initial draft EBM Framework, the core team will need to develop a shared vision for EBM; an identification of high-priority integrated strategies and activities that are missing from current activities in the management area; identify the existing and/or appropriate new collaborative governance arrangements for the management area; and identify an effective adaptive management approach. Of course, once strategic partners and stakeholders are brought in, the EBM Framework will need to be modified to accommodate any changes required to meet the vision and requirements of the broader group. Information on the EBM Framework is provided in Section 1. The EBM Diagnostic Tool in Section 2 can be used to assess progress toward EBM and prioritize ongoing and new work to achieve the seven integrated strategies. Information on identifying or establishing collaborative governance arrangements, creating a shared vision for EBM, and integrating the implementation of existing management plans can all be found in Section 3.

## **Get Ready for Implementation**

This step also includes making necessary modifications to existing management plans. Modifying the component plans is important to allow integrated management and to ensure that each plan adheres to the EBM Framework. Information on modifying existing work plans can be found in Section 3.

An EBM Work Plan will likely be necessary to catalyze additional new work toward any of the seven management strategies. The core team should lead the development and implementation of an EBM Work Plan, as described at the beginning of this section.

## **Implement EBM**

This step involves the integrated implementation of component plans and EBM Work Plan, plus the monitoring and evaluation of all progress. This is, of course, the most important step of the process – where all the visions, plans, objectives, and activities are actualized to manage resources and achieve EBM outcomes. Importantly for EBM, this is where assumptions and ideas are tested. Keeping the outcomes for EBM at the forefront of decision-making, monitor and evaluate progress at regular intervals, making small and large course corrections. This includes any “learning by doing” that is part of the day-to-day management of the plans.

It is essential that your team capture a record of decisions and programmatic changes, as these are the elements that constitute learning. This learning, together with the data from your monitoring, will inform any more formal adaptive management cycles, detailed below.

Monitoring plans can involve the regular collection and analysis of several types of information. There are several good guides on developing monitoring and evaluation plans for natural and social resources management, and we recommend that you turn to one of these for specifics (see Appendix 3 for suggestions). Monitoring plans should include the establishment of methods and systems to record, store, and process data. Monitoring plans can include, for example, measurements and indicators of progress against EBM goals and outcomes, the seven strategies' activities and indicators of progress, and milestones established in each of the component plans; financial analyses and budgetary reviews; operational analyses; analyses of the governance arrangements and the efficacy of co-management; case studies of successes and challenges; and the identification of lessons learned.

The list of strategies and activities in Table I, along with the indicators of progress for each activity that are listed in Appendix I, provides one example of a monitoring outline that can be used to develop your monitoring plan.

### **Prepare to Adapt**

There are many elements of EBM that can and may need to be adapted as you learn by doing and make corrections along the way. Any element from the ways in which strategic partnerships, governance arrangements, component plans, and/or EBM Work Plan are formed and implemented may need to be adjusted to best work within the guiding principles of EBM.

There are four important steps to an adaptation process: (1) prepare, (2) analyze, (3) adapt plans and strategies, and (4) capture and share lessons. These steps should occur at regular intervals with varying levels of formality. For example, you may want to establish an annual review and retooling of the EBM Work Plan and component plans. Then, every five years, you may want to institute a more in-depth and complete analysis that involves revisioning and setting new or revised outcomes to address emergent opportunities and threats to coastal community and natural resource health.

**Prepare Information** Begin by preparing your data and information by converting it to useful information. This includes identifying and preparing not only the achievements of the project, but also the challenges as they relate to the core assumptions and operational structure of your plans and teams. This process can be time- and data-intensive, so it is important to budget sufficient resources to this important step.

**Analyze Information** A designated, integrated management team, identified within the EBM Framework and/or through the component plans, should work together to interpret the results. This team should include the core management team for the EBM Framework and each of the component plans. Input from outside experts and additional stakeholders may also be valuable. Here are some examples of the types of questions your adaptive management group can consider:

- Do the results we are seeing align with those we predicted for this process? Are we moving toward our vision for EBM?
  - If so, are we on track to meet our goals and objectives?
  - If not, did we make some errors in how we were interpreting the situation? What can we do to correct those errors?
- Are the indicators we are using sufficiently useful to keep track of our programs and plans?
- Do we have sufficient resources (financial resources, authority, political will, physical resources, equipment, and human capacity) to carry out our plans?

- Does our team function effectively and efficiently?
- What changes are needed to our goals, objectives, EBM plan and component plans, budget, work plans, teams, and timelines to reflect the current situation and keep moving toward our vision for EBM?

The EBM core team, strategic partners, and the administrators of the component plans should collaboratively identify and prioritize changes that will be implemented in each of the plans. The output of this process is a set of revised project documents (including action plans, monitoring plans, operational plans, work plans, budgets, and financing plans).

### **Adapt**

Work with core team, strategic partners, and others to adapt each stage of the management process and work plans as needed, as illustrated in Figure 5. Once the adaptations have been completed, it is very important to share all lessons and formal products with key internal and external audiences. This includes giving and receiving feedback, conducting evaluations and audits, and promoting a learning culture. It is important to foster learning not only within the project but also at an institutional level and, more generally, within the conservation community.

More information on the adaptive management cycle can be found in a guide entitled “Open Standards for the Practice of Conservation (Version 3.0)” by the Conservation Measures Partnership (2013).



FISH SELLERS IN DILI, TIMOR-LESTE © USAID CTSP/WFF/TORY READ

## Section 5. Examples of EBM in the Coral Triangle

This section includes seven case studies of management integration and/or EBM in the Coral Triangle. Each of these case studies includes a site description. In addition, information is provided to illustrate some or all of the following:

- development of an EBM Framework;
- implementation of integrated strategies for EBM;
- establishment of collaborative governance arrangements for EBM; and
- implementation of adaptive EBM.

### DAVAO GULF MANAGEMENT COUNCIL, DAVAO GULF, PHILIPPINES

The Davao Gulf Management Council serves as one of the first and best examples of EBM in the Philippines. The council works under a Framework Plan that links coastal municipalities to manage eight program areas, including habitat protection, fisheries management, and economic development. This example illustrates the development and implementation of an EBM Framework and the implementation of integrated strategies for EBM.

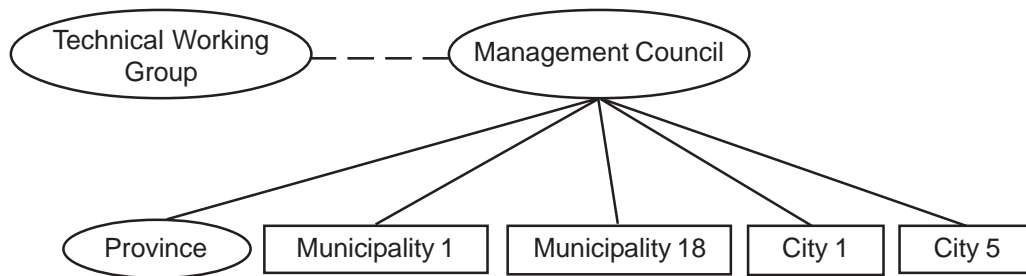
#### Site Description

The Davao Gulf is located in the southeastern part of the Philippines, about 984 km south of Manila. It is bounded by Davao City and the four provinces of Davao del Sur, Davao del Norte, Compostela Valley, and Davao Oriental. The gulf has an area of 6,600 km<sup>2</sup> and a coastline of approximately 500 km. The high mountain ranges of Sarangani Province in the west and southwest, the mountain ranges of Mt. Apo (the highest Philippine peak) in the north and northwest portion of the region, and the mountain ranges of Davao del Norte and Oriental in the eastern side, surround the gulf. The Davao Gulf has a water area of 10,500 km<sup>2</sup> and a total catchment area of 5,132 km<sup>2</sup>, which is derived from the various watersheds of Sarangani, Davao del Norte, Davao Oriental, Compostela Valley, and Davao City.

### Development of an EBM Framework

The Davao Gulf Management Council (DGMC) is a coordinating body organized to harmonize coastal resource management programs, projects, and policies of Davao Gulf (Figure 6). Regular members of the DGMC are the respective mayors of five coastal cities and 18 coastal municipalities. Each of the local government units regularly contributes financially to the DGMC for its operations; the contribution is relative to the income class of the local government unit. A Technical Working Group of the DGMC is composed of different national government agencies.

The EBM Framework Plan is implemented through broad stakeholder participation; capacity-building; organizational strengthening; education and outreach; income-generating activities; database management; research and development; and monitoring and evaluation.



**Figure 6.** Management structure of Davao Management Council in Davao Gulf, Southern Philippines (copied with permission from Pomeroy et al., 2010).

### Implementation of Integrated Strategies for EBM

In response to a complex set of environmental and development issues in Davao Gulf, the DGMC has eight program areas: habitat management; fisheries management; “foreshore” management (a legally accepted term under Philippine law denoting the intertidal zone); coastal tourism and water use; enterprise and livelihood development; watershed management; waste management and pollution control and mitigation; and legal arrangements and institutional development.

The Technical Working Group, in collaboration with various experts and stakeholders of the Davao Gulf area, developed a Framework Plan for 2005–2014. The Framework Plan has been adopted by the DGMC as the official operational implementation guideline, providing guidance to local government units in the sustainable implementation of various coastal resource management programs and projects.

### For More Information

Davao Gulf Management Council (DGMC) website: [davaogulfmanagementcouncil.org](http://davaogulfmanagementcouncil.org)

Pomeroy, R., Garces, L., Pido, M., & Silvestre, G. (2010). Ecosystem-based fisheries management in small-scale tropical marine fisheries: Emerging models of governance arrangements in the Philippines. Provincial Government of Davao del Sur. (2001). Coastal Resource Management Plan 2001-2005.

## PALAWAN PROVINCE, PHILIPPINES

Palawan Province is one of the CTI Priority Geographies that is advanced in its strategic integration of fisheries management, climate change adaptation, and habitat protection. The Palawan Council for Sustainable Development is an integrating body that promotes co-management and public-private partnerships, especially between government agencies and live reef fish traders. This example illustrates the implementation of integrated strategies for EBM; the creation and implementation of interinstitutional and participatory co-management arrangements; and the implementation and adaptive management of an EBM Work Plan.

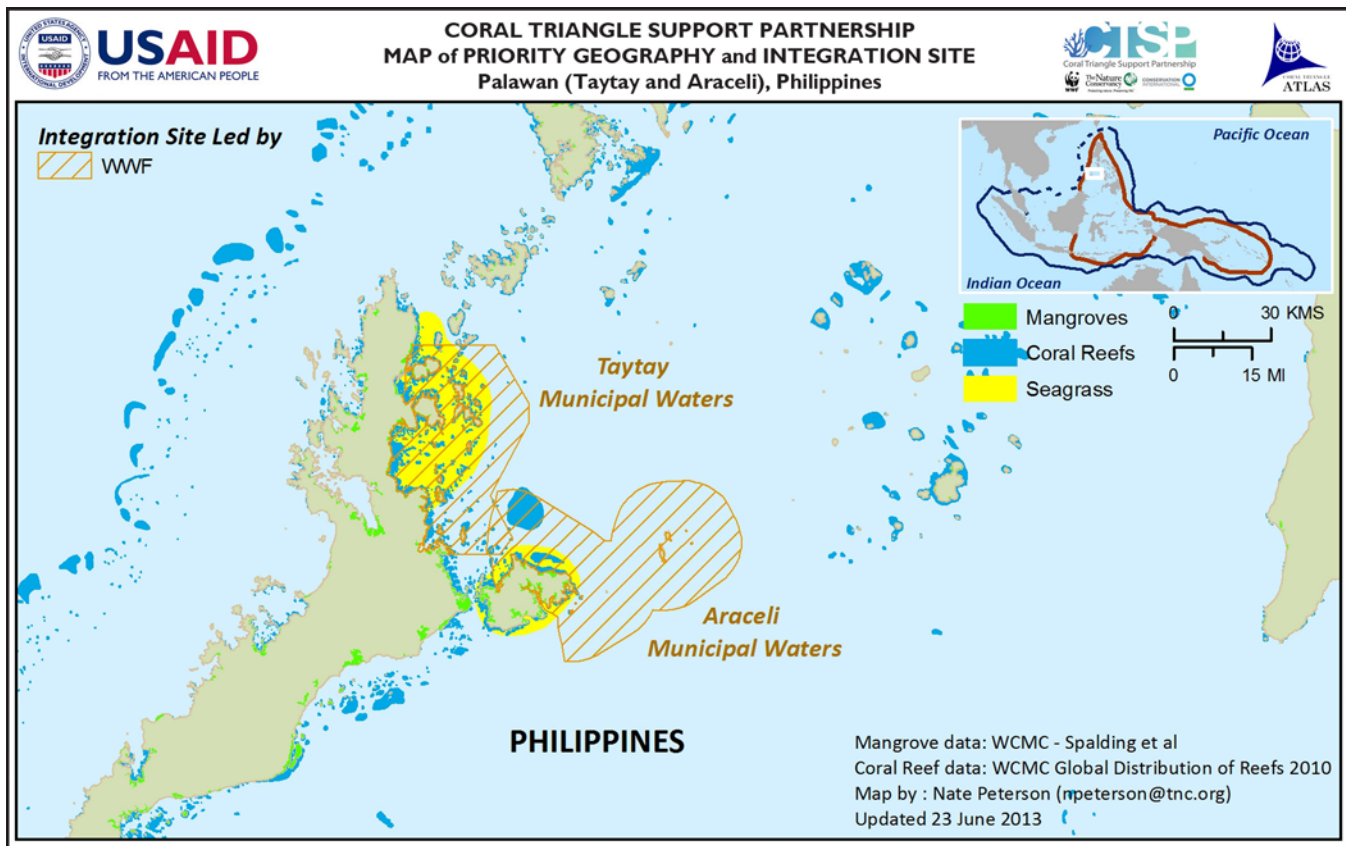


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Overlook of boat in ocean from the Island of Coron in Palawan, Philippines.

### Site Description

Palawan Province, a CTI Priority Geography, represents a highly biodiverse portion of the Philippines and includes three national MPAs (Tubbataha Reefs, Malampaya Sound, and El Nido) that together cover 1740 km<sup>2</sup> (Figure 7). The province also includes many smaller, locally managed MPAs. Key resources identified within the province include rich fisheries, coral reefs, fisheries spawning areas, and mangrove



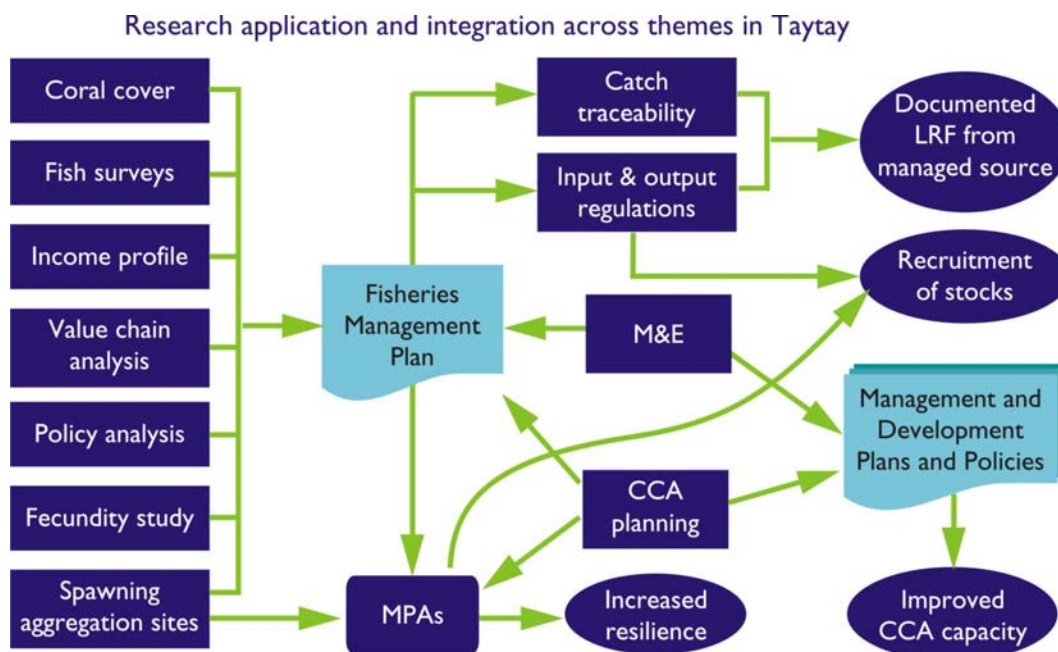
**Figure 7.** Map of Palawan Priority Geography, including Taytay. Information on the representation of Coral Triangle boundaries can be found in Figure 1.



forests. The primary threats are overfishing, conflicts of interest related to fishing, destructive fishing, and the degradation of adjacent terrestrial areas that impact coastal waters. The population of about 900,000 depends heavily on marine resource use, including both fishing and an expanding tourism industry. Key government agencies involved in the Priority Geography include the provincial government, the Palawan Council for Sustainable Development, and municipal governments. Other stakeholders include international organizations such as WWF-Philippines; local organizations such as the Environmental Legal Assistance Center (ELAC); academic institutions such as Western Philippines University (WPU); and the Palawan Research and Development Foundation, Inc. (PRDFI). The private sector is increasingly involved.

### Implementation of Integrated Strategies for EBM

Using Taytay as an example, three goals of the CTI (MPAs, EAFM, and CCA) have been adopted into an integrated site-level framework and work plan (illustrated in Figure 8). Coral reefs are the integrating factor in Taytay. They are central to the biology of live reef fish under EAFM, which in turn determines new MPA sites. Adaptation measures revolve around increasing coral reef resiliency in order to protect people’s livelihoods. CCA includes monitoring and comparing the rate of coral reef recovery from bleaching for both the MPAs and fishing grounds, which contributes to developing CCA measures.



**Figure 8.** Illustration of integration across themes and the application of science-based decision-making in Taytay, Philippines. Contributed by WWF-Philippines.

### Establishment of Collaborative Governance Arrangements for EBM

Taytay is considered a model of public-private partnerships. The government is represented mainly by Taytay’s municipal government, the Palawan Council for Sustainable Development, the provincial government of Palawan, and the Bureau of Fisheries and Aquatic Resources of the Department of Agriculture. The private sector is represented by live reef-fish trade fishers and traders, including live reef-fish traders’ organizations. Civil society is represented by WWF-Philippines. The international community is represented by international NGOs and government aid agencies.

## Implementation of Adaptive EBM

Monitoring and evaluation feeds into the overarching fisheries management plan to allow for adaptation of the component and overarching plans for integrating MPAs, EAFM, and CCA at the site level.

## For More Information

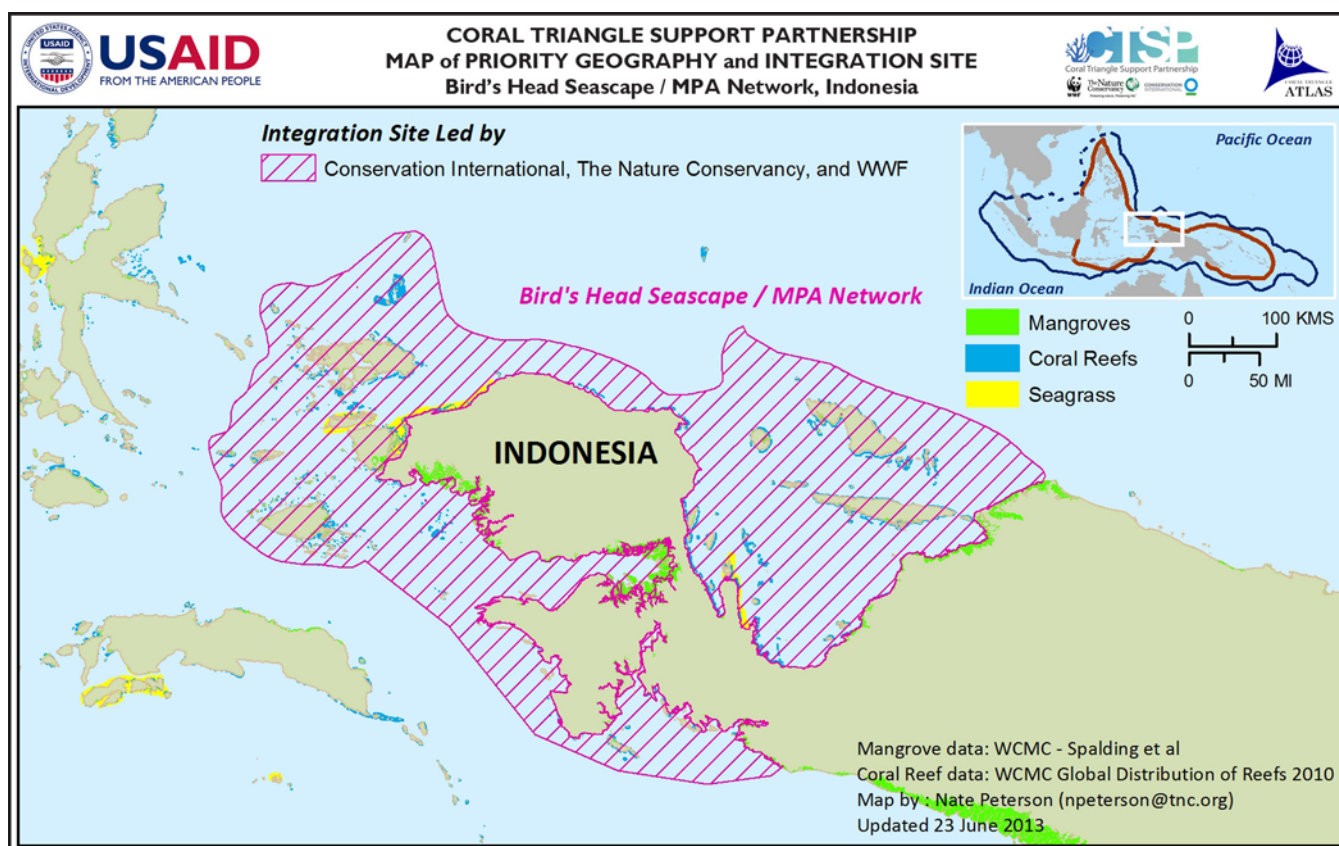
Palawan Council for Sustainable Development website: <http://www.pcsd.ph/>

## BIRD'S HEAD SEASCAPE, WEST PAPUA, INDONESIA

The Bird's Head Seascape was designed with the principles of EBM, linking human and economic development to habitat protection and fisheries management. It is managed at a scale that incorporates large and small ecosystems and manages for their interconnectedness. It is also notable for its capacity development program, which is serving as a model for NGOs and the government of Indonesia for training MPA managers across the country. This example illustrates the implementation of integrated strategies for EBM and the creation and implementation of interinstitutional and participatory co-management arrangements.

## Site Description

The Bird's Head Seascape (BHS) in eastern Indonesia encompasses over 22.5 million ha of sea and small islands off the West Papua Province (Figure 9). With 1,638 species of coral reef fishes and over 600 species of scleractinian corals (approximately 75 percent of the world's total) recorded to date, the region has the highest coral reef biodiversity recorded for an area of its size anywhere in the world.



**Figure 9.** Bird's Head Seascape and MPA Network. Information on the representation of Coral Triangle boundaries can be found in Figure 1.

BHS also includes critical habitats for globally threatened marine species, including the world's largest Pacific leatherback turtle nesting site and regionally important green and hawksbill turtle rookeries. The rich resources in BHS are the life support system for the native Papuans, providing food, jobs, and protection from storms and rising seas for more than 760,000 people. BHS is equally important for its numerous subsistence and small-scale fisheries that are vital to the livelihoods and well-being of Papuan communities.



The Ayau people were a turtle eating community, but because of CI's "Pig for Turtle" program in Raja Ampat, fewer people are eating turtles. This young turtle was trapped by a night fisherman and was released as a lesson for these children.

This Priority Geography contains 12 sites, all of which are either MPAs or marine managed areas (MMAs) under legislation for protection. These managed areas collectively cover approximately 3.6 million ha, which include about 30 percent of the critical habitats within this geography.

Resources of concern include coral reefs and their associated fisheries and habitats. Identified threats to fisheries include new development investments, many focusing on short-term exploitation such as destructive fishing and overfishing, oil and gas exploration, nickel mining, illegal logging, and poorly planned roads.

The focus of CTI-related work in BHS is to improve spatial planning and build capacity among local entities including governments, NGOs, and academic institutions to sustainably manage existing marine resources. Site-specific work is focused on improving the implementation of the existing MPAs and MMAs through participatory planning and enforcement within the sites.

### **Implementation of Integrated Management Strategies for EBM**

BHS includes a multiple-use MPA network that was designed at a scale large enough to effectively manage coastal and marine resources in a sustainable manner that incorporates the principles of EBM and conserves the rich biodiversity of the Seascape while supporting the livelihoods of its people. This integrated network design includes a spatial management plan and regulatory scheme to apply EAFM within local and national legislation. Additional elements include climate change resilience, threatened species protection, sustainable finance, and sustainable economic development alternatives. For example, ecosystem health targets include consistent or increasing mangrove cover and increasing abundance of indicator species. Socioeconomic targets include increases in food security and sustainable job opportunities for communities within or bordering the MPA.

To build effective, local management, a comprehensive MPA Management Capacity-Building Program was launched in partnership between international NGOs, the state university of Papua, and the government of Indonesia at both local and national levels. This program is underpinned by the decision to recruit and mentor well-respected Papuan leaders from within the local community to fill key MPA management positions, including the MPA leaders themselves. To sustain effective management across the MPA network, a national accreditation system for MPA staff is under development. To assess the

impact of fisheries management and biodiversity conservation efforts on Papuan livelihoods, the BHS team and local partners continually collect socioeconomic data throughout the Seascope.

### **Establishment of Collaborative Governance Arrangements for EBM**

International NGOs, local NGOs, and bilateral and private donors are working with the governments of Raja Ampat and Indonesia to develop the Raja Ampat MPA Network Management Authority. This authority will work through an innovative management structure so that it can access both government revenue sources and private funding to support the sustainable financing of the MPA network. At the Seascope and provincial levels, the Bird's Head team improves effective governance by supporting a BHS secretariat to engage decision-makers at the provincial level and to serve as a coordination body for the BHS team.

Traditional tribal leaders and other community groups were involved throughout the establishment of the MPAs. For example, during the zonation process, the Papuan tradition of seasonal harvest closures was melded with the modern concept of no-take zones as a way of reinvigorating this important cultural practice.

### **For More Information**

Agostini, V.N., et al. (2012). Achieving fisheries and conservation objectives within marine protected areas: Zoning the Raja Ampat network.

Allen, G.R., & Erdmann, M.V. (2012). *Reef fishes of the East Indies* (Vol. I-III).

Mangubhai, S., et al. (2012). Papuan Bird's Head Seascope: Emerging threats and challenges in the global center of marine biodiversity.

Rotinsulu, C. (2005). Ecosystem-based management of the Bird's Head Seascope (fact sheets).

## **MANUS ISLAND, MANUS PROVINCE, PAPUA NEW GUINEA**

Manus is an island province in northern Papua New Guinea that manages a large ocean area. This case study describes the MPA network design process, which was undertaken to bolster the resilience of habitats and fish stocks to the threats of climate change. The population of Manus Island perceives that their fisheries are under threat, and they actively participate with governments and NGOs to co-manage their shared resources. This example illustrates the implementation of integrated strategies for EBM and the creation and implementation of interinstitutional and participatory co-management arrangements.

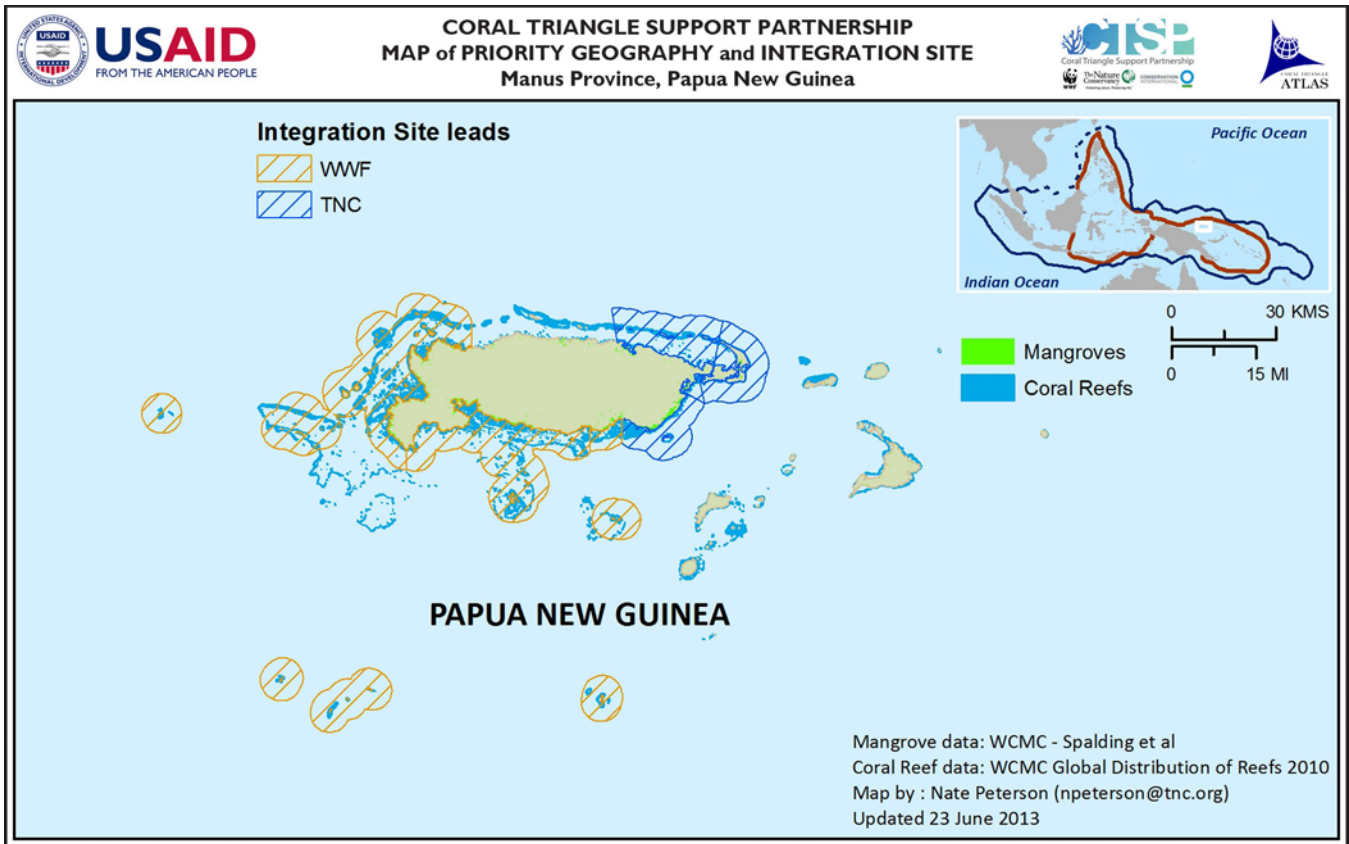
### **Site Description**

Manus Province is a CTI Priority Geography. It is the smallest province in Papua New Guinea,



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**Communities on Manus Island, PNG, depend on their coastal resources for their food and livelihoods.**



**Figure 10.** Manus Province Priority Geography. Information on the representation of Coral Triangle boundaries can be found in Figure 1.

with a land area of 2,100 km<sup>2</sup> but with more than 220,000 km<sup>2</sup> of ocean (Figure 10). In the year 2000, the province had a total population of 43,387 people.

The province is made up of the Admiralty Islands (a group of 18 islands in the Bismarck Archipelago), Wuvulu Island, and nearby atolls to the west. The largest island in the group is Manus Island, where the capital Lorengau is located. The reefs near the atolls are accessible by outboard motor or canoe and provide superb diving and fishing. Manus is rugged and heavily timbered, with streams running through central hills that rise to over 700 m.

Manus is known for its endemic species including the Chauka, or friarbird, and the emerald green tree snail. Manus Island and the smaller atolls contain endemic plant species because of their isolation from other land masses. The marine waters contain mammals such as dugongs as well as a variety of coral species.

### Implementation of Integrated Strategies for EBM

Effective MPA management and planning is incorporating resilient designs for fisheries management for an MPA network that goes all the way around Manus Island. This incorporates all three themes (CCA, EAFM, and MPAs), with fisheries at the leading edge. However, lack of capacity to draft and implement an integrated EBM agreement and work plan presents a real challenge for progress at this Priority Geography.

## Establishment of Collaborative Governance Arrangements for EBM

Political will for the integration of MPAs with EAFM and CCA in Manus exists at national to local levels. There is high community engagement, in part due to outreach efforts by international NGOs. Fishing is perceived as threatened, and communities are starting to see declines in fish catch. The community is also starting to see the effects of climate change through the deterioration of coastal roads due to sea level rise and through village inundation during the king tides (the highest high tide of the month).

The strategies and goals of the CTI are all implemented by the Manus Provincial Government. The EBM focal point at Manus sits within this government body. At the local level, sustainable integrated planning by the Manus Provincial Government is a primary way that EBM is implemented.

TNC, WWF, the Locally-Managed Marine Area Network, and the Wildlife Conservation Society have signed an MOU to cooperate on natural resource management and conservation in the province. There is also good local NGO involvement. For example, James Cook University and TNC are conducting collaborative research on grouper, coral trout, and fish aggregating devices (FADs).

## SOUTHEAST CEBU ISLAND, PHILIPPINES

This example illustrates the development and implementation of an EBM Framework; the implementation of integrated strategies for EBM; the creation and implementation of interinstitutional and participatory co-management arrangements; and the implementation and adaptive management of an EBM Work Plan.

### Site Description

In the Philippines, each municipality exercises independent control of its municipal waters up to 15 km offshore. On southeast Cebu Island, eight municipalities demonstrated a novel approach to EBM through fisheries management when they collaborated to jointly manage adjacent waters. In 2004, a local NGO called the Coastal Conservation and Education Foundation (CCEF), together with the eight municipalities, began implementing the Local Governance for Coastal Management Project. In this scaling-up exercise, they collectively identified EBM outcomes through joint planning and decision-making.

The Coastal Resource Management Project (CRMP) ran from 1996 to 2004 and enhanced the capacity of the municipalities to implement coastal management. Incentives that catalyzed movement toward EBM in southeast Cebu emerged from earlier coastal management projects, including CRMP, that encouraged data- and resource-sharing; a foreshore (intertidal zone) database developed and used by the intermunicipal cluster in its planning decisions; and efforts to enhance coastal law enforcement and to improve implementation of coastal management programs in each municipality.



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Coral reef with swarm of anthias fish in the Philippines, areas of which have the highest concentration of marine species in the globe.

As a result of this effort, the municipalities have become committed to EBM and the southeast Cebu Coastal Resource Management Council (described below) as an institution created to realize EBM drivers such as addressing specific threats to overfishing by commercial fisheries and increasing knowledge of ecosystem dynamics.

### **Establishment of Collaborative Governance Arrangements for EBM**

Because they shared similar issues, similar marine ecosystems (main coral reef, seagrass, and mangrove systems), a history of collaboration with one another, fishing stocks, and a common resource base, the municipalities agreed to integrate municipal coastal management, expanding management to an ecosystem scale. The eight participating municipalities began joint management planning with the goal of a more productive fishery. EBM became the framework to manage this nearshore area. To conform to the current legal-institutional regime in the Philippines, the municipalities created the Council of Vice-Mayors and Mayors through a Memorandum of Agreement (MOA).

This multi-institutional collaboration is supported by state policies. Further, municipal collaboration is supported by the Philippine Fisheries Code, which adopted the concept of integrated coastal management (ICM) for the management of fishery and aquatic resources by municipalities and other local government units. The Code proposes the creation of Integrated Fisheries and Aquatic Resources Management Councils (IFARMCs) in bays, gulfs, lakes, rivers, and dams bounded by two or more municipalities. An additional legal act that supports local government unit alliance formation is the National Integrated Protected Areas System (NIPAS) Act.

The Southeast Cebu Coastal Resource Management Council is the coordinating body for all identified programs of the eight municipalities. The council is composed of mayors and vice-mayors, and it functions as a policy-making and supervising body. A management committee and a secretariat, composed mostly of technical staff from each municipality, also support the council. In addition, an advisory group, composed of government agencies and NGOs, provides technical and legal advice.

Despite new initiatives on several fronts, intergovernmental coordination mechanisms are still reported to be weak in the areas of administrative and fiscal accountability. Nevertheless, the southeast Cebu municipalities demonstrate commitment and willingness to collaborate and cooperate in fisheries ecosystem management.

### **Implementation of Integrated Strategies for EBM**

The primary threats to southeast Cebu were degradation of key coastal habitats, overfishing, and dwindling fish stocks. Coral reef habitats were very degraded, with less than 25 percent live coral cover on coral substrates, and no sites in excellent condition. Illegal large-scale commercial fishing operations were using bag nets, purse seines, and trawls inside coastal waters. Nearshore fishers were very concerned by the intrusion of large commercial fishers into coastal waters.

An integrated fisheries strategy was completed with local interest in increasing fish biomass and improving fisheries habitat and living substrates. Between 2004 and 2009, the municipalities achieved key CRM benchmarks including adoption and implementation of a multi-year CRM plan; annual programming and budget to sustain local CRM plans and programs; and more (Eisma-Osorio et al., 2009).

## Implementation of Adaptive EBM

Regular council meetings and joint actions have facilitated adaptive learning and management. For example, to respond to the growing need to increase the capacity of law enforcement, the council conducted a series of coastal law enforcement training courses for fish wardens and police enforcers.

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## NINO KONIS SANTANA NATIONAL PARK, TIMOR-LESTE

Established in 2007, Nino Konis Santana is a relatively new national park. Leaders from the five communities, or *sucos*, living within the park work with provincial and national government authorities to develop marine and coastal natural resource management plans to protect habitat and manage fisheries. These areas will be zoned to ensure climate resilience while ensuring the needed ecosystem benefits to local communities. This case study includes information on the development and implementation of an EBM Framework; the implementation of integrated strategies for EBM; the creation and implementation of interinstitutional and participatory co-management arrangements; and the implementation and adaptive management of an EBM Work Plan.

### Site Description

The Nino Konis Santana National Park (NKS) in Timor-Leste is the nation's first and only national park (Figure 11). Declared in 2007, five years after Timor-Leste's independence, the park encompasses more than 1,236 km<sup>2</sup> of terrestrial territory and 556 km<sup>2</sup> of marine territory. Timor-Leste has extremely high marine biological diversity at the site level, including the recent discovery of several new species and a number of range extensions (Erdmann and Mohan, 2012).

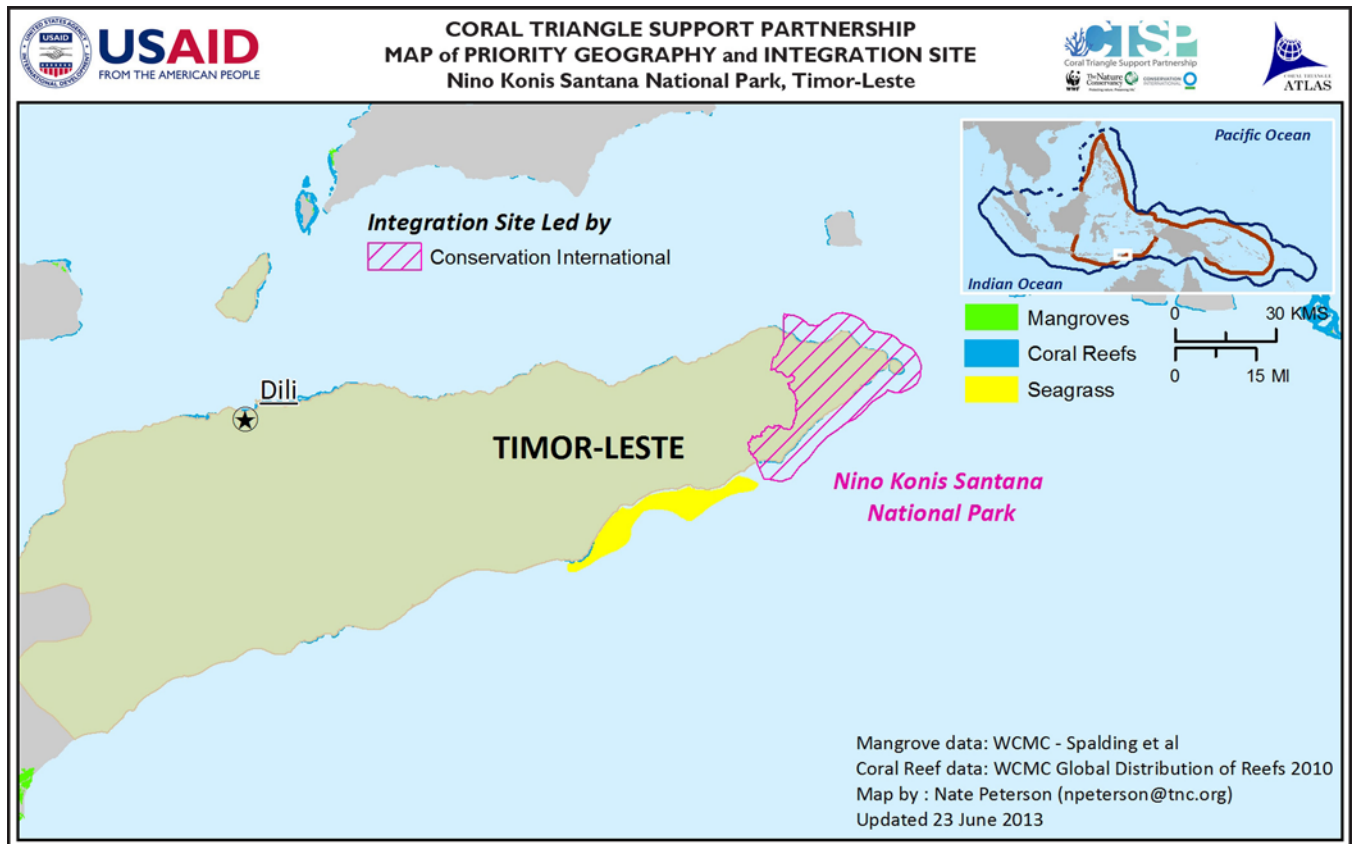
Recent assessments suggest no evidence of past or recent large-scale high temperature bleaching-induced coral mortality around Timor-Leste. This is consistent with the presence of cool waters in most sites, typically 25-27 °C. This is three to four degrees cooler than many neighboring locations. If these cooling influences remain consistent, reliable features, Timor-Leste's oceanography may provide a cool-water buffer against the increasing sea temperatures predicted from climate change over coming decades.

In addition to its high biological diversity, the marine environment of NKS is extremely important to the livelihoods of thousands of people living within the park. The Timorese government is also focusing on nature-based tourism as a strategy for future economic development. The marine and coastal environments of NKS are threatened by overfishing, by destructive fishing by foreign fishers, and, in some areas, by sedimentation from upland agriculture and forestry.

### Development and Implementation of an EBM Framework

An EBM Framework has been developed through iterative planning over the past four years. Under the CTI, the government of Timor-Leste requested assistance from CTSP to address threats in NKS by developing low-cost management solutions with strong community participation. Over time, CTSP





**Figure 11.** Nino Konis Santana MPA Priority Geography. Information on the representation of Coral Triangle boundaries can be found in Figure 1.

was able to pursue fully integrated management strategies that collectively form a framework for pursuing EBM in NKS. Additionally, the CTSP team in Timor-Leste utilized the draft version of this Integration Guide as a basis for its capacity-development strategy through the identification of gaps in strategies and the skills, knowledge, and resources required to pursue these strategies.

**Establishment of Collaborative Governance Arrangements for EBM**

Over the past four years, CTSP supported the government to develop a co-management approach to marine resource management, working with the communities in NKS. In Timor-Leste, the National Ministry of Agriculture and Fisheries has the mandate to manage marine resources. However, it recognizes the critical role of the district



**Community members in Com, a community within the NKS National Park, work together to develop a coastal natural resources management plan.**

government, village-level government, and community members in management. Since NKS includes both terrestrial and marine territory, other national departments play a critical role in management and oversight.

The central feature of this co-management approach is supporting community members and government representatives from the national, district, and village levels to develop key skills and knowledge needed for effective marine resource and fisheries management. The national, district, and village governments work collectively to help facilitate planning processes with community members. Once plans are complete, each level in the co-management arrangement incorporates activities and rules into their appropriate planning and regulatory frameworks. For example, village-level activities and rules are incorporated into village development plans. At the national level, rules are legalized through ministerial diploma. The result is a planning approach that honors and empowers each level in their most appropriate and most practical role in a collective effort to pursue effective management.

### **Implementation of Integrated Strategies for EBM**

With CTSP's support, government and local leaders facilitated the communities through a comprehensive planning process. Based on the identified priority resources, threats, causes, and proposed solutions, the team provided outreach on key ecological factors that are important to consider when developing management actions. This outreach included highlighting essential factors that will help to conserve biological diversity, build sustainable fisheries, and support resilience to long-term threats such as climate change. The proposed solutions became the core of the planning process and the foundation for development of a multiple-use zoning and regulatory scheme.

CTSP also utilized CCA planning tools to understand the potential vulnerability of priority resources to climate change impacts and to develop adaptation activities. The community identified the several adaptation activities that were subsequently included in community management plans.

Perhaps the biggest missing element of a full EBM Framework in NKS is a ridge-to-reef strategy addressing terrestrial ecosystem integrity and sedimentation. In coming years, the government and CI hope to more fully develop terrestrial management.

### **Adaptive Management of EBM**

Moving forward, the collaborative team working in NKS will hold additional consultations and planning sessions to fill the identified gaps in management. This will include the creation of additional no-take zones in a few high-priority areas of NKS where none have yet to be declared as well as expanding the existing no-take areas to cover important features. The team is also focusing significant attention on effectively implementing the management, compliance, and enforcement activities of the community management plans.

### **For More Information**

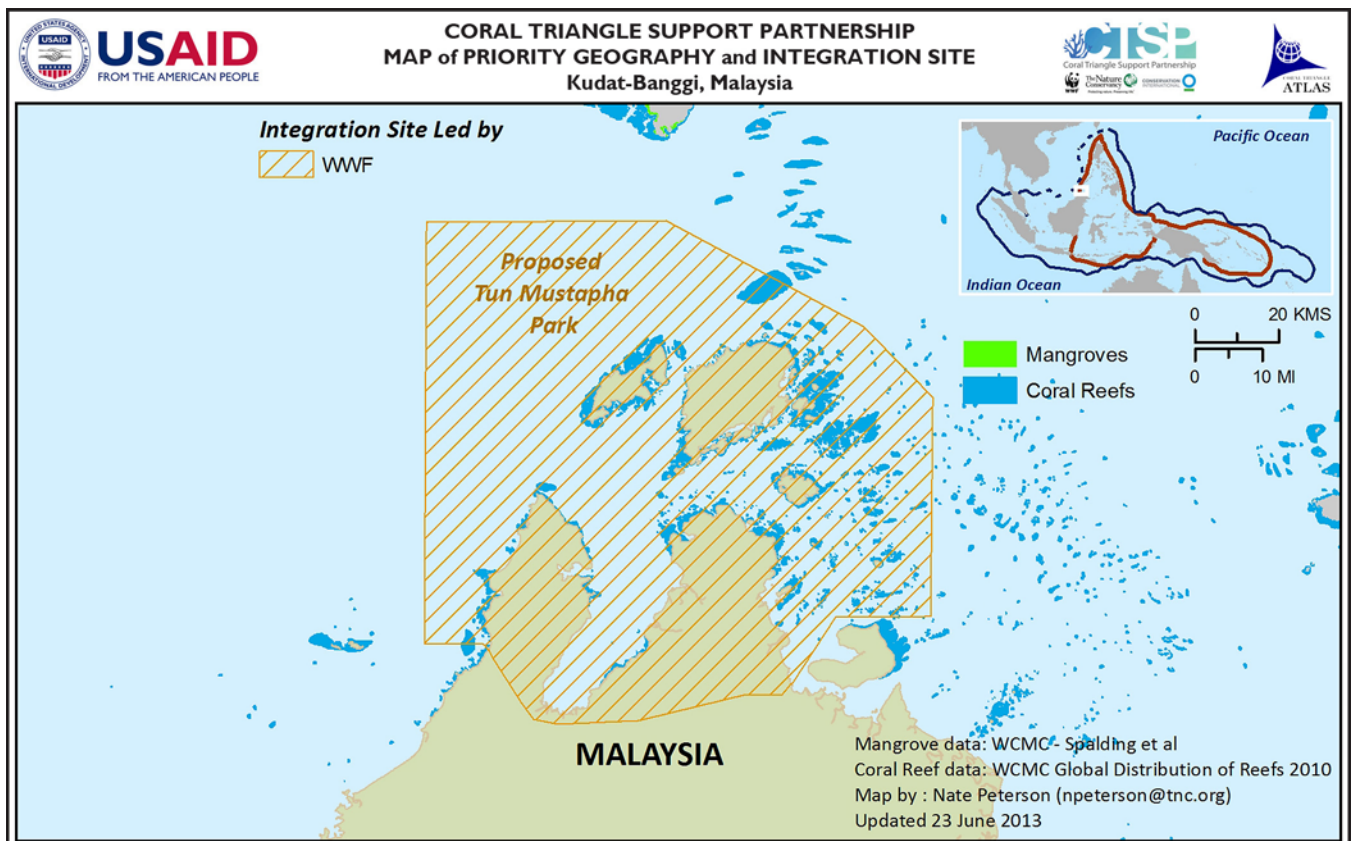
Erdmann, M.V., & Mohan, C. (Eds). (2013). A rapid marine biological assessment of Timor-Leste (RAP Bulletin of Biological Assessment 66). Dili, Timor-Leste: Conservation International and CTSP.

## TUN MUSTAPHA PARK (PROPOSED), SABAH, MALAYSIA

Tun Mustapha Park is a new MPA that is in the process of gazettement. The zoning, which is currently underway, involves the integration of fishing, recreational activities, and habitat protection. The steering committee is a co-management body that includes government representatives, NGOs, businesses, other resource users, and community leaders. This example illustrates the development and implementation of an EBM Framework; the implementation of integrated strategies for EBM; and the creation and implementation of interinstitutional and participatory co-management arrangements.

### Site Description

Measuring just over 1 million hectares and comprising more than 50 islands and islets, Malaysia's proposed Tun Mustapha Park (TMP) MPA lies at the northern tip of Borneo (Figure 12). Jurisdiction for this proposed MPA falls under the Sabah Parks, Sabah Department of Fisheries, and three local district governments. This area stands to become one of the largest marine parks in Southeast Asia. TMP is proposed to be managed through a zoned, ecosystem-based fishery management regime that promotes sustainable livelihoods and food security. A draft integrated management plan has been developed. Ultimately, a full integrated coastal and spatial management plan will be developed with use zones that include no-take zones for biodiversity protection. Finally, as a scenic and historical area in Sabah, the TMP has great potential for sustainable ecotourism.



**Figure 12.** The Proposed Tun Mustapha Park Priority Geography. Information on the representation of Coral Triangle boundaries can be found in Figure 1.

Biodiversity features of the park include complex, linked habitats including primary rainforest, coral reefs, mangroves, and seagrass beds; Malaysia's second largest concentration of coral reefs; 252 species of hard corals; 350 species of fish recorded as of 2011; and endangered green sea turtles and dugongs.

Approximately 100 metric tons of fish are landed from TMP, valued at about RM 700,000 (approximately US\$230,000) daily. TMP supplied about 70 metric tons of live reef fish to fish traders in 2001. Seaweed is also grown in Banggi for food and cosmetic industries.

### **Implementation of Integrated Strategies for EBM**

Representatives of TMP and associated stakeholders worked together in 2013 to pilot the EBM Diagnostic Tool. Findings demonstrated their high level of implementation of the strategies pertaining to sustainable fisheries, habitat protection, and threatened and critical species. Activities pertaining to the other four strategies were less well-implemented. Under Malaysia's commitment to the CTI, led by the Ministry of Science, Technology and Innovation (MOSTI), TMP is recognized as an important area for the implementation of its objectives for EAFM, adopting protected areas as one of the EAFM implementation tools. Toward this effort, the health of the ecosystem as a key indicator is being integrated into the management of the MPA.

Through zoning, the park intends to use a comprehensive system to control artisanal and commercial fishing, tourism, and habitat protection. The zoning plan will include large local communities who will continue to live in and earn a living from the park through fishing, tourism, and other livelihoods.

### **Establishment of Collaborative Governance Arrangements for EBM**

As part of Malaysia's commitment to the CTI-CFF, Sabah Parks has been tasked to form an Interim Steering Committee for the proposed TMP. The committee and its six working groups have been working toward an integrated management plan to achieve the objectives of the proposed TMP. A multi-stakeholder group has been working to realize the formal enactment of the proposed TMP. This group includes government agencies led by Sabah Parks, Sabah Fisheries Department, Universiti Malaysia Sabah, and the Land and Survey Department. The group also includes NGOs, including WWF-Malaysia and the local communities.



**Multi-stakeholder team undertakes a pilot assessment of the EBM Diagnostic Tool and Integration Guide in Sabah, Malaysia, in April 2013.**

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# Conclusion

The US CTI Support Program's Integrated Toolkit for Coastal Resource Management, of which this guide is a key component, was created to achieve several objectives: (1) to support sites to work efficiently to achieve the five goals of the CTI-CFF RPOA; (2) to improve natural resource management by encouraging an EBM Framework, which is one of the guiding principles of the RPOA; (3) to catalyze the integration of CCA within MPAs, fisheries, and threatened/endangered species management; (4) to stimulate resource managers in the Coral Triangle to think *big*, beyond MPAs and FMUs to the scale of seascapes and ecoregions; and (5) to encourage resource managers to pursue integrative management activities with a deeper appreciation for how fisheries and biodiversity management strategies can be used synergistically to achieve joint outcomes.

The intention of this guide is to help coastal and marine management efforts move toward EBM by integrating multiple goals and objectives of the CTI-CFF RPOA in coastal areas of the Coral Triangle. Completing the elements described here should serve as an important step for you and your team toward that aim.

As you move forward with EBM, we hope you develop an approach for EBM that includes a monitoring plan, which will help you evaluate your progress toward certain milestones and manage your work adaptively. Table 1 and the associated EBM Diagnostic Tool (Section 2) can provide one such measure. However, Table 1 and the more detailed information in Appendix 1 will only help you monitor the outputs of your activities. Progress should also be measured against the intended outcomes of your work: resilient, healthy, and productive natural resources and human populations; diminished vulnerability to climate change; and the continuance of the environment's services upon which we rely. If it is clear that your milestones and outcomes are not being achieved, then evaluate your barriers and improve your management strategies to overcome these barriers. This is the heart of an adaptive management cycle, and adaptive management is fundamental to sustainability and future success.

Finally, in your journey ahead, we encourage you to share your lessons with others who are also struggling with how to integrate their management approaches and activities. Share not only your achievements and progress, but also your challenges and failures. Let us move toward more holistic and integrated resource management approaches as outlined in this guide. Our coastal and marine environment and human communities depend on it!

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# Appendices

## APPENDIX I. INTEGRATED STRATEGIES, MANAGEMENT ACTIVITIES, AND INDICATORS OF PROGRESS

**Strategy A. Governance of management areas: Manage coastal and marine areas based on ecological boundaries, resource use patterns, and governance jurisdictions.**

**1. Participatory processes for decision-making (such as co-management) are used effectively to govern a management area.**

Managing at the scale of ecosystems means that there are more people, households, and communities that interact with and care about the management area. Cooperative or co-management increases the participation of these stakeholders in management. With co-management, local resource users (for example, fishers, tour operators, coastal developers) and government share the responsibility and authority for management.

*Indicators of Progress*

- Stakeholders are engaged in making management decisions.
- Stakeholders are involved in management activities.

**2. Governance of the management area includes coordination and cooperation between government agencies.**

No one agency has the mandate to address all of the issues threatening marine and coastal ecosystems and livelihoods. Involving agencies and organizations that work across the sectors affecting the ecosystem is required for effective area management<sup>1</sup>. This could include those with management authority over fish, coasts, and climate as well as associated sectors like mining, energy, agriculture, and tourism. Relevant government agencies may include local, provincial, and national authorities responsible for MPA management, fisheries management, enforcement of local and national regulations relating to resource use, the protection and management of marine and terrestrial threatened species, economic development, and CCA for various sectors (including fisheries, natural coastal protection, built coastal infrastructure, coastal and upland agriculture, economic development, human health, and freshwater systems).

*Indicators of Progress*

- Intersectoral coordinating mechanisms (such as the Philippines' ICM law or MOUs) among various agencies and various levels of government are established and functional.

**3. Boundaries of the management area are identified and, if appropriate, legally established for management area governance.**

Clearly defining the area to be managed – especially through legal area establishment – helps to ensure that the area will be maintained over the long term. Where corresponding or overlapping management units (such as MPAs, MPA networks, FMUs, seascapes, TURFs, LMMAs, etc.) exist within or across management area boundaries, these should also be identified. Where FMUs, MPAs, seascapes, and/or other management areas have overlapping boundaries, the areas should be co-managed by the relevant agencies and stakeholder groups.

*Indicators of Progress*

- Boundaries of the management area have been defined and mapped, and they reflect political, ecosystem, fisheries, and human use elements.
- Boundaries of the management area have been formally recognized in law, policy, or other appropriate means.

<sup>1</sup>Effective management indicates management for which effectiveness has been assessed using a standardized management effectiveness tool. Management effectiveness requires that several pieces function well, including capacity development for MPA managers and co-management bodies, high levels of compliance with MPA rules and regulations, and effective enforcement.

**4. Spatial management is applied across the management area to achieve EBM outcomes.**

Spatial management, when applied effectively, protects ecosystem structure, function, and key processes. It recognizes interconnectedness within and among systems. It also integrates ecological, social, economic, and institutional perspectives. Spatial management can be used effectively within seascapes, FMUs, very large MPAs, or MPA networks. Clearly defining zones for multiple uses within the management area can ensure varied levels of protection and multiple benefits. Zoning within the spatial management plan should address and limit threats, and should manage key aspects of the ecosystem, resource base, and resource use by stakeholders.

*Indicators of Progress*

- A spatial management plan supporting EBM principles is developed.
- The spatial management plan supporting EBM principles is integrated with sector-specific management plans.

**5. Compliance and enforcement systems support implementation of the EBM Framework and component plans.**

Compliance with and enforcement of the EBM Framework and component plans are key elements of management success. Enforcement of regulations should be carefully aligned with the management area's stated objectives. Promotion of compliance should be integrated into enforcement strategies.

The EBM Framework and its component plans should describe who is responsible for enforcement, the means of enforcement, and the penalties for non-compliance. Monitoring, control, and surveillance (MCS) programs should be developed to support compliance and enforcement within and adjacent to the management area.

*Indicators of Progress*

- Compliance and enforcement guidelines and procedures are clearly defined in the EBM Framework and component plans.
- Monitoring, control, and surveillance programs are in place within the management area.
- Adequate resources are made available to undertake compliance and enforcement actions.
- Enforcement and compliance are improved within a management area, resulting in increased protection of coastal and marine resources.

**6. An EBM Framework integrates the implementation of all seven strategies and all component plans.**

An EBM Framework links and coordinates EAFM, MPA network, ridge-to-reef, community disaster management, and other relevant plans as components. Each component plan should include both spatial and regulatory schemes. Each also can include zoning for multiple uses. The component plans should have their own timelines, budgets, and standard operating procedures. The EBM Framework should define how the relevant sectors will coordinate and plan together.

*Indicators of Progress*

- A comprehensive, integrated EBM agreement is developed and includes the following components: intersectoral management agreement, co-management agreement, and list of component plans.
- The plan includes the guiding principles and seven strategies of EBM.
- The plan links component management plans (for example, fisheries, ICM, watershed, MPA, LMMAs).

**7. Monitoring and evaluation support adaptive management and improve effectiveness of the EBM Framework.**

Management areas, in and out of marine reserves, should be monitored to measure the impacts of climate and ocean change on habitats, fish stocks, and threatened species. The EBM Framework and component plans each should include how management effectiveness will be measured. Further, the plans should define how managers will use information from monitoring to address unmet objectives and adapt to new conditions.

*Indicators of Progress*

- A monitoring system designed to identify and measure indicators of the EBM Framework's performance is developed and followed.

**Strategy B. Fisheries managed for sustainability: Manage multiple fisheries and their associated ecosystems for sustainable use and human benefit under an ecosystem approach to fisheries management (EAFM).**

**8. Ecosystem boundaries are established for EAFM.**

Managing fisheries with an ecosystem approach requires identifying and establishing ecosystem boundaries based on biological and physical processes and features. Boundaries also should consider existing political, social, economic, and management processes, in addition to human activities from land to sea. Ecosystem boundaries can be used to resolve conflict among activities that impact and are impacted by fisheries within the management area and FMU(s).

*Indicators of Progress*

- Marine ecosystem boundaries are identified for EAFM.
- Management plans for FMUs acknowledge wider ecosystem boundaries.
- FMUs work within and across ecosystem boundaries to achieve fisheries and ecological objectives.

**9. Information co-produced by fishers, managers, agencies, and external agents (scientists and non-governmental organizations) supports EAFM.**

Effective EAFM is interdisciplinary. Environmental, social, economic, and governance information should be used together to assess the current condition of FMUs. EAFM also involves communities. Traditional ecological knowledge, local knowledge, and indigenous knowledge contribute additional information. Collecting information from different agencies, experts, non-governmental organizations, and community representatives will improve the understanding of ecological, social, and economic properties of the FMU, including the interactions between these properties.

*Indicators of Progress*

- Traditional knowledge is co-produced across stakeholders to support EAFM.
- Environmental, social, economic, and governance information is co-produced across different agencies, experts, and non-governmental organizations to support EAFM.
- Traditional knowledge and additional information are used to inform EAFM.
- Information is continually co-produced and used to inform the monitoring, evaluation, and adaptive management of EAFM.

**10. Fisheries management measures ensure the conservation of target species as well as species and habitats belonging to the same ecosystem.**

Most types of fishing gear impact non-target species in some way. The fisheries management measures implemented should help to prevent irreversible ecosystem impacts from fishing. Further, they should minimize reversible and undesirable impacts. Technical fisheries management measures will include fishing gear regulations to address selectivity, by-catch, and discards. These measures can help to maintain the reproductive stock of target species and reduce impacts on non-target species. The precautionary approach should be applied to destructive fishing methods that damage physical structures supporting the ecosystem.

*Indicators of Progress*

- A range of management measures are evaluated, applied, and used effectively.

### **11. Improved human well-being and equity are addressed through EAFM.**

An EAFM plan, when prepared using a participatory approach, should address the interests of the array of stakeholders. This includes poor, small-scale fishers and marginalized parts of society, such as women's groups. The plan should include specific measures and activities that aim to increase equity and improve overall well-being for the stakeholder community. The EAFM plan, as it is developed, should be fully integrated with community and economic development plans.

#### *Indicators of Progress*

- The EAFM plan describes the current socio-economic conditions in the FMU.
- The EAFM plan includes socio-economic goals, indicators, and management measures.
- The EAFM plan is fully integrated with community and economic development plans.

### **12. Fishing overcapacity is reduced using integrated mechanisms.**

Overcapacity (excessive levels of harvest in the fishery) is the single most important factor threatening the sustainability of fish stocks and the fisheries that depend on them. Reducing overcapacity can lead to increased catches, increased profits, healthier fish stocks, and improved livelihoods for small-scale fishers. However, overcapacity reduction may create unemployment and displacement of some fishers.

The only feasible solution to overcapacity may be a coordinated and integrated strategy of resource management, resource restoration and conservation, economic and community development, and restructured governance arrangements.

#### *Indicators of Progress*

- Overcapacity is assessed.
- A plan of action to address fishing overcapacity is developed and integrated into the overall EAFM plan.
- Overcapacity is reduced.

### **13. Critical fisheries habitats are protected and rehabilitated.**

Critical fisheries habitats are those that are essential to ecosystem productivity. Critical habitats for fisheries include wetlands, mangroves, coral reefs, lagoons, nursery and spawning grounds, and healthy habitat areas. The precautionary approach should be applied. Gear types destructive to critical habitats should be prohibited—for example, trawling in coral reef and seagrass habitats. High-impact and illegal fishing methods should be replaced with those having less impact—for example, traps, hand-lines, or long-lines. Spatial management measures like multiple-use MPAs and marine reserve areas protect critical habitat from fishing activities that damage physical structures supporting the ecosystem.

#### *Indicators of Progress*

- Sufficient critical habitats are identified and protected.
- Critical habitats are healthy and/or have improved.

### **14. The vulnerability of fish stocks and their associated ecosystems to threats including the impacts of climate and ocean change is assessed.**

To prioritize how to address specific climate and ocean change threats and issues for fishery management, complete a fisheries risk assessment. This assessment should be linked to a climate vulnerability<sup>2</sup> assessment, which can be conducted at a national or local level. A climate vulnerability assessment will include the full breadth of users and government agencies that might impact or be impacted by the EAFM plan given future changing conditions. The results from a climate vulnerability assessment can be used to help fishing communities assess their capacity to identify adaptive measures to reduce the risk of climate and ocean impacts.

<sup>2</sup>Vulnerability assessments can be conducted individually at an activity level or holistically across all strategies to assess the climate vulnerability of the entire community, natural resources, and infrastructure.

*Indicators of Progress*

- A climate vulnerability assessment is undertaken and completed, and results are communicated.

**15. An EAFM plan guides sustainable fisheries management.**

An EAFM plan differs from a conventional fisheries plan. It results from a planning process that outlines what management arrangements are needed for a fishery to benefit the community over the long term. The plan is developed with stakeholders and, because it is more holistic, incorporates ecological and social management objectives for the FMU and its associated species, habitats, and ecosystems. Fisheries-related species and ecosystems as well as the patterns with which humans interact with fisheries are dynamic, and an EAFM plan also builds in adaptive management to address changes over time, including those attributed to climate and ocean change.

*Indicators of Progress*

- An EAFM plan is developed.
- An EAFM plan includes adaptation measures designed to reduce the vulnerability of fish stocks and critical habitat to climate and ocean change.
- EAFM is implemented through a work plan.

**Strategy C. Protected habitats and their connectivity: Protect representative and critical habitats (and their connectivity) through MPA networks and other means.**

**16. Multiple-use MPAs (large is better) and MPA networks are established to protect habitats and their connectivity.**

Multiple-use MPAs with marine reserves protect and manage marine habitats and fishery resources in a manner that is sensitive to multiple factors. These include the location and vulnerabilities of critical habitats; marine larval movements and connectivity; and primary uses by people. Marine reserves, also known as no-take reserves, protect an ocean area from extractive activities, and may also protect an area from destructive activities.

*Indicators of Progress*

- MPAs that may include marine reserves are established.
- MPA networks that include but are not limited to networks of marine reserves are established.

**17. Activities that damage or destroy habitat are stopped throughout the management area.**

Destructive fishing and other activities (boating, anchoring, coral mining, etc.) are often primarily responsible for physically degraded areas of coral reef and related habitats. Reducing or stopping destructive activities protects habitat and increases resilience to new threats and climate and ocean change.

*Indicators of Progress*

- Destructive activities are prohibited, reduced, and stopped.

**18. Marine reserves are designated to include at least 20 percent of each habitat type.**

Studies suggest that by protecting at least 20 percent of important tropical habitats, the biomass and reproductive capacity of marine organisms can increase. This contributes to the sustainability and longevity of biodiversity and fisheries resources. Protection of this habitat needs to be coordinated with the larger management area. It also should support the precautionary approach for EAFM described in activity 13.

*Indicators of Progress*

- A portion of each habitat type is included in marine reserves.

**19. Marine reserves are designated to include multiple examples of each habitat type.**

Because each habitat type in the marine ecosystem has specific functions and because some organisms move from one habitat to another during their life cycles, multiple examples of each habitat type should be protected. Having representative habitat types also provides replication, which builds biodiversity conservation for long-term ecosystem resilience.

*Indicators of Progress*

- Marine reserves with multiple habitat types are established.

**20. Key reproduction areas (for example, spawning, feeding, and nursery areas) are protected in marine reserves.**

Areas providing essential ecological functions such as spawning, feeding, and nursery areas should be preserved. Without these operating naturally, fisheries resources decline rapidly. Some species may become vulnerable and threatened. Protecting these ecological functions and areas contributes to food security and livelihoods.

*Indicators of Progress*

- Marine reserves that include spawning, feeding, and/or nursery areas are established.

**21. Marine reserves are sized to balance ecological and human needs.**

The minimum size for a marine reserve depends on the natural home range of species to be protected. If the area of protection is too small, the species will be captured during their normal movement patterns, and there will be little or no benefit from the MPA to fisheries or biodiversity conservation. As a rule of thumb, a marine reserve should be at least twice the size of the home range of the target species. The reserve's maximum size should be determined to balance human and ecological needs.

*Indicators of Progress*

- The minimum size of established marine reserves considers the area required to protect primary target species of concern.
- The maximum size of established marine reserves considers both human and ecological needs.

**22. MPAs and MPA networks incorporate marine reserves that are separated by a minimum of 1 km and a maximum of 20 km.**

Marine reserves should be placed at variable distances from 1 km up to 20 km apart. This way, different types and patterns of larval movements can have the opportunity to find refuge in one or more reserves in the area. Many larvae do not move long distances, so placing reserves closely together increases the chance that they will recruit from one reserve to another. Placing others somewhat further apart allows for risk spreading in the face of existing and emergent threats.

*Indicators of Progress*

- A network of marine reserves across the management area is established.
- Marine reserves are spaced at variable distances, between 1-20 km apart.

**23. Areas of each habitat type known or thought to be resistant to climate and ocean change impacts are protected.**

Climate change will increasingly impact marine habitats in generally negative ways due to temperature changes, sea level rise, and ocean acidification. Therefore, habitats that are thought to be resistant to those impacts should be protected. This will help to ensure longer-term survival of habitats over wide areas where some areas are more vulnerable than others. Habitat types include seagrasses, mangroves, sandy beaches, sandy benthic areas, islets, coral reefs, sites with particular oceanographic features, and so on.



*Indicators of Progress*

- Marine reserves that include habitats believed to be resistant to climate change impacts are established.

**24. MPAs, including marine reserves, are in place for the long term, preferably permanently.**

Most research and life experience indicates that MPAs—particularly marine reserves—must be permanent to maintain the benefits derived. This is because older organisms produce many more babies than younger organisms. When the older organisms are removed, the productivity of the marine area declines dramatically. Studies show that MPAs should be in place for at least 20 years—preferably permanently—to maximize benefits. In order to facilitate the long-term sustainability, financing mechanisms may be required to ensure that sufficient funds are available for continued effective management over time.

*Indicators of Progress*

- MPAs are established for the long term through legal or other means.
- Sustainable financing mechanisms are in place to support MPA management over the long term.

**Strategy D. Threatened species, critical species, and functional groups: Protect and restore species and functional groups that maintain ecosystem integrity.**

**25. The status and need for protection of threatened species, critical species, and functional groups are assessed.**

Critical species include threatened, vulnerable, endangered, keystone, flagship, umbrella, and highly migratory species. They also include functional groups that perform essential ecological processes, such as energy conversion and recycling, needed to maintain ecosystem integrity. Functional groups include microbial communities, detritivores, herbivores, and apex predators.

Legally, threatened species are defined as those listed as threatened, vulnerable, or endangered in the *IUCN Red List of Threatened Species*. In nature, it is likely that many additional species and functional groups are threatened that have not yet been assessed due to insufficient data, particularly for cryptic organisms. In this case, the precautionary principle should apply.

*Indicators of Progress*

- Identify critical species in the management area.
- Assess and monitor critical species in the management area.

**26. Laws and regulations are in place to adequately protect threatened species, critical species, and functional groups.**

Ecosystems are made up of species, their habitats, and the surrounding environment, all working together in an interconnected manner. Each species and/or functional group of species that disappears from the ecosystem reduces the resilience of the ecosystem to recover from human and natural impacts. Many threatened species such as sharks and turtles have tourism appeal, so their healthy presence can contribute to successful area management. Most actions to protect threatened species or critical functional groups require effective laws and policies. Where laws are lacking, solid scientific information can be used to inform public opinion. Public opinion can then be energized to encourage law-making bodies to draft and establish laws to preserve species, functional groups, and habitats that contribute to the integrity and resilience of the ecosystems of the management area. These laws and policies may be implemented through an area management plan, such as an MPA network management plan, an EAFM plan, or another relevant management plan.

*Indicators of Progress*

- Laws and regulations are in place to protect threatened species, critical species, and functional groups.
- Laws and regulations are linked to the regular assessments of threatened species, critical species, and functional groups.
- Threatened species, critical species, and functional groups are assessed and managed through a management plan.

**27. Fisheries laws are in place to reduce the bycatch of threatened species, critical species, and functional groups.**

Bycatch (the unintentional capture and killing of animals not targeted by a fishery) has been proven to be a threat to species such as sharks, turtles, fish, corals, and other plants and animals. Fisheries laws and practices that prohibit and discourage the taking and discarding of bycatch can have a direct impact on the survival of threatened species. To be effective, these laws must be appropriate and effectively enforced.

*Indicators of Progress*

- Laws are in place to regulate bycatch.
- Laws that regulate bycatch are effectively enforced.

**28. Laws that protect threatened species, critical species, and functional groups are enforced.**

In many places, laws do exist to protect threatened species from direct threats such as hunting or fishing. Unfortunately, many of these laws are rarely enforced. Reasons include a lack of incentive to enforce the laws; insufficient resources to staff and maintain an enforcement body; a lack of understanding of the laws; or difficulty prosecuting those caught disobeying the laws. It is important to identify and overcome these challenges so that threatened species can thrive within management areas.

*Indicators of Progress*

- An enforcement system is in place.
- The enforcement system is effective in detecting illegal activity.
- The enforcement system is effective in prosecuting illegal activity.

**29. Critical areas for threatened species, critical species, and functional groups are protected.**

Habitat loss (for example, that caused by destructive fishing activities and coastal deforestation) can do more harm to threatened species than killing or removing them. Therefore, strategies and laws that protect threatened species should also protect the need for feeding, mating, spawning, nesting, and migration. These critical areas may be managed through a management plan that is specific to these critical areas, or through a habitat management plan (for example, an MPA or MPA network management plan).

*Indicators of Progress*

- Critical areas for threatened species, critical species, and functional groups are identified and managed effectively.
- The management of critical areas is implemented through a management plan.

**30. The vulnerability of threatened species, critical species, and functional groups to climate and ocean change and other threats is assessed for all life-history stages.**

Climate change will increasingly impact threatened species and their critical habitats in generally negative ways due to temperature changes, sea level rise, increased storminess, and ocean acidification. Vulnerability assessments based on scientific data and local knowledge can help to ensure that climate change and other adaptation strategies are appropriate to the needs and priorities of threatened species in and near the management area. The results of vulnerability assessments can inform each of the other activities in this strategy.

*Indicators of Progress*

- The vulnerability of threatened species, critical species, and functional groups is assessed and communicated.

**Strategy E. Community and economic development: Diversify and sustain coastal communities' livelihoods.**

**31. Improved basic public services are provided to households and communities by social and community development.**

Social and community development efforts can help to integrate population, health, education, welfare, and infrastructure (roads, communication, water) programs into the area management approach. Education, extension, and skills training can support supplemental and alternative livelihood programs. A formal social security mechanism can help to make fishers and their families feel more secure about change and more willing to transition to a new fishing management strategy or livelihood. Social and community development should be guided by a development plan, which is prepared by government and stakeholders for communities in the management area. This plan should then be adopted by a co-management body and funded and resourced adequately.

*Indicators of Progress*

- A plan is in place that guides social and community development.
- Basic public services are increasingly available and improved through the implementation of the plan.
- The community development plan is included in the EBM Framework.

**32. A sustainable livelihoods strategy is developed for households and coastal communities.**

A sustainable livelihoods strategy helps to ensure that area management contributes to the livelihoods of the community—especially those impacted by management. The approach requires understanding the diversity of coastal people and communities, especially in relation to their livelihood strategies. It also requires understanding the means by which households adapt to reduce their risks, the incentives that drive the decisions of resource users, and the sources of their vulnerability to stresses and shocks. To be effective, the strategy should integrate resource management, resource restoration and conservation, economic and community development, and restructured governance arrangements.

*Indicators of Progress*

- A sustainable livelihood strategy that identifies new, environmentally friendly, enhanced, alternative, and supplemental livelihood opportunities and options is prepared.
- New livelihood opportunities are in place for households and coastal communities.

**33. Coastal economies and markets are linked to larger subnational and national economies and economic development activities.**

Working with economic development experts, an analysis of trends and projections in both the sub-national (for example, municipal, provincial, regency) and national economies and in future occupational demands can provide direction for skills training and microenterprise development. Economic base studies can provide information useful for identifying economic linkages between the community economy and the regional and national economies.

*Indicators of Progress*

- Communities in the management area have an economic development plan, which is linked to regional and national economic development plans and actions.

**34. Environmentally friendly enhanced, alternative, and supplemental livelihood opportunities are developed and available to households and coastal communities.**

Fishers and their families need a broad range of livelihood options – including enhanced, supplemental and alternative – to choose from in order to reduce household economic dependence on the fishery. A focus on all members of the family allows them to be trained in new livelihoods and better address the income and other needs of the household. Ideally, these livelihood options are “environmentally friendly” – that is, they reduce the community’s overall environmental impact and/or reduce its impact on the provision of critical ecosystem goods and services.

*Indicators of Progress*

- Government, NGOs, and the private sector support implementation of a sustainable livelihood strategy.
- The number of people participating in enhanced, supplemental, and alternative livelihoods is increased.

**35. The vulnerability of community and economic development to threats, including climate and ocean change, is assessed.**

The vulnerability of coastal livelihoods to climate change and ocean acidification is similar to the community’s susceptibility to harm by events like coral bleaching, storm damage, and sea level rise. Vulnerability is the degree to which a human or natural system is susceptible to, and unable to cope with, adverse effects of climate and/or ocean change, including climate variability and extremes. A vulnerability assessment evaluates the vulnerability of the community, its economic activities, and projected economic development to threats, including climate and ocean change. Vulnerability assessments serve as a primary input to economic development and adaptation planning.

*Indicators of Progress*

- A vulnerability assessment of marine ecosystems, fisheries, and local economies to identified threats in the management area, including climate and ocean change, is completed and communicated.

**36. Climate and ocean change adaptation measures are implemented to reduce vulnerability of community and economic development to threats including climate and ocean change.**

When communities assess their vulnerability to climate and ocean change, they then can plan changes, or identify adaptation strategies and actions, that will increase their resiliency. As climate and ocean change is expected to impact a broad array of community services and infrastructure—including those important to the local economy—adaptation measures will integrate social development (empowerment, organizations, education, training); economic development (job creation, private sector investment, market access, microfinance); and ecological interventions (rehabilitating coastal habitats, coastal resource management).

Both the public and private sectors need to be actively involved in determining adaptation measures. Adaptation decision analysis is intended to assess and categorize adaptation options according to whether they result in planning actions that deliver near-term or long-term loss or gains for climate and acidification threats in addition to the other threats facing the coastal fisheries.

*Indicators of Progress*

- An adaptation decision analysis has been undertaken.
- Identified adaptation options are implemented.
- Community members, the local economy, and livelihoods are positively impacted by adaptation actions.

## Strategy F. Watershed management: Effectively manage watersheds and freshwater resources.

### 37. Freshwater systems are healthy.

Assessing freshwater sources, water quality, flow patterns, quantity, seasonal variation, and the effects of climate change is essential to plan for minimizing negative impacts on water sources and for adjusting coastal area management plans to address changes in water flow and/or water-borne pollution.

#### *Indicators of Progress*

- Water and ecosystem parameters are assessed and monitored.
- Management plans for water conduits are developed and implemented.

### 38. Estuarine and brackish systems are healthy.

Assessing water sources, water quality, flow patterns, quantity, seasonal variation, and the effects of climate change is essential to plan for minimizing negative impacts downstream and for adjusting coastal area management plans to address key issues pertaining to changes in water flow and/or water-borne pollution. Coastal land use and development plans should consider the needs of brackish systems and their role in terrestrial and marine ecosystems, including fisheries, and associated livelihoods.

#### *Indicators of Progress*

- Water and ecosystem parameters are assessed and monitored.
- Management plans for water conduits are developed and implemented.
- Management plans to protect brackish wetlands and systems are developed.

### 39. Erosion and sedimentation are managed.

Land-based sedimentation caused by deforestation, mining, industry, poor agricultural practices, shoreline development, and insufficient waste management systems takes a large toll on nearshore marine habitats due to smothering and chemical changes in the water. Rivers, streams, and other channels for upland runoff are the conduits for sedimentation that affects estuaries and coastal waters. Thus it is important to determine the primary sources of land-based sedimentation and conduits and make plans for its mitigation through monitoring and analysis.

#### *Indicators of Progress*

- Sedimentation sources are identified and profiled, mitigated, managed, and monitored.

### 40. Land-based sources of pollution (air, water, soil, solid waste, and others) are managed.

Land-based pollution in the form of excess nutrients, damaging chemicals, solid waste, and air pollution is negatively impacting near-shore marine habitats. It is threatening the health of coastal habitats and spurring rapid ecological changes. Land-based pollution should be identified and assessed, and ultimately reduced in order to protect the functioning of coastal and marine systems and the sustainability of the goods and services they provide to local communities.

#### *Indicators of Progress*

- The sources and types of pollution are identified and assessed.
- Plans for addressing pollution issues are developed.
- Pollution levels and impacts are reduced and monitored.

**41. The vulnerability of estuaries and watersheds and freshwater resources to climate and ocean change and other threats is assessed.**

Climate change will impact different ecosystems and areas in different ways. A vulnerability assessment of estuaries, watersheds, and freshwater resources will increase the effectiveness of the EBM Framework. At a minimum, vulnerability should be assessed using existing data from the area interfaced with an appropriately scaled climate change model to determine the level and area of threat.

*Indicators of Progress*

- A vulnerability assessment for estuaries and watersheds is completed and communicated.

**42. Adaptation and mitigation measures are implemented to reduce the vulnerability of watersheds and freshwater resources to emerging threats, including climate and ocean change.**

Climate and ocean change is expected to impact multiple aspects of the structure and function of watersheds and freshwater resources—including those important to the local economy. Adaptation and mitigation measures will integrate ecological interventions with social needs relating to agriculture, water use, and the management of undeveloped areas.

Both the public and private sectors need to be actively involved in determining adaptation and mitigation measures. Adaptation and mitigation decision analysis is intended to assess and categorize options according to whether they deliver near-term or long-term loss or gains as they reduce the impacts of and vulnerabilities to climate and ocean change, as well as other threats facing the coastal fisheries and habitats.

*Indicators of Progress*

- An adaptation decision analysis has been undertaken.
- Identified adaptation options are implemented.
- Watersheds and freshwater resources are positively impacted by adaptation actions.

**43. Management of watersheds and freshwater resources is undertaken cooperatively by relevant government agencies and participating stakeholders.**

Cooperative or co-management increases the participation of these stakeholders in management. With co-management, local resource users (for example, fishers, tour operators, coastal developers) and government share the responsibility and authority for management. Laws that encourage or mandate different jurisdictions to coordinate their planning and implementation activities are essential to sustainable co-management. The reasons for cooperation may not be obvious to the stakeholders or government agencies involved, so leaders must actively encourage participation. This is especially true for the inclusion of stakeholders operating in the coastal and marine environment, who may not traditionally have been involved in discussions of upland and water use management.

*Indicators of Progress*

- Participatory planning processes include key government agencies and stakeholders.
- Stakeholders are engaged in making management decisions.
- Stakeholders are involved in management activities.

## Strategy G. Hazard risk reduction: Reduce risk to communities from climate change impacts and coastal hazards.

### 44. The vulnerability of the social, economic, and ecological systems to climate threats and coastal hazards is assessed.

Vulnerability assessments describe how people, their homes, livelihoods, critical infrastructure, and the natural resources upon which they depend will be affected by coastal and climate hazards. The results of a vulnerability assessment help communities identify appropriate adaptation measures to reduce their risk to coastal hazards.

#### *Indicators of Progress*

- A vulnerability assessment is completed.
- Assessment results are communicated to the community.

### 45. Development plans incorporate measures to reduce risk from climate change and coastal hazards.

Coastal communities experience a range of coastal hazards from natural processes (earthquakes, tsunamis, king tides); man-made hazard events (hazardous material and oil spills); and climate change–related threats (sea level rise, storm surge, ocean acidification). In addition, some natural hazards such as king tides (associated with El Niño Southern Oscillation events) and storms can be exacerbated by climate change. Community development plans establish social, economic, and ecological objectives to improve the health and well-being of a community. These plans should incorporate land use, basic service delivery (for example, water and electricity); economic development and livelihoods (for example, agriculture, fisheries, tourism); critical infrastructure (for example, hospitals, schools, ports and harbors, roads); and environmental services (for example, hazardous and solid waste management). Plans should identify and incorporate ways to reduce risks to communities based on historical hazards and projected future climate change–related threats.

#### *Indicators of Progress*

- Hazard/climate change vulnerability and risks are identified.
- Activities to reduce the vulnerability and risks of hazards and climate change vulnerability are implemented as part of community development plans.
- Hazard/climate change vulnerability and risks are reduced.

### 46. Land-use zones and building standards are developed to reduce risk from climate impacts and coastal hazards.

Effective land-use zoning and structural design reduces risks to both the built and natural infrastructure. Land-use zoning should locate coastal development outside of hazard-prone areas and protect coastal habitats that serve as natural buffers to hazards impacts (dunes, mangroves, coral reefs). Infrastructure should be designed to withstand hazards and sited outside hazard-prone areas. Land-use policies and building standards should be reviewed and revised based on a vulnerability assessment.

#### *Indicators of Progress*

- Land-use plans and building standards incorporate risk-reduction measures.
- Land-use plans and building standards are used effectively to reduce risk.

### 47. Coastal habitats are protected and rehabilitated to buffer communities from climate impacts and coastal hazards.

Coastal habitats such as sand dunes, mangroves, and coral reefs serve an important coastal protection function and support coastal livelihoods. These habitats are often lost due to intensive coastal development such as aquaculture, coastal roads, and tourism development. Coastal habitats that serve protective functions should

be defined, protected by law, and rehabilitated if needed. The protection of these areas needs to be enforced from encroachment of competing resource uses.

*Indicators of Progress*

- Habitats that provide protection are identified.
- Habitats that provide protection are legally established and managed.

**48. Early warning systems are established or strengthened, and communities know how to respond.**

An early warning system can save lives by notifying at-risk populations before a disaster occurs, giving them time to move to safety. Communities must be capable of receiving notifications and alerts of hazards, warning at-risk populations, and taking appropriate action based on these alerts.

*Indicators of Progress*

- Early warning systems are established and implemented.
- Vulnerable populations can capably respond to early warnings.

**49. Community-based disaster management plans and programs are in place and functional.**

Community-based disaster management promotes self-reliance by engaging individuals, families, local organizations, and local government. These plans reduce the risks from natural and man-made hazards by helping communities avoid impacts of disasters before an event and accelerate recovery after an event. As part of disaster management planning, emergency response plans must be developed, reviewed, regularly practiced, and updated.

*Indicators of Progress*

- Community-based disaster management plans are developed and implemented.
- Emergency response plans are developed, routinely practiced, and updated.

**50. Adaptation actions are implemented and monitored for effectiveness to reduce risks from climate impacts and coastal hazards.**

Climate adaptation plans identify actions to reduce vulnerability to climate change–related threats. These actions should be designed to address risks from coastal and climate hazards and complement environmental, economic, and community goals. Adaptation activities should be carefully evaluated to minimize unintended impacts on vulnerable populations and sensitive ecosystems and to avoid maladaptation. The effectiveness of adaptation actions should also be evaluated to ensure that they are successful in reducing vulnerability and increasing the resilience of the community.

*Indicators of Progress*

- Adaptation plans are developed and actions implemented.
- Adaptations reduce communities' vulnerability to climate and ocean change.



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**Live reef fish in pens in Anambas, Indonesia awaiting purchase for the Singapore or Hong Kong markets.**



## APPENDIX 2. U.S. CTI SUPPORT PROGRAM INTEGRATED GLOSSARY

**Adaptation** – adjustment in natural or human systems in response to actual or expected climate and/or ocean change, or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation include anticipatory, autonomous, and planned adaptation (United Nations Intergovernmental Panel on Climate Change, 2007).

**Adaptation actions** – management actions prioritized for implementation to adapt a system or target resource to the predicted impacts of climate or ocean change or other new and newly emerging threats.

**Adaptation options** – the range of actions that can be taken to reduce vulnerability of a target resource to climate and/or ocean change. For example, for a social resource target such as housing, adaptation option may include moving housing, developing new building standards, or retrofitting existing housing to withstand a climate threat. For natural resources targets, such as coral reefs, adaptation options may include strengthening or expanding existing management efforts such as improving enforcement of existing marine protected area or expanding protection to a network of marine protected areas.

**Adaptive capacity** – the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (United Nations Intergovernmental Panel on Climate Change, 2007).

**Adaptive management** – a systematic process for continually improving management policies and practices toward achieving articulated goals and objectives by learning from the outcomes of previously employed policies and practices. The basic steps of adaptive management are to conceptualize; plan actions and monitoring; implement actions and monitoring; analyze, use, and adapt; and capture and share learning. *Active* adaptive management is where management options are used as a deliberate experiment for the purpose of learning (Millennium Ecosystem Assessment, 2006).

**Apex predator species** – an animal which, as an adult, has no natural predators of its own in its ecosystem. It therefore resides at the top of its food chain. Apex predator species occupy the highest trophic level(s) and have a crucial role in maintaining the health of their ecosystems.

**Artisanal fishery** – a small-scale fishery carried out using traditional fishing boats and gear.

**Benchmark** – a standard against which something can be measured or judged. Used as a planning tool to catalyze and guide local implementation of a particular process. A benchmark tool typically identifies common milestones and describes each milestone. It can help to identify the level and status of a group's efforts on a particular project.

**Biodiversity** – the variation of life at all levels, ranging from genes to ecosystems. It is more than a count of species and can be characterized by extinctions, reductions, or increases of some species, invasions and hybridizations, degradation of habitats, and changes in ecosystem processes.

**Climate** – weather averaged over a long period of time (typically over 30 years or more). Climate is what you expect; weather is what you get (United Nations Intergovernmental Panel on Climate Change, 2007).

**Climate change** – a change in the state of the climate that can be identified (for example, using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer (United Nations Intergovernmental Panel on Climate Change, 2007).

**Climate change adaptation (CCA)** – actions taken to help society, communities, and ecosystems moderate, cope with, or take advantage of actual or expected changes in climate conditions. Adaptation can reduce vulnerability, both in the short and long term (United Nations Intergovernmental Panel on Climate Change, 2007).

**Climate story** – the summary of past, present, and potential future climate conditions and their potential impacts on target resources of importance to a community or society. The climate story is developed based on both community-based and scientific observations of climate change and potential impacts on target resources and the provision of ecosystem services.

**Climate variability** – the climatic variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all spatial and temporal scales beyond that of individual weather events. Examples of climate variability include interannual El Niño and La Niña events that occur every two to seven years and influence weather patterns over vast regions of the globe (United Nations Intergovernmental Panel on Climate Change, 2007).

**Coastal and marine spatial planning (CMSP)** – a public process of analyzing and allocating the spatial and temporal distribution of human activities in coastal and marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process. Sometimes used interchangeably with marine spatial planning (MSP) (Ehler and Douvère, 2009).

**Coastal management area** – See Management area.

**Code of Conduct for Responsible Fisheries (CCRF)** – a voluntary guide developed by the Food and Agriculture Organization of the United Nations (FAO) that provides a set of principles on how to sustainably develop fisheries and aquaculture.

**Co-management** – a partnership arrangement between key stakeholders (for example, communities of local resource users such as fishers, tour operators, coastal developers) and government to share the responsibility and authority for the management of fisheries and coastal resources, with various degrees of power-sharing.

**Community-based management (CBM)** – management planning and implementation carried out by the people and stakeholders in a community.

**Connectivity** – the demographic linking of local populations through dispersal of pelagic larvae and movement of juveniles or adults. There are different types of connectivity including connectivity among populations in the same habitat in different locations; connectivity among marine habitats (for example, where species use different habitats at different stages in their life history); and connectivity between the land and the sea (Jones et al., 2009; Green et al., 2013).

**Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF)** – a partnership of six countries working together to sustain extraordinary marine and coastal resources by addressing crucial issues such as food security, climate change, and marine biodiversity (CTI-CFF, 2009).

**Core team** – those individuals committed to facilitating and overseeing a process, and completing any associated documents or reports. In addition to the core team, specialized technical experts and partners may be needed to be consulted at different steps in the process. Depending on the target resources of concern to the community, and the type of process being undertaken, members of the core team may include technical expertise (from, for example, forestry, coastal resource management, land use, agriculture, tourism, fisheries, transportation, social services, and emergency management services) as well as policy-makers; representatives from relevant economic interests; community leaders; and the government or non-government decision-makers that can carry forward the core team's findings.

**Critically endangered species** – the highest risk category assigned by the IUCN Red List for wild species. Critically endangered species are those that are facing an extremely high risk of extinction in the wild (International Union for the Conservation of Nature, 2013).

**CTI-CFF Regional Plan of Action (RPOA)** – a 10-year, living, and non-legally-binding document to conserve and sustainably manage coastal and marine resources within the Coral Triangle region. The RPOA takes into consideration

laws and policies of each country in the Coral Triangle (Indonesia, Malaysia, Philippines, Timor-Leste, Papua New Guinea, and the Solomon Islands) (CTI-CFF, 2009).

**Demersal fishery** – a fishery that targets fish which live close to the sea floor, in contrast to a pelagic fishery that targets fish that swim near the surface of the sea.

**Ecoregion** – a large unit of land and water that contains a geographically distinct assemblage of natural communities sharing a large majority of species, dynamics, and environmental conditions, and consequently functions effectively as a conservation unit (Omernik, 2004).

**Ecosystem** – a relatively self-contained system that contains plants, animals (including humans), micro-organisms and non-living components of the environment as well as the interactions between them (Secretariat of the Pacific Community, 2010).

**Ecosystem approach (EA)** – a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way. Often used interchangeably with ecosystem-based management (EBM) (Convention on Biological Diversity, 2000).

**Ecosystem approach to fisheries management (EAFM)** – an approach to fisheries management and development that strives to balance diverse societal objectives by taking into account the knowledge and uncertainties about biotic, abiotic, and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries. An EAFM is a practical way to implement sustainable development for the management of fisheries by finding a balance between ecological and human well-being through good governance. The purpose of EAFM is to plan, develop, and manage fisheries in a manner that addresses the multiple needs and desires of societies, without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems (Garcia et al., 2003; Food and Agriculture Organization, 2003, 2011).

**Ecosystem approach to fisheries management plan (EAFM plan)** – the output of a planning framework that outlines the integrated set of management arrangements for a fishery to generate more acceptable, sustainable, and beneficial community outcomes.

**Ecosystem goods and services** – the benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual and cultural benefits; and supporting services such as nutrient cycling or waste degradation that maintain the conditions for life on Earth.

**Ecosystem-based fisheries management (EBFM)** – considered a component of ecosystem-based management, focused on the fisheries sector. EBFM considers both the impacts of the environment on fisheries health and productivity and the impacts that fishing has on all aspects of the marine ecosystem. Often used interchangeably with an ecosystem approach to fisheries management (EAFM).

**Ecosystem-based management (EBM)** – a management framework that integrates biological, social, and economic factors into a comprehensive strategy aimed at protecting and enhancing the sustainability, diversity, and productivity of natural resources. EBM “emphasizes the protection of ecosystem structure, functioning, and key processes; is place-based in focusing on a specific ecosystem and the range of activities affecting it; explicitly accounts for the interconnectedness among systems, such as between air, land, and sea; and integrates ecological, social, economic, and institutional perspectives, recognizing their strong interdependencies.” Sometimes used interchangeably with ecosystem approach (EA) (McLeod et al., 2005).

**Endangered species** – a species whose numbers are so small that the species is facing a very high risk of extinction in the wild (International Union for the Conservation of Nature, 2013).

**Essential fish habitat** – those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. *Waters* include aquatic areas and their associated physical, chemical, and biological properties. *Substrate* includes sediment underlying the waters. *Necessary* means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. *Spawning, breeding, feeding, or growth to maturity* covers all habitat types utilized by a species throughout its life cycle (Magnuson-Stevens Act, 2007).

**Exclusive economic zone (EEZ)** – under the Law of the Sea, an exclusive economic zone (EEZ) is a sea-zone over which a country has special rights over the exploration and use of marine resources. It stretches from the seaward edge of the country's territorial sea out to 200 nautical miles (370 km) from its coast.

**Exposure** – the extent to which a region, resource, or community experiences changes in climate. For example, a house on the shoreline will be more exposed to storm surges than a house further inland at a higher elevation (United Nations Intergovernmental Panel on Climate Change, 2007).

**Facilitator** – a person who manages the interaction of other people to achieve an acceptable outcome for all.

**Fish sanctuary** – See marine reserve.

**Fisheries management** – an integrated process to improve the benefits that society receives from harvesting fish consisting of (1) information-gathering, (2) analysis, (3) planning, (4) consultation, (5) decision-making, (6) allocation of resources, and (7) formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and accomplishment of other fisheries objectives.

**Fishery management unit (FMU)** – the area of the ecosystem and fisheries that are the focus for management under an ecosystem approach to fisheries management. The fisheries can be any particular types of fishing (for example, trawl fishery) and/or a particular resource fishery (for example, shrimp fishery).

**Fishery replenishment/reserve area (FRA)** – a zone where the taking of all plants and animals is prohibited for the long term (more than 10 years) or permanently. This means that this is an area that the community has agreed to set aside and not harvest. FRAs are an effective way to build long-term abundant fisheries populations and resilience and are synonymous with marine reserves.

**Fishery resource** – the aggregation of fish that are harvested, where fish includes mollusks, crustaceans, and any aquatic animals that are harvested.

**Flagship species** – species used as the focus of a broader conservation marketing campaign based on its possession of one or more traits that appeal to the target audience (Veríssimo et al., 2011).

**Food security** – the availability of consistent and sufficient quantities of food, access to appropriate and sufficient foods, and consumption or appropriate use of basic nutrition and food preparation.

**Food web** – a system of interlocking and interdependent food chains.

**Framework** – a basic structure underlying a system or context. A framework can serve as a basis of policies and approaches widely accepted enough to serve as a guide in the design and operation of a system. See ecosystem-based management for an example.

**Functional group** – a collection of species that performs a similar function in ecosystem processes, irrespective of their taxonomic grouping (Steneck and Dethier, 1994), such as predators, grazers, bioeroders, primary producers, and habitat builders (Done et al., 1996).

**Gear restriction zones** – a zone where one specific fishing method is prohibited because it is more damaging than other methods that are allowed. This type of zone might be useful if there are specific areas in the management area with habitats or species that are sensitive to certain gear types. For example, net fishing may not be allowed in certain areas of reef because it can severely damage reefs and the habitat of many fish.

**Governance or governance system** – the way formal and informal rules are set and implemented. It includes the planning and implementation mechanisms, processes and institutions through which citizens and governing groups (institutions and arrangements) voice their interests, mediate differences, exercise their legal rights and meet their obligations.

**Habitat** – the environment in which the fish and other living marine resources live, including everything that surrounds and affects their life (for example, water quality, bottom, vegetation, associated species including food supplies).

**Hazard** – a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. Hazards can include latent conditions that may represent future threats and can have different origins. Each hazard is characterized by its location, intensity, and probability (World Meteorological Organization, accessed March 2013).

**Hazard risk reduction** – the suite of actions that can be taken to minimize vulnerabilities and disaster risks throughout a society. Actions to reduce risk from natural and man-made hazards include those to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development (World Meteorological Organization, accessed March 2013).

**Home range** – the area in which an individual spends most of its time and engages in most of its routine activities, such as foraging and resting (Kramer and Chapman, 1999).

**Illegal, unregulated, and unreported (IUU) fishing** – *Illegal fishing* is conducted by vessels of countries that are parties to a regional fisheries management organization (RFMO) but operate in violation of its rules, or operate in a country's waters without permission. *Unreported fishing* is catch not reported or misreported to relevant national authorities or RFMO. *Unregulated fishing* is conducted by vessels without nationality or flying the flag of states that are not party to relevant fisheries organizations and who therefore consider themselves not bound by their rules (Food and Agriculture Organization, 2002).

**Indicator** – a variable, pointer, or index that measures the current condition of a selected component of the ecosystem. The position and trend of the indicator in relation to a benchmark indicates the present status of the component. Indicators provide a bridge between objectives and action.

**Integrated coastal management (ICM)** – an ecosystem approach to managing a coastal area. A continuous mechanism that involves a systematic process for managing competing issues in marine and coastal areas, including diverse and multiple uses of natural resources. ICM puts into practice effective governance, active partnerships, practical coordinating strategies, sustainable financial resources, and strengthened technical institutional capacities. Under ICM, decisions are made for the sustainable use, development, and protection of coastal and marine areas and resources.

**Integrated management plan** – the integrated management plan is both a process and a document. Its primary goal is to provide a planning framework to achieve healthy ecosystems and sustainable use of fisheries resources and the process by which a given area will be managed for a period of time.

**Integrated watershed management (IWM)** – a rational framework for the development of water resources management strategies.

**Integration** – the process of simultaneously and synergistically working toward multiple objectives and goals (for example, the five goals of the CTI-CFF RPOA), rather than undertaking separate activities in parallel or sequentially. Integration is carried out at the scale of priority geographies or management areas, including those within seascapes. For governance, integration means working across sectors.

**Keystone species** – a species whose presence and role within an ecosystem has a disproportionate effect on other organisms within the system. A keystone species is often a dominant predator whose removal allows a prey population to explode and often decreases overall diversity. Other kinds of keystone species are those, such as some coral species or beavers, that significantly alter the habitat around them and thus affect large numbers of other organisms.

**Livelihood** – “How we make our living, the things we use, and the choices we make to ensure that our lives run as we like.” A sustainable livelihood, then, is a livelihood that “can continue into the future despite any changes and disasters and without losing that which makes the livelihood possible. This may include food production or being prepared for natural disasters. It is important to remember that income generation may be just one part of a livelihood” (Govan, 2011).

**Local early action plan (LEAP)** – a plan to guide adaptation to predicted changes from climate and ocean change. It includes a profile of the community, a climate story, assessment of vulnerability of target resources, and priority adaptation actions that a community wants to take to reduce vulnerability to climate and ocean change. The LEAP can serve as a stand-alone document that can be used to support budget requests, or parts of it can be integrated into existing plans (U.S. Coral Triangle Initiative Support Program, 2013).

**Locally managed area (LMA)** – any area of coastline and marine waters that is managed by the local community in collaboration with government or non-governmental organizations. This definition was developed to be inclusive of other commonly used terms for this type of locally based management including Locally Managed Marine Areas (LMMAs); Territorial Use Rights in Fisheries (TURFs); Community-Based Coastal Resource Management (CBCRM); and Community-Based Management (CBM). LMAs can be a tool for any or all of the following: fisheries management, biodiversity conservation, threatened species management, ecotourism development, and climate change adaptation (Gombos et al., 2013).

**Maladaptation** – an action implemented to reduce vulnerability to climate and/or ocean change that impacts adversely on or increases the vulnerability of other systems, sectors, or social groups (Barnett and O'Neill, 2010).

**Management area** – the spatial extent of the land and/or water that is identified for management integration. Management areas, which should be as large as possible, may fall under the jurisdiction of one or more local communities, local governments, provincial or national governments, or a combination of all of these. Management areas are ideally defined by ecological boundaries, resource use patterns, and governance jurisdictions. Examples of management areas include seascapes, marine protected area (MPA) networks, and fisheries management units (FMUs). Examples of zones within managed areas include various types of MPAs, various types of FMUs, various types of land-based protected or management areas, and others.

**Management effectiveness or MPA effectiveness** – a system for measuring the status of governance and contribution toward management objectives of a marine managed area. Management effectiveness monitoring systems track progress or change in biophysical, social, and governance components of a managed area (Hockings et al., 2006; Maypa et al., 2012).

**Management goal** – a broad statement of a desired outcome. Goals are usually not quantifiable and may not have established timeframes for achievement.

**Management measures** – specific controls applied to achieve the management objective, including gear regulations, areas and time closures (see MPA), and input and output controls on fishing effort.

**Management objective** – a description of a set of activities that, once completed, will achieve the desired outcome. Objectives can be quantified and measured and, where possible, have established timeframes for achievement.

**Management plan** – an explicit set of rules governing how to apply the principles and framework of natural resource management in a given area. This plan may be adapted to changes in the natural and social environment

or upon the basis of new information about how a system functions. It may or may not have a legal basis for implementation.

**Marine managed area** – See Management area.

**Marine management area** – See Management area.

**Marine protected area (MPA)** – a clearly defined geographical space, recognized, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. MPAs include a wide variety of governance types (including community-based areas), and include but are not limited to marine reserves where no extraction is permitted (Dudley, 2008; International Union for the Conservation of Nature-World Commission on Protected Areas, 2008).

**Marine protected area network** – a collection of individual MPAs or reserves operating cooperatively and synergistically, at various spatial scales, and with a range of protection levels that are designed to meet objectives that a single reserve cannot achieve (International Union for the Conservation of Nature-World Commission on Protected Areas, 2008).

**Marine protected area (MPA) networks and marine protected area systems** – MPA networks are usually designed to develop ecological networks and benefits. Due to the expanse of the Coral Triangle, it is not realistic for the CTMPAS to create an ecological network at that scale, and new science indicates that the distance needed for connectivity is smaller than previously thought, allowing smaller areas to provide adequate ecological benefits. In order to differentiate between the numerous smaller MPA ecological networks being compiled into the regional level program, the preferred vision or description is to consider the broader, larger area of multiple networks as the CT MPA System (Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security, 2013).

**Marine reserve** – a type of MPA or zone within a larger MPA where no extraction is permitted and that is primarily established to “reserve” marine life for the future. Marine reserves are also known as no-take areas, fish sanctuaries, fish refugia, no-take replenishment zones, and fisheries replenishment areas (International Union for the Conservation of Nature-World Commission on Protected Areas, 2008).

**Marine spatial planning (MSP)** – See Coastal and marine spatial planning.

**Milestone** – a step or event that, if achieved, indicates progress toward the completion of an activity and/or objective. “Milestone” is sometimes interchanged with “benchmark.”

**Monitoring, control, and surveillance (MCS)** – the overall process and set of activities used to ensure laws, rules and regulations are complied with.

**No-take area, no-take replenishment zone, or no-take reserve** – See Marine reserve.

**Non-climate threats** – non-climate threats include natural hazards and local man-made threats. Non-climate threats make existing resources more sensitive to climate impacts. Target resources may be exposed to natural hazards such as tsunamis and earthquakes. Upland deforestation can cause sedimentation of nearshore waters, degrading coral reef habitats and making them more sensitive to climate impacts from increased sea surface temperature and ocean acidification.

**Objective** – a statement of what is intended to be achieved. An objective should be linked to indicator(s) against which progress can be measured. Positive or negative change resulting from the achievement of an objective is an outcome.

**Ocean acidification (OA)** – ocean acidification occurs when CO<sub>2</sub> from the atmosphere is absorbed into the ocean, reacting with water to create carbonic acid, decreasing both ocean pH and the concentration of the carbonate ion, which is essential for calcification by calcifying marine organisms such as corals (Kleypas et al., 2006).

**Ocean change** – a change in the state of ocean conditions that can be identified (for example, using statistical tests) by changes in the mean and/or the variability of its properties (for example, temperature, salinity, currents, pH), and that persists for an extended period, typically decades or longer. Ocean changes of particular concern include ocean acidification, ocean warming, and ocean de-oxygenation.

**Operational objective** – a short-term objective achievable through management intervention.

**Outcome** – the change in status, attitude, or behavior that results from a set of management activities. An outcome should be able to be tracked through measurement and/or observation over time.

**Participatory monitoring and evaluation (PME)** – the process of evaluating progress carried out by the stakeholders.

**Periodically closed zones** – an area that is open most of the time but may be closed for shorter times such as during spawning events.

**Periodically open zones** – an area that is closed for much of the time but occasionally opens for special harvesting occasions such as for a feast, wedding, or funeral.

**Potential impact** – the estimated impact of both exposure and sensitivity combined. The greater the exposure and/or sensitivity the greater the potential impact.

**Precautionary approach** – where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation (United Nations Conference on Environment and Development, 1992).

**Precautionary principle** – preparing for unknown changes and protecting resources is the best approach for long-term community resilience to keep resource healthy in the long-term. With or without climate and/or ocean change impacts, these are things that will help a community be happier and healthier over time.

**Promoting agency** – the government agency that takes the lead in promoting a new concept, such as EAFM.

**Protected area** – a clearly defined geographical space that is recognized, dedicated, and managed through legal or other effective means to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Includes marine, coastal, and terrestrial protected areas (International Union for the Conservation of Nature-World Commission on Protected Areas, 2008).

**Recruitment** – the addition of a new cohort to a population, or the new cohort that was added. The magnitude of recruitment depends on the time and life history stage at which it is recorded (Mora and Sale, 2002).

**Refuge or refugia** – See Marine reserve.

**Resilience** – the ability of an ecosystem to maintain key functions and processes in the face of (human or natural) stresses or pressures, either by resisting or adapting to change (Nystrom and Folke, 2001). This concept applies to both ecological and social capacity to cope with, adjust to, and recover from external stresses and disturbances such as those brought on by climate change.

**Resource dependency** – the linkage between socioeconomic and ecological systems. Resource dependency may have social dimensions (for example, attachment to place or family); economic dimensions (for example, occupation, income, markets); and environmental dimensions (local and environmental knowledge, attitudes, and skills). Because of this linkage, the vulnerability of ecological and social systems must be assessed together (Marshall et al., 2009).

**Risk** – a function of probability and consequence. Risk assessment is the process intended to calculate or estimate the risk to an object or system. Risk assessment includes identifying the severity of a hazard (its impact) and likelihood of it happening.



**Rotational zones** – a zone that is divided into two or more parts, each of which allows fishing in rotation so there is always one area that does not allow fishing. The area that is closed to fishing can be closed for one or more years at a time and then re-open as the other area closes. These types of zones allow fish populations to improve while they are closed and then be harvested when they are open.

**Rules** – statements, usually written but sometimes unwritten, that clearly define what activities are prohibited or allowed within a certain area (for example, within a specific management zone or a whole management area).

**Scoping** – determination of the broad parameters that project will involve and affect, including a description of the geographic area, stakeholders, fisheries, critical habitats, and issues on which a project or resource management plan must focus (Secretariat of the Pacific Community, 2010).

**Seascape** – large multiple-use marine areas, defined scientifically and strategically, in which government authorities, private organizations, and other stakeholders cooperate to conserve the diversity and abundance of marine life and promote human well-being (Atkinson et al., 2011).

**Sensitivity** – the degree to which a system is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (for example, a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (for example, damages caused by an increase in the frequency of coastal flooding due to sea level rise) (United Nations Intergovernmental Panel on Climate Change, 2007).

**Spawning aggregation** – a group of conspecific fish gathered for the purposes of spawning with fish densities or numbers significantly higher than those found in the area of aggregation during the non-reproductive periods (Domeier and Colin, 1997).

**Species-specific zone** – a zone where harvesting one or more specific species is prohibited to allow those species to recover. For example, a zone where harvesting one or more important herbivore species is not allowed to help keep improve populations and keep herbivores abundant on your reefs so they can keep algae populations down. This type of zone is good for allowing populations of a certain species to improve.

**Stakeholder** – any individual, group or organization who has an interest in (or a “stake”), or who can affect or is affected, positively or negatively, by a process or management decision.

**Sub-national** – a geographic or governance area that is smaller than the national level. Sub-national includes all designations of vertical governance structure between the community level and the national level. Examples include province or multi-province, local government unit (or regency), or multiple local governments working together, and other appropriate designations.

**Sustainable development** – development (improvement in human well-being) that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**Sustainable use** – the harvesting of natural resources that does not lead to long-term decline of the resource and biodiversity, thereby maintaining its potential to meets the needs of the present without compromising the ability of future generations to meet their own needs.

**Target resource** – the social and ecological assets of the community. Social assets may include people, homes, schools, hospitals, roads, business, and livelihoods. Ecological assets may include rivers, sand dunes, wetlands, estuaries, mangroves, coral reefs, and fish. Target resources are the focus of vulnerability assessment and adaptation planning.

**Temporary closure zones** – a zone that is closed at certain times but open at other times. These areas are very similar to traditional closures (*tambu, tabu, sasi*, etc.) and provide a balance of short-term protection of species and harvest of the area. They do not provide long-term improvement to fisheries populations or resilience.

**Territorial use rights in fisheries (TURF)** – a certain territory and certain rights of use relating to fishing within that territory.

**Threatened species** – species (including animals, plants, and fungi) that are facing a high risk of becoming vulnerable, endangered, or critically endangered in the wild in the near future. Also referred to as a near-threatened species (International Union for the Conservation of Nature, 2013).

**Transboundary areas** – areas of land and/or sea that straddle one or more borders between countries, subnational units such as provinces and regions, autonomous areas and/or areas beyond the limit of national sovereignty or jurisdiction, whose constituent parts are especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed cooperatively through legal or other effective means (Sandwith et al., 2001).

**Umbrella species** – species selected for making conservation-related decisions, typically because protecting these species indirectly protects the many other species that make up the ecological community of its habitat.

**US CTI Support Program implementation partners** – lead national agencies for MPAs, fisheries and environment, CTSP consortium members and other NGOs, key academic and technical persons involved in setting policy for MPAs, fisheries and climate change, and CTSP field staff who lead projects in each country supported by the US CTI.

**US CTI Support Program integration sites** – geographic areas where the integration of MPA, fisheries and CCA strategies are being planned and implemented under U.S. government funding and in support of CTI goals and objectives.

**US CTI Support Program priority geographies** – broad geographies within which are the project sites, where CTSP is providing technical and financial support for field conservation.

**Vulnerability** – the degree to which a human or natural system is susceptible to, and unable to cope with, adverse effects of climate and/or ocean change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity (United Nations Intergovernmental Panel on Climate Change, 2007)

**Vulnerability assessment (VA)** – an evaluation of the exposure, sensitivity, and adaptive capacity of a target resource to climate and/or ocean change threats. It serves as a primary input to adaptation planning.

**Vulnerable species** – a species considered to be facing a high risk of extinction in the wild (International Union for the Conservation of Nature, 2013).

**Weather** – atmospheric conditions at a particular place in terms of air temperature, pressure, humidity, wind speed, and rainfall. Weather is what is happening now or is likely to happen in the very near future. You can observe the weather by looking outside to see if it is raining, windy, sunny, or cloudy. You can tell how hot or cold it is by looking at a thermometer.

**Zones** – defined areas within the management area where there are additional rules that apply aimed at a specific purpose (for example, protecting spawning fish or building herbivore populations). These additional rules apply only to that specific area or zone, *not* the whole management area.

## APPENDIX 3. U.S. CTI INTEGRATED TOOLKIT – LIST OF TOOLS

### Summary List of Tools, Sorted by Integrated Strategy

Most of the tools in this list have been developed by the U.S. CTI Support Program specifically to support implementation of the CTI-CFF RPOA, however, a few have not. Some U.S. CTI Support Program tools were developed as generalized tools for use at the CTI-regional level, and others were developed for use in specific countries. Those that were not developed by the U.S. CTI Support Program are nevertheless in use at CTI Priority Geographies and are recommended for use in implementing the RPOA and associated National Plans of Action. Each tool is summarized here and described in detail below, with links to the tool or to its authors for more information or direct support on its use. The tools are listed by their title in alphabetical order. Tools marked with an asterisk (\*) were *not* developed by the U.S. CTI Support Program.

#### A. Governance of management areas

Manage coastal and marine areas based on ecological boundaries, resource use patterns, and governance jurisdictions.

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
Coral Reefs, Fisheries, and Food Security: Integrated Approaches to Addressing Multiple Challenges in the Coral Triangle (EBM Policy Brief)	✓						
Coral Triangle Atlas	✓	✓	✓	✓	✓		✓
Mending Nets: A Handbook on the Prosecution of Fishery and Coastal Law Violations, Second Edition	✓	✓	✓				
The Seascapes Guidebook: How to Select, Develop and Implement Seascapes	✓	✓	✓	✓	✓	✓	

#### B. Fisheries managed for sustainability

Manage multiple fisheries and their associated ecosystems for sustainable use and human benefit under an ecosystem approach to fisheries management (EAFM).

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
Coral Triangle Regional Ecosystem Approach to Fisheries Management (EAFM) Guidelines	✓	✓			✓		
EAFM Indicators (for Indonesia)		✓					
EAFnet (Online tools and decision support by FAO)*		✓					
Ecosystem Approach to Fisheries and Aquaculture: Implementing the FAO Code of Conduct for Responsible Fisheries*		✓					
Ecosystem Approach to Fisheries Management Leaders, Executives and Decision-makers (EAFM LEAD) training program	✓	✓					
ESSENTIAL EAFM - Ecosystem Approach to Fisheries Management Training Course Curriculum	✓	✓					
Guide and Information Sheets on Fisheries Management for Communities*		✓					
Guidelines for Incorporating Climate and Ocean Change into an Ecosystem Approach to Fisheries Management (EAFM) Plan	✓	✓					✓
Tool for Understanding Resilience of Fisheries (TURF) (for Philippines)		✓					✓

### C. Protected habitats and their connectivity

Protect representative and critical habitats (and their connectivity) through MPA networks and other means.

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
Coral Triangle Marine Protected Area System (CTMPAS) Framework and Action Plan	✓		✓				
Designing MPA Networks to Achieve Fisheries, Biodiversity, and Climate Change Objectives in Tropical Ecosystems: A Practitioners Guide		✓	✓				✓
MPA 101 Curriculum (for Indonesia)	✓		✓				
MPA Management Effectiveness Assessment Tool (MEAT) (for the Philippines)			✓				
MPA Management Planning Curriculum (for Indonesia)	✓		✓				
MPA Marine Spatial Planning Curriculum (for Indonesia)	✓		✓				
Reef Resilience Toolkit*		✓	✓				✓
Stakeholder Engagement and Co-management in MPAs Curriculum (for Indonesia)	✓		✓				
Sustainable Fisheries in MPAs Curriculum (for Indonesia)		✓	✓				
Sustainable Tourism in MPAs Curriculum (for Indonesia)			✓		✓		
Technical Guidelines for Evaluating the Management Effectiveness of Aquatic, Coasts and Small Islands Conservation Areas (for Indonesia)			✓				

### D. Threatened species, critical species, and functional groups

Protect and restore species and functional groups that maintain ecosystem integrity.

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
International Plan of Action for the Conservation and Management of Sharks*				✓			

### E. Community and economic development

Diversify and sustain coastal communities' livelihoods.

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
Building on What We Have for a Better Life: Asking the Right Questions to Improve Livelihoods*					✓		
Enterprise Strategies for Coastal and Marine Conservation: Review of Best Practices and Lessons Learned*		✓	✓		✓		
Livelihoods and an Ecosystem Approach to Fisheries Management (COASTFISH)		✓			✓		
Sustainable Livelihoods Enhancement and Diversification (SLED): A Manual for Practitioners*					✓		

## F. Watershed management

Effectively manage watersheds and freshwater resources.

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
Coastal Zone Management Handbook*						✓	
Managing Impacts of Development in the Coastal Zone (Philippine Coastal Management Guidebook No. 7)*	✓					✓	
Ridges to Reefs Conservation Plan for Choiseul Province, Solomon Islands*						✓	

## G. Hazard Risk Reduction

Reduce risk to communities from climate change and coastal hazards.

Tools that support this strategy	Strategies this tool supports						
	A	B	C	D	E	F	G
Adapting to Coastal Climate Change: A Guidebook for Development Planners*							✓
Climate Change Adaptation for Coral Triangle Communities: A Guide for Vulnerability Assessment and Local Early Action Planning (LEAP Guide)							✓
Climate Change Coastal Adaptation Course Curriculum							✓
Coastal Integrity Vulnerability Assessment (CIVA) Tool (for Philippines)							✓
Coral Triangle Adaptation Marketplace: Linking Climate Adaptation Projects & Funds	✓						✓
Designing Resilient Locally Managed Areas in Tropical Marine Environments: A Guide for Community-based Managers		✓	✓				✓
Integrated Coastal Sensitivity, Exposure, Adaptive Capacity to Climate Change Vulnerability Assessment Tool (ICSEA-C-Change) (for Philippines)		✓	✓		✓		✓

### Available Resources and Tools (Annotated Alphabetical List)

#### Adapting to Coastal Climate Change: A Guidebook for Development Planners\*

*Adapting to Coastal Climate Change: A Guidebook for Development Planners* provides a detailed treatment of climate concerns in coastal areas. The guidebook proposes an approach for assessing vulnerability to climate change and climate variability, developing and implementing adaptation options, and integrating options into programs, development plans, and projects at the national and local levels. This is known as a vulnerability and adaptation approach. This approach is presented in a series of five steps: (1) assess vulnerability, (2) select a course of action, (3) mainstream coastal adaptation into coastal policies at all levels of governance, (4) implement adaptation actions, and (5) evaluate for adaptive management.

United States Agency for International Development (USAID). (2009). *Adapting to coastal climate change: A guidebook for development planners*. Washington, DC: University of Rhode Island Coastal Resources Center and International Resources Group (IRG) for USAID.

Available online at <http://www.crc.uri.edu/download/CoastalAdaptationGuide.pdf>

#### Building on What We Have for a Better Life: Asking the Right Questions to Improve Livelihoods

The aim of this guide and workbook is to help people assess the potential of different livelihood options. This workbook is comprised of a folder with seven guidance pages and may also contain loose sheets covering

- information on various common livelihood opportunities in selected Pacific Island countries;

- a list of contact people and information sources in your country; and
- forms or templates to fill in and record your notes.

Govan, H. (2011). Building on what we have for a better life: Asking the right questions to improve livelihoods (FSPI Reports). Suva, Fiji.

Available online at <http://www.fspi.org.fj/index.php/sustainable-livelihoods-resources/a-community-tool-a-user-guide>

### **Climate Change Adaptation for Coral Triangle Communities: A Guide for Vulnerability Assessment and Local Early Action Planning (LEAP Guide)**

The LEAP Guide is organized into four major steps to support the integration of planned adaptation within the context of existing development objectives and plans and ongoing projects and programs. Intended users include national and local governments, marine and coastal managers, disaster managers, and community development practitioners who work with coastal communities on a wide range of development issues such as food security, health, biodiversity conservation, and economic development. It is recommended that a cross-sector team be formed to facilitate and guide communities through the process. Each step is designed for active community participation and engagement. In addition, some activities may require input from technical experts from different disciplines.

Understanding and defining climate threats in a community and assessing vulnerability to these threats are themselves early actions that support planned adaptation. This knowledge of climate threats and vulnerability is used to identify adaptation actions that can be implemented by the community. The planning process is designed to help communities, through a series of activities and exercises, develop a Local Early Action Plan (LEAP) that identifies activities that can help to reduce the impacts of climate change on their natural and social resources. The LEAP is intended to be a simple document that serves as a stand-alone plan or that can be incorporated into other plans.

U.S. Coral Triangle Initiative Support Program. (2013). Climate change adaptation for coral triangle communities: Guide for vulnerability assessment and local early action planning (LEAP Guide). Prepared with support from the United States Agency for International Development.

Available online at [http://www.uscti.org/uscti/Resources/LEAP\\_Final\\_complete.pdf?utm\\_source=CCA+LEAP+Guide+Distribution&utm\\_campaign=CCA+LEAP+Guide&utm\\_medium=email](http://www.uscti.org/uscti/Resources/LEAP_Final_complete.pdf?utm_source=CCA+LEAP+Guide+Distribution&utm_campaign=CCA+LEAP+Guide&utm_medium=email)

### **Climate Change Coastal Adaptation Course Curriculum**

The Climate Change Coastal Adaptation Course is an eight-day, highly interactive course, plus a two-day training of trainers. At the conclusion of both courses, the desired results are:

- National government, local government, and assisting organization teams are strengthened to
  - identify climate change risks and assess adaptation options for critical coastal infrastructure, habitats, and vulnerable segments of society (for example, livelihoods/gender) with links to marine protected area and coastal fisheries management and
  - lead an integrated local early action planning process for CCA and manage CCA programs at the national and sub-national levels.
- Your internal team will have a plan developed to conduct a local vulnerability assessment and identify early actions for CCA in one or two priority/demo sites for immediate implementation.
- National resource team (university, experts, links with other organizations, NGOs) is strengthened to support the national and local actions as the country teams move toward implementation and replication of the curriculum, adaptation planning and implementation actions.
- National managers and resource persons are better able to contribute to regional CTI capacity and future replication and sharing.

Report available online at <http://www.coraltriangleinitiative.org/library/report-cti-cff-climate-change-adaptation-coastal-communities-course-port-moresby-papua-new>

### **Coastal Integrity Vulnerability Assessment (CIVA) Tool (for Philippines)**

The CIVA tool is an objective tool for assessing the vulnerability of coastal areas to erosion and inundation resulting from wave impact and sea-level rise. This VA tool is made simple enough for non-specialists such as coastal managers to implement. It is designed to combine the coastal system's susceptibility to change with its natural ability to adapt to changing environmental conditions, "yielding a relative measure of the system's natural vulnerability to the effects of sea level-rise." This tool assesses the vulnerability of the physical coast to erosion in relation to CC hazards; includes a high (fine) resolution of analysis; provides direct guidance in developing CC adaptation strategies; and incorporates variables relating to natural habitats and processes. This tool may be applied by coastal managers and field practitioners with assistance from coastal geology experts in data analysis and interpretation. Best if intended users receive training on correct and appropriate application of the tool (for example, with guidance of the Coastal Learning Adaptation Network or CLAN).

Siringan, F., Sta. Maria, Y., Samson, M., Licuanan, W., & Rollon, R. (2012). Coastal integrity vulnerability assessment tool. In Marine Environment and Resources Foundation Inc. and Conservation International. *Vulnerability Assessment Tools for Coastal Ecosystems: A Guidebook*, Quezon City, Philippines.

### **Coastal Zone Management Handbook**

This handbook is the first complete manual that provides complete guidance on coastal matters. It is considered by many to be the best overall presentation of the various aspects of integrated coastal zone management (ICZM). Written by an international consultant, this handbook reflects a global perspective on the natural resources, sensitivities, economics, development, productivity and diversity of coastal zones. The emphasis is on tropical and subtropical coastal ecosystems. The book describes the strategic basis for coastal management, provides a set of working tools for management and planning activities, and presents case studies of management projects around the globe.

Clark, J. R. (1996). Coastal zone management handbook. Florida: CRC Press.

### **Coral Reefs, Fisheries, and Food Security: Integrated Approaches to Addressing Multiple Challenges in the Coral Triangle (EBM Policy Brief)**

This short policy brief describes the advantages of EBM of marine and coastal resources and highlights key steps for national and regional bodies to take toward implementing this framework.

U.S. Coral Triangle Initiative Support Partnership. (2013). Coral reefs, fisheries, and food security: Integrated approaches to addressing multiple challenges in the Coral Triangle. Jakarta, Indonesia: CTSP.

### **Coral Triangle Adaptation Marketplace: Linking Climate Adaptation Projects & Funds**

The Coral Triangle Adaptation Marketplace was developed as a means of providing the essential information on funds for climate change adaptation projects focused on coastal and marine areas—and doing so in an efficient, accessible format. The function of the Adaptation Marketplace is to connect investors with project developers according to matchmaking criteria in an interactive and supported forum, thus increasing the numbers of adaptation projects implemented in the Coral Triangle region.

Available online at <http://www.adaptationmarketplace.org/>

### **Coral Triangle Atlas**

The Coral Triangle Atlas provides decision-making assistance using existing data sets for selected sites in the Coral Triangle and helps decision-makers place their work into a regional context. The CT Atlas is an online GIS database, providing governments, NGOs, and researchers with a view of spatial data at the regional scale. Data on fisheries, biodiversity, natural resources, and socioeconomics have been collected for decades by scientists and managers

working in different parts of the Coral Triangle. The CT Atlas aggregates this data into region-wide layers to provide an overview and support management planning and decision-making at a regional level. The CT Atlas has been designated as the primary data storage and analysis tool to track progress towards the goals of the Coral Triangle RPOA.

Available online at <http://ctatlas.reefbase.org/>

### **Coral Triangle Marine Protected Area System (CTMPAS) Framework and Action Plan**

A policy framework for guiding the development and implementation of the Coral Triangle MPA System from a regional perspective. It is the guiding policy for what will constitute the CTMPAS and at the same time lays out an action plan for implementation up to 2020. The framework specifies the criteria for how MPAs and MPA networks in the region contribute and become part of the CTMPAS. The framework contains four categories of MPAs.

Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF). 2013. Coral triangle marine protected area system framework and action plan. Cebu City, Philippines: CTI-CFF, USAID CTSP, and NOAA.

### **Coral Triangle Regional Ecosystem Approach to Fisheries Management (EAFM) Guidelines**

The EAFM Regional Guidelines provide information and guidance on EAFM in the context of achieving the CTI-CFF Regional Plan of Action. The reasons why EAFM is a preferred option for sustainable livelihoods and food security is outlined, as are the differences between EAFM and conventional fisheries management and other management approaches. The main section considers the planning and implementation of EAFM and outlines the five-step process to creating and implementing an EAFM plan, guidance over the activities that ought to be conducted at a national and local level is given. The document also highlights the need to increase the scale at which fisheries are management and the need for increased coordination across sectors and agencies/departments. The primary audience for this guide includes fishery, environment and non-governmental organization staff, as well as related economic development and planning staff, at the national, provincial/state and district/local levels who are responsible for administrating fisheries and the marine environment in which they operate.

Pomeroy, R., Brainard, R., Heenan, A., Moews, M., Shackeroff, J., & Armada, N. (2013). Coral triangle regional ecosystem approach to fisheries management (EAFM) guidelines. Honolulu, HI: USAID Coral Triangle Support Partnership.

### **Designing MPA Networks to Achieve Fisheries, Biodiversity, and Climate Change Objectives in Tropical Ecosystems: A Practitioners Guide**

This guide provides an integrated set of biophysical principles to help practitioners design networks of tropical MPAs to achieve fisheries sustainability, biodiversity conservation, and ecosystem resilience in the face of climate change. The document also provides a succinct, graphic, and user-friendly synthesis of the best available scientific information for practitioners who may not have access to, or the time to review, the increasing amount of research literature regarding this issue.

Green, A., White, A., & S. Kilarski (eds). (2013). Designing marine protected area networks to achieve fisheries, biodiversity, and climate change objectives in tropical ecosystems: A practitioner guide. Cebu City, Philippines: The Nature Conservancy and the USAID CTSP.

### **Designing Resilient Locally Managed Areas in Tropical Marine Environments: A Guide for Community-based Managers**

This guide was developed to support facilitators in community-based awareness-raising and planning processes that support the design of resilient Locally Managed Areas (LMAs) and LMA networks. Science-based principles and management recommendations from two documents were used to support the development of this document.



The first supporting document is a technical report that provided the scientific basis for this approach. This document provides a scientific review of the literature and 15 biophysical principles for MPA network design. It is available at: <http://www.coraltriangleinitiative.org/library/guidelines-biophysical-principles-designing-resilient-networks-marine-protected-areas>. The second was a guide for field practitioners, which provides a succinct, graphic, and user-friendly synthesis of the best available scientific information for practitioners who may not have access to, or the time to review, the increasing amount of research literature regarding this issue. It can be downloaded at: <http://www.uscti.org/uscti/Resources/MPA%20Practitioner%20Guide%20Final%207Mar13.pdf>

Gombos, M., Atkinson, S., Green, A., & Flower, K. (Eds.). (2013). *Designing resilient locally managed areas in tropical marine environments: A guide for community-based managers*. Jakarta, Indonesia: USAID Coral Triangle Support Partnership.

### **EAFM Indicators (for Indonesia)**

The Ecosystem Approach to Fisheries Management (EAFM) introduces a series of modifications to conventional fisheries governance in order to improve performance and contribute to sustainable development. It provides a framework for implementing the Ecosystem Approach outlined in the Convention on Biological Diversity and for applying it in the marine environment.

Implementation of EAFM requires a suite of indicators to monitor and evaluate implementation progress and performance of fishery management. The tool consists of indicators for Indonesian fisheries spanning habitat, fishery resource, fishing technique, economic, social and institutional domains via expert elicitation and participative review. The set of indicators to monitor and evaluate progress of EAFM implementation is completed with its assessment module. It covers the methodology for data collection, analysis, and interpretation.

Pilot-testing has demonstrated that the indicators have been used successfully to assess the performance and providing the recommendation for the improvement of various fishery scenarios – namely species-based fisheries, area-based fisheries, and marine protected areas.

Indonesia Ministry of Marine Affairs and Fisheries, WWF-Indonesia, & Bogor Agricultural University. (2011). *Ecosystem approach to fisheries management in Indonesia: Establishing indicators and preliminary assessment of EAFM performance*. Jakarta, Indonesia: CTSP.

### **EAFnet**

EAFnet has been developed to facilitate access to the information and resources that are available at FAO on the application of the Ecosystem Approach to Fisheries (EAF). This includes background information about EAF, the EAF toolbox to assist with EAF management planning and implementation, plus links to all the various EAF projects being undertaken by FAO.

The EAF Toolbox has been designed to guide users through each of the four main EAF management planning steps and activities using simplified text and clear instructions. The toolbox also helps users decide which tool(s) could be most appropriate for each step given the type of fishery, their resources, and capacity. As of January 2012, the EAF Toolbox includes 54 tools.

Available online at <http://www.fao.org/fishery/eaf-net/en>

### **Ecosystem Approach to Fisheries and Aquaculture: Implementing the FAO Code of Conduct for Responsible Fisheries**

This publication provides guidance on how to implement the FAO Code of Conduct for Responsible Fisheries (CCRF) using an ecosystem approach to fisheries and aquaculture. The CCRF is a voluntary code covering all

aspects of the management and development of fisheries and is designed to ensure that they are developed sustainably without adversely affecting the livelihoods of local communities that share the same resources as the fisheries.

The authors outline the basic principles of the CCRF, describe concrete steps to be taken to use the ecosystem approach effectively, and recommend certain institutional changes and reforms that will be necessary in the Asia-Pacific region if the potential of the ecosystem approach is to be realized.

Staples, D., & Funge-Smith, S. (2009). *Ecosystem approach to fisheries and aquaculture: Implementing the FAO Code of Conduct for Responsible Fisheries*. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand: RAP Publication 2009/11.

Available online at: <ftp://ftp.fao.org/docrep/fao/012/i0964e/i0964e00.pdf>

### **Ecosystem Approach to Fisheries Management Leaders, Executives and Decision-makers (EAFM LEAD) training program**

This two-day EAFM training course has been developed for leaders, executives, and decision-makers (LEAD) to provide an overview of the features of an Ecosystem Approach to Fisheries Management (EAFM) and also address the challenges in implementing this broader approach to management and provide next steps to support EAFM. The format of the course involves presentations and facilitated discussion on why, what and how to implement an EAFM, with reference to the existing fisheries management policies and practices specific to each country in which the course is conducted. The primary audience for this curriculum includes senior-level representatives from government agencies primarily associated with fisheries and the environment, in addition to economic development and planning.

Brainard, R., Heenan, A., Maurin, P., Moews, M., & Pomeroy, R. (2013). *Ecosystem approach to fisheries management leaders, executives and decision-makers (EAFM LEAD) training program*. Honolulu, Hawaii: Pacific Islands Fisheries Science Center, National Oceanic and Atmospheric Administration.

### **Enterprise Strategies for Coastal and Marine Conservation: Review of Best Practices and Lessons Learned**

The purpose of this guidebook is to assist coastal practitioners and local government officials to promote enterprise strategies in coastal communities with the intent of simultaneously promoting biodiversity conservation and poverty alleviation, and to achieve both objectives on a sustainable (self-financing) basis. The audience includes those in the conservation community without training and expertise in enterprise development, as well as those in the enterprise development and microfinance community without expertise in coastal and marine conservation. While the emphasis is on rural areas in developing countries, the approach can be adapted for use in more urban and developed contexts.

Torell, E., & Tobey, J. (2012). *Enterprise strategies for coastal and marine conservation: A review of best practices and lessons learned*. Coastal Resources Center, University of Rhode Island.

Available online at [http://www.crc.uri.edu/download/SUCCESS\\_2013\\_Enterprise\\_Strategies.pdf](http://www.crc.uri.edu/download/SUCCESS_2013_Enterprise_Strategies.pdf)

### **ESSENTIAL EAFM - Ecosystem Approach to Fisheries Management Training Course**

This is a five-day course (with a two-day training-the-trainers add-on) to provide basic knowledge on the Ecosystem Approach to Fisheries Management (EAFM) process and decision-making for responsible and sustainable capture fisheries. Participants will learn about EAFM concepts and work with an EAFM plan template to develop a draft meaningful plan for their fisheries. Participants will learn the principles of co-management and how to foster cross-sector co-ordination, as well as practice the crucial skills of effective communication, facilitation, and conflict management. This course was developed for the CTI by Bay of Bengal Large Marine Ecosystem (BOBLME) Project, Food and Agricultural Organization of the United Nations (FAO), the CTSP EAFM Regional Action Team, and

NOAA. The primary audience for this curriculum includes fishery, environment, and non-governmental organization staff, as well as related economic development and planning staff, at the national, provincial/state and district/local levels who are responsible for administrating fisheries and the marine environment in which they operate.

Staples, D., Brainard, R., Capezzuoli, S., Funge-Smith, S., Grose, C., Heenan, A., Hermes, R., Maurin, P., Moews, M., O'Brien, C., & Pomeroy, R. 2013. Essential EAFM. Ecosystem Approach to Fisheries Management Training Course. Bay of Bengal Large Marine Ecosystem (BOBLME) Project, Food and Agriculture Organization of the United Nations and US-Coral Triangle Initiative, National Oceanic and Atmospheric Administration.

### **Guide and Information Sheets on Fisheries Management for Communities**

The purpose of the information sheets is to assist fishing communities and people working with them by providing information on species of interest and advice on appropriate fisheries management options for them. Community-based fisheries management involves fishing communities taking a key role in managing the fisheries resources on which they rely for both food security and livelihoods. To do this, communities require technical information and advice on the resource species involved.

Available online at [http://www.spc.int/DigitalLibrary/Doc/FAME/Brochures/Anon\\_11\\_ISFC\\_00\\_Guide.pdf](http://www.spc.int/DigitalLibrary/Doc/FAME/Brochures/Anon_11_ISFC_00_Guide.pdf)

### **Incorporating Climate Change and Ocean Acidification Into an Ecosystem Approach to Fisheries Management (EAFM) Plan**

This document provides information and guidance on the impacts of climate and ocean change in the context of an Ecosystem Approach to Fisheries Management (EAFM). The guidance here is specifically intended to be used alongside the Coral Triangle Regional Ecosystem Approach to Fisheries Management Guidelines. The guidelines can be divided into four main sections. The first reviews information on how climate and ocean conditions are projected to change and the likely biological and social implications. The second section considers additional activities, which, if included in the EAFM planning process, can be used to understand and plan for climate and ocean change-related impacts in near-shore fisheries and coastal habitats. The third section highlights actual implementation considerations including scaling up management, adaptation options and an adaptation option framework, and the role of monitoring in detecting climate and ocean change in fisheries management. National and regional level activities to support EAFM in changing climatic and ocean conditions are offered in the final section.

Heenan, A., Pomeroy, R., Brainard, R., Amri, A., Aliño, P., Armada, N., Bell, J., Cheung, W., David, L., Guieb, R., Green, S., Jompa, J., Leonardo, T., Logan, C., Mamauag, S., Munday, P., Parker, B., Shackeroff, J., & Yasin, Z. (2013). Incorporating climate change and ocean acidification into an ecosystem approach to fisheries management (EAFM) plan. Honolulu, HI: USAID Coral Triangle Support Partnership.

### **Integrated Coastal Sensitivity, Exposure, Adaptive Capacity to Climate Change Vulnerability Assessment Tool (ICSEA-C-Change), Version 1.0 (for Philippines)**

This VA tool measures integrated vulnerability of coastal system to synergistic climate change impacts. It can be used as a scoping and rapid reconnaissance tool and offers a coarse resolution of analysis. It can be used to compare general vulnerabilities across sites but must be complemented with other Coastal VA tools for use in adaptation planning. Data needs include information from existing research and previous resource evaluations (for example, provincial and municipal development plans, PCRA). Coastal managers and field practitioners may choose to use the TURF in the Philippines with minimal assistance from marine experts. However, it is best if the intended users receive training on correct and appropriate application of the tool from representatives the development team or their selected representatives.

Licuanan, W., Siringan, F., Mamauag, S., Samson, M., Aliño, P., Rollon, R., Sta Maria, Y., Quibilan, M., Martinez, R.J., Espana, N., Geronimo, R., Villanoy, C., Cabrera, O., Salamante, E., Micalat, E., David, L. (2012). Integrated coastal sensitivity, exposure, and adaptive capacity to climate change VA Tool. In Marine Environment and Resources

Foundation Inc. and Conservation International. *Vulnerability assessment tools for coastal ecosystems: A guidebook*. Quezon City, Philippines.

### **International Plan of Action for the Conservation and Management of Sharks**

This International Plan of Action was developed as the FAO Committee on Fisheries members in 1997 found that it would be necessary to have some form of international agreement in order to manage the concerned issues in compliance with the Code of Conduct for Responsible Fisheries. The most suitable instrument for this issue was found to be a voluntary International Plan of Action. The text was developed in the course of two intergovernmental meetings, open to all FAO members, held in 1998. The IPOA was adopted by the 23rd session of the FAO Committee on Fisheries in February 1999 and endorsed by the FAO Council at the session it held in June 1999.

Food and Agriculture Organization of the United Nations. 1999. International plan of action for reducing incidental catch of seabirds in longline fisheries; International Plan of Action for the Conservation and Management of Sharks; International Plan of Action for the Management of Fishing Capacity. Rome: FAO.  
Available online at <ftp://ftp.fao.org/docrep/fao/006/x3170e/X3170E00.pdf>

### **Livelihoods and an Ecosystem Approach to Fisheries Management (COASTFISH)**

This brief document describes livelihoods strategies that are in line with EAFM. It was written to fulfill the needs of the COASTFISH activity within the CTI-CFF RPOA.

Pomeroy, R. (2013). Livelihoods and an ecosystem approach to fisheries management. Jakarta, Indonesia: USAID Coral Triangle Support Partnership.

### **Mending Nets: A Handbook on the Prosecution of Fishery and Coastal Law Violations, Second ed**

This book addresses the issues of law enforcement for coastal management in the Philippines. It provides an overview of the legal mandates of different government and non-government entities with law enforcement functions. This guidebook discusses in part the resources in the coastal and marine environment as well as the offenses that occur in them. Approaches to addressing coastal law violations previously available only in military literature are also explained in simple terms, in recognition of the increased participation of non-uniformed agencies in law enforcement resulting from recent enactments. Lastly, emerging trends and best practices in coastal law enforcement are presented. The annexes provide additional information that can be useful to both law enforcement practitioners and coastal resource management planners.

Environmental Legal Assistance Center. 2008. Mending nets: A handbook on the prosecution of fishery and coastal law violations, Second ed. The Environmental Legal Assistance Center, Cebu City, Philippines.  
Available online at [http://oneocean.org/download/db\\_files/mending\\_nets2nd\\_ed.pdf](http://oneocean.org/download/db_files/mending_nets2nd_ed.pdf)

### **MPA 101 Curriculum (for Indonesia)**

Eight-day course that introduces the basic concepts of MPA management. Course is usually administered by NOAA's capacity development team. In the case of Indonesia, the MPA 101 course was adapted and piloted for MPA managers through a partnership between NOAA, Indonesia's Ministry of Marine Affairs and Fisheries (MMAF), and Conservation International. The course includes the following sessions: Introduction to MPAs (1/2 day); marine ecosystems and interactions (1 day); community-based management (1 day); MPAs and fisheries (1 day); MPAs and enforcement (1 day); sustainable tourism (1 day); MPAs and education (1 day); field site visits (2 half-days), interspersed. This curriculum has been adopted and accredited for use by MMAF for training MPA managers across the country.

Ministry of Marine Affairs and Fisheries. (2013). Marine protected area 101. Jakarta, Indonesia: Badan Pengembangan Sumber Daya Manusia (BPSDM), MMAF, Government of Indonesia.

### **MPA Management Effectiveness Assessment Tool (MEAT) (for the Philippines)**

The MPA MEAT is a harmonized version of the MPA Report Guide of the Coastal Conservation and Education Foundation, Inc. (CCEF, White et al., 2004) as modified by the Philippine Environmental Governance Project 2 (EcoGov2) (Arceo et al., in prep), facilitated by the MPA Support Network (MSN) through the CTSP. Some elements are incorporated in the MPA MEAT to gauge and highlight important threshold indicators and processes that help promote and achieve MPA management effectiveness outputs and outcomes.

Available online at <http://www.coraltriangleinitiative.org/library/toolkit-marine-protected-area-management-effectiveness-assessment-tool-february-2011>

### **MPA Management Planning Curriculum (for Indonesia)**

This six-day course is focused on teaching MPA managers the skills required to develop and implement an MPA Management plan. Sessions include setting of management objectives, identifying threats to key resources, and identifying management activities to reduce these threats using a “threat-action model” approach. Managers also learn how to create work plans based on the outputs of these planning activities, including creating timelines and budgets.

Developed by NOAA with support from Conservation International in Indonesia, this curriculum has been adopted and accredited for use by the Government of Indonesia’s Ministry of Marine Affairs and Fisheries for training MPA managers across the country.

National Oceanic and Atmospheric Administration (NOAA). (2013). Sustainable fisheries in MPAs. Jakarta, Indonesia: International MPA Capacity Building Program of National Marine Sanctuaries.

### **MPA Marine Spatial Planning Curriculum (for Indonesia)**

Marine spatial planning (MSP) can provide an integrated, ecosystem-based framework to maintain marine biodiversity of the area while allowing for sustainable use of the marine and coastal environment. To understand and eliminate the conflicts between multiple use and biodiversity protection, it is important to examine a range of management approaches and options to determine the best fit, both in concept and practical application. Marine spatial planning draws on many other marine resource management frameworks that managers are already familiar with. For example, MSP provides managers with an opportunity to incorporate frameworks such as ecosystem-based management, integrated coastal zones management, ocean zoning, and other management models into a broader and more comprehensive planning model.

This eight-day curriculum includes an overview of MSP and the MSP process; methods for characterizing an MPA; understanding adjacent environments and predicting future conditions; introduction to spatial planning tools; condition analyses and how to use the information generated; spatial planning; setting boundaries and zones; and marine spatial plan implementation.

Ministry of Marine Affairs and Fisheries. (2013). MPA management planning. Jakarta, Indonesia: Badan Pengembangan Sumber Daya Manusia (BPSDM), MMAF, Government of Indonesia.

### **Reef Resilience Toolkit**

Two modules, (1) coral reefs and (2) fish spawning aggregations, provide coral reef managers with guidance on building resilience to climate change into the design of MPAs and daily management activities. Both modules follow the same structure, and help is available. The toolkit is also available on CD.

Available online at <http://www.reefresilience.org/>

### **Ridges to Reefs Conservation Plan for Choiseul Province, Solomon Islands**

This ridges-to-reef conservation plan harmonizes the local knowledge with a modern conservation planning approach. It recognizes that what we do on the land has a profound effect on our streams, rivers, and nearshore areas. In May 2009, a participatory mapping workshop identified and mapped conservation features. These data were then digitized for conservation planning. In line with the Solomon Islands' commitment under the Convention of Biological Diversity (CBD, 2006), the target representation of conservation features for a protected area network was set at a base of 10 percent of total area of each feature, with a 20 percent climate change scenario also generated. Sites that are of critical importance were given elevated targets: 50 percent of total area for fish spawning aggregations and 95 percent for nesting beaches of endangered turtles. In October 2009, LLCTC participants provided their unanimous support for two recommendations from the process: (1) Establish a Luru Protected Areas Network (LPAN) and (2) Each ward establishes at least one marine protected area and one terrestrial protected area. The implementation of the LPAN is a community-driven process that is guided by the Choiseul Ridges to Reef Conservation Plan.

Lipsett-Moore, G., Hamilton, R., Peterson, N., Game, E., Atu, W., Kereseka, J., Pita, J., Ramohia, P., & Siota, C. (2010). Ridges to reefs conservation plan for Choiseul Province, Solomon Islands. TNC Pacific Islands Countries Report No. 2/10.

### **The Seascapes Guidebook: How to Select, Develop and Implement Seascapes**

This document provides guidance to identify candidate seascapes, select seascapes for investment, and develop management strategies for selected seascapes. Seascapes are defined as "Large, multiple-use marine areas, defined scientifically and strategically, in which government authorities, private organizations, and other stakeholders cooperate to conserve the diversity and abundance of marine life and to promote human well-being." Although specifically prepared for use by the Coral Triangle Initiative countries, this guide will be useful in other regions as well. It is designed for marine practitioners as they work to develop seascape management regimes and draws on the experiences of seascapes and marine management practitioners from around the globe. The recommended steps can be adapted as necessary to fit varying circumstances and organizational mandates.

Atkinson, S., Esters, N., Farmer, G., Lawrence, K., & McGilvray, F. (2011). The seascapes guidebook: How to select, develop and implement seascapes. Arlington, VA: Conservation International. Available online at <http://www.coraltriangleinitiative.org/library/guidebook-seascapes-guidebook-how-select-develop-and-implement-seascapes-october-2011>

### **Sustainable Livelihoods Enhancement and Diversification (SLED): A Manual for Practitioners**

This guidebook provides development practitioners with an introduction to the SLED process and guidance for facilitating that process. The SLED approach has been developed by IMM Ltd. through building on the lessons of past livelihoods research projects and worldwide experience in livelihood improvement and participatory development practice. It aims to provide a set of guidance for development and conservation practitioners whose task it is to assist people to enhance and diversify their livelihoods. Under the Coral Reefs and Livelihoods Initiative (CORALI), this approach has been field-tested and further developed, in very different circumstances and institutional settings, in six sites across South Asia and Indonesia.

While this process of testing and refining SLED has been carried out specifically in the context of efforts to manage coastal and marine resources, it is an approach that can be applied widely wherever natural resources are facing degradation because of unsustainable human use. The SLED approach provides a framework within which diverse local contexts and the local complexities of livelihood change can be accommodated.

IMM Ltd. (2008). Sustainable livelihood enhancement and diversification (SLED): A manual for practitioners. International Union for the Conservation of Nature (IUCN). Available online at <http://www.icran.org/pdf/SLED%20Manual%20Final%20-%20Low%20Res.pdf>

### **Sustainable Fisheries in MPAs Curriculum (for Indonesia)**

This six-day course is focused on teaching MPA managers the basics of fish population dynamics, growth patterns, connections with the ecosystem. Managers learn assess threats to fisheries and fish populations, identify appropriate measures to reduce these threats, and develop a fisheries management plan for use within their jurisdictional boundaries.

National Oceanic and Atmospheric Administration (NOAA). (2013). Sustainable fisheries in MPAs. Jakarta, Indonesia: International MPA Capacity Building Program of National Marine Sanctuaries.

### **Sustainable Tourism in MPAs Curriculum (for Indonesia)**

This six-day course is an introduction to the concept of sustainable tourism, focusing on the “triple bottom line” of environmental sustainability, social responsibility, and profitability. MPA managers learn to compare sustainable to conventional tourism. The course a planning process to assess whether a tourism activity is compatible with an MPA’s goals and objectives. MPA managers learn to plan for and manage impacts from tourism using the “limits of acceptable change” model.

National Oceanic and Atmospheric Administration (NOAA). (2013). Sustainable tourism in MPAs. Jakarta, Indonesia: International MPA Capacity Building Program of National Marine Sanctuaries.

### **Stakeholder Engagement and Co-management in MPAs Curriculum (for Indonesia)**

This six-day course focuses on . The first half is focused on strategies for effective stakeholder engagement, participatory decision-making, and consensus building. It includes stakeholder identification and characterization, including visioning the level to which each stakeholder can participate. The course also focuses on building concrete facilitation skills to ensure effective engagement. The second half focuses on various models for co-management, from advisory councils to full co-management and joint decision making. The course helps MPA managers identify the appropriate model of co-management and degree of stakeholder engagement is most compatible with their MPA.

National Oceanic and Atmospheric Administration (NOAA). (2013). Stakeholder engagement and co-management in MPAs. Jakarta, Indonesia: International MPA Capacity Building Program of National Marine Sanctuaries.

### **Technical Guidelines for Evaluating the Management Effectiveness of Aquatic, Coasts and Small Islands Conservation Areas (for Indonesia)**

This guide for Improving Marine Protected Area Management Effectiveness (MPAME) in Indonesia presents a simple yet robust tool to assess how an MPA is doing in its management and ultimately how well an MPA meets its conservation goals or objectives. In fact, although MPAs may be set up to achieve different objectives in different areas of the country, this guide has been developed for flexibility and adaptability and is intended to be used to assess MPAs anywhere in the country, at a range of scales and under a range of different governance mechanisms. In addition to providing an easy means of assessing progress or problems within MPAs, this guide is also designed as a learning tool that supports adaptive management. It provides a simple process for MPA planners, managers, and stakeholders to assess what has been accomplished within an MPA and what is missing or needs more attention to make it more effective.

Directorate for Conservation of Area and Fish Species (2012). Technical guidelines for evaluating the management effectiveness of aquatic, coasts and small islands conservation areas (E-KKP3K). Jakarta: Directorate for Conservation of Area and Fish Species, Directorate General of Marine, Coasts and Small Islands, Ministry of Marine Affairs and Fisheries.

Available online at [http://www.wdpa.org/ME/PDF/MPAME%20Guide\\_March2011.pdf](http://www.wdpa.org/ME/PDF/MPAME%20Guide_March2011.pdf)

### **Tool for Understanding Resilience of Fisheries (TURF) (for Philippines)**

The TURF is a rapid assessment of vulnerability for coastal fisheries in the Philippines. This tool can be used in planning programs of actions under an adaptive management strategy. Insights on adaptation measures arising from vulnerability assessment (VA) can be incorporated in coastal resource management plans such as

- MPA establishment and management;
- appropriate fisheries regulations;
- rehabilitation and protection of nearshore habitats; and
- baseline profiling, monitoring, and evaluation.

Mamauag, S., & Aliño, P. (2012). Tool for understanding resilience of fisheries. In Marine Environment and Resources Foundation Inc. and Conservation International. *Vulnerability assessment tools for coastal ecosystems: A guidebook*. Quezon City, Philippines.







*Integrated management addresses multiple objectives and impacts at once. When implemented using an ecosystem approach, integrated management can protect food security and support the long-term sustainability of important coastal and ocean resources across the Coral Triangle.*



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The Misool Eco Dive Resort in Raja Ampat, Indonesia, is committed to “demonstrating that tourism can support a local economy.”