



SULU-CELEBES SEA SUSTAINABLE FISHERIES MANAGEMENT PROJECT



REGIONAL STRATEGIC ACTION PROGRAM



RSAP

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FISHERIES MANAGEMENT PROJECT

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Acknowledgment:

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Endorsement of the Strategic Action Program for the Sustainable Fisheries Management of the Sulu-Celebes (Sulawesi) Sea Large Marine Ecosystem (SCS-LME)

The Sulu-Sulawesi Marine Ecoregion Tri-National Committee;

In recognition of the urgency to arrest environmental degradation in the Sulu and Celebes (Sulawesi) Seas due to the causes identified in the Transboundary Diagnostic Analysis (TDA) of the GEF/UNDP initiative entitled, "Sulu-Celebes Sea Sustainable Fisheries Management Project (SCS-SFMP);"

Recognizing also the co-ordinating mechanism through the Sulu-Sulawesi Marine Ecoregion (SSME) Tri-National Committee (Tri-Com) of Indonesia, Malaysia, and Philippines that agreed to adopt the ecoregion approach to conservation embodied in the Ecoregion Conservation Plan (ECP);

Encouraging other relevant agencies, national and regional programs (e.g. CTI, PEMSEA, ASEAN, APEC), donors, development partners, and stakeholders to actively participate and support the effective and successful implementation of this Strategic Action Program (SAP)

Noting that several small pelagic fish stocks in Indonesia, Malaysia, and Philippines genetically belong to one stock and shared by the countries provided strong scientific evidence and served as the rationale for the joint management of small pelagic fish stocks in the Sulu and Celebes Seas;

Noting further that the ecosystems approach to fisheries provides co-ordinated management to address the environmental problems of the SCS-LME, with clear management targets and actions;

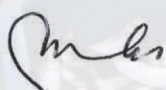
Appreciating the support and assistance provided by the Global Environment Facility (GEF) through the Conservation International-Philippines in facilitating the preparation of the Strategic Action Program (SAP) and the Transboundary Diagnostic Analysis (TDA);

Following the consultations with relevant government agencies and key stakeholders in the region, **Endorse** the Strategic Action Program for the sustainable fisheries management of the Sulu-Celebes Sea Large Marine Ecosystem.



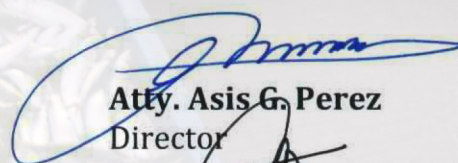
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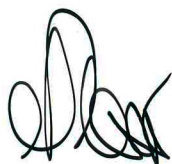
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Foreword

The Sustainable Fisheries Management Project for the Sulu-Celebes Sea Large Marine Ecosystem (SCS-LME) is the first regional collaborative project of the Sulu-Sulawesi Marine Ecoregion (SSME) Program under the stewardship of the Tri-National Committee (Tri-Com) and is implemented with direct guidance from its Sub-Committee on Sustainable Fisheries. This Program has boldly taken on the colossal task to improve the SCS-LME as part of its noble goal to undertake marine biodiversity conservation in the Sulu and Sulawesi seas. Much support is needed to follow through this important work such as from external resources, informed local participation, and joint action.

This Strategic Action Program (SAP) for the Sulu-Celebes Sea Large Marine Ecosystem (SCS-LME, also known as SSME) is the result of the 3-countries discussions on the follow-up actions to be undertaken on the issues and problems indentified during the recent review and update of the Transboundary Diagnostic Analysis of the SCS-LME. Focusing on fisheries as the top priority problem, key stakeholders, experts, and focal government units of Indonesia, Malaysia, and Philippines have formulated solutions and approaches to improve and sustain the small pelagic fisheries of the region using the Ecosystem Approach to Fisheries (EAF) framework.

Forty years ago global marine fisheries used to be productive and healthy. Since then, up to 60% of the 600 marine fish stocks monitored globally by FAO are already fully exploited. With population fast rising, global climate changing, and other pressing anthropogenic impacts, ensuring sustainable fisheries is our best approach to simultaneously address food security, poverty, and environmental protection.



Datuk Rayner Stuel Galid

Director, Department of Fisheries Sabah

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ABBREVIATIONS

BAS	Bureau of Agricultural Statistics (Philippines)
BFAR	Bureau of Fisheries and Aquatic Resources (Philippines)
BFAR FAO	BFAR Fisheries Administrative Order
CAP	Comprehensive Action Plan
CBA	Cost-Benefit Analysis
CCRF	Code of Conduct for Responsible Fisheries (FAO)
CI-P	Conservation International Philippines
CPUE	Catch Per Unit Effort
CTI	Coral Triangle Initiative
DoE	Department of Energy (Philippines)
DoFS	Department of Fisheries Sabah
DoST	Department of Science and Technology (Philippines)
EAFM	Ecosystem Approach to Fisheries Management
[Eco/WR]QO	[Ecological/Water Resource] Quality Objective
ECP	Ecoregion Conservation Plan
FAO	Food and Agriculture Organization (United Nations)
GEF	Global Environment Facility
GIWA	GEF International Waters Assessment
IEC	Information, Education, and Communication
IPCC	Intergovernmental Panel on Climate Change
IUU Fishing	Illegal, Unreported, and Unregulated Fishing
LME	Large Marine Ecosystem
MCS	Monitoring, Control, and Surveillance
MoU	Memorandum of Understanding
MMAF	Ministry of Marine Affairs and Fisheries (Indonesia)
MPA	Marine Protected Area
PES	Payments for Ecosystem Services
RCFMC	Research Center for Fisheries and Marine Conservation (Indonesia)
[R/N]POA	[Regional/National] Plan of Action
SAP	Strategic Action Program (Regional by default unless specified as National)
SCS	Sulu-Celebes Sea (also SSME)
SEAFDEC	Southeast Asian Fisheries Development Center
SFMP	Sustainable Fisheries Management Project
SF Sub-Com	Sustainable Fisheries Sub-Committee (SSME Tri-National Committee)
SPF	Small Pelagic Fish (or Fisheries)
SSME	Sulu-Sulawesi Marine Ecoregion (also SCS)
Sub-Com	SSME Sub-Committee
TDA	Transboundary Diagnostic Analysis
TEK	Traditional Ecological Knowledge
TEV	Total Economic Value
ToR	Terms of Reference
TP	Transboundary Problem
Tri-Com	SSME Tri-National Committee
UMS	University of Malaysia Sabah
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNOPS	United Nations Office for Project Services
VMS	Vessel Monitoring System
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund
°C	degree Celsius
km ²	square kilometers
mm yr ⁻¹	millimeters per year

SULU-CELEBES (SULAWESI) SEA STRATEGIC ACTION PROGRAM FOR SUSTAINABLE FISHERIES MANAGEMENT

I. THE SULU-CELEBES (SULAWESI) SEA LARGE MARINE ECOSYSTEM

The Sulu-Celebes Sea Large Marine Ecosystem (SCS LME) is composed of the Sulu and Celebes (Sulawesi) Seas that are separated by a chain of islands called the Sulu archipelago¹. This ecosystem is important to Indonesians, Malaysians, Filipinos, and to the world. It is at the apex of the Coral Triangle Initiative (CTI) area (Figure 1).



FIGURE 1. THE SCS LME (SSME) WITHIN THE CORAL TRIANGLE INITIATIVE AREA (MAP COURTESY OF CI PHILIPPINES).

Problems occur and give major threats to SCS LME region such that fish stocks have declined evident from the declining catch per unit effort (CPUE). Most coral reefs of the SCS LME have live coral cover below 50% and vast expanses of mangroves have been converted to aquaculture ponds, while seagrasses suffer from degradation and destruction from coastal development. The looming threat of climate change especially with large-scale shifts in ocean circulation will have its impacts on productivity, fisheries and carbon dioxide uptake. These changes will put 20-30% of species under increased risk of extinction (see TDA).

Sedimentation is also a common marine pollution problem in SSME countries. In the coastal zone, coral reefs usually succumb to sedimentation while mangroves and seagrasses are less affected. Other pollution problems include solid waste, chemical contamination and oil spills, and eutrophication leading to harmful algal blooms and concomitant fish kills in coastal areas and aquaculture farms. Impacts of human activities (like deforestation) in the watersheds and drainage basins, exacerbated by climate change, will compromise freshwater availability and its intended use. Increasing mobility through trade, business travel, migration, tourism and human interaction are among the key drivers in spreading alien and invasive species.

¹http://www.lme.noaa.gov/index.php?option=com_content&view=article&id=83:lme37&catid=41:briefs&Itemid=72

BIODIVERSITY FEATURES AND ECOSYSTEM SERVICES²

The SCS LME has the highest marine biodiversity among the oceans.³ It is at the apex of the Coral Triangle – the area where the number of species of corals, fishes, molluscs, mangroves, seagrasses, and algae are highest in the world. This high diversity of marine organisms results in healthy ecosystems that generate ecosystem services such as food and resiliency against natural and anthropogenic stresses.

The SCS LME has a combined area of at least 124,000 km² of mangroves, seagrass beds, and coral reefs. Among the three countries, Indonesia has the most extensive coral reefs (39,538 km², and also the most diverse with more than 550 coral species) and mangrove ecosystems (~20,000 km²) while Philippines has the greatest known extent of seagrass cover (~27,000 km²). The coral reef ecosystem of the Sulu-Celebes Sea supports diverse fisheries and provides an annual potential finfish yield of 675,380 metric tons to more than 40 million people. The aggregate marine capture fisheries production in the SCS countries during the last decade was more than 53x10⁶ tons, which represent a tenfold increase from the 1950s.

The high biodiversity of the SCS LME provides a wide array of ecosystem services. The stocks of marine fishes in mangrove forests, coral reefs, bays, and pelagic waters are the natural resources exploited by coastal and offshore fisheries. The marine resources benefit the people living in and around the SCS LME, and exported fishery products benefit the wider region (especially Japan and Taiwan) and the rest of world.

Mangrove forests and coral reefs protect coastlines from being eroded and human settlements from being washed-over by surges during storms and typhoons. The SCS LME, a twin-basin of about 940,000 km² and depths reaching 5,000 meters, has the potential to store large quantities of carbon, which is important in regulating climate, and removing pollutants in surface waters. The regulating services of these ecosystems are rarely given monetary values but it is increasingly needed for decision-making.

SSME ECOREGION CONSERVATION PLAN AND COMPREHENSIVE ACTION PLAN

The three countries essentially agreed to adopt the ecoregion approach to conservation embodied in the Ecoregion Conservation Plan (ECP) that will facilitate the realization of the four fundamental goals of biodiversity conservation, which are, representation, sustainability of ecological processes, viability of species, and resiliency. Completed in 2003, the ECP has, and continues to have, significant achievements and lessons learned in implementing conservation at scale. These served as the impetus to update the SSME ECP and come up with the SSME Comprehensive Action Plans (CAP), which was first launched in November 2009 in the East Asian Seas Congress. These contained workplans on sustainable fisheries, MPAs and networks, and threatened, charismatic and migratory species, where each is actually under a sub-committee of the SSME Tri-National Committee. The CAP update of the ECP is crucial as it incorporated climate change in addressing biodiversity and conservation targets of the SSME. Apart from country level activities detailed in the plan, including the costs of implementation, the CAP more importantly highlights the need for transboundary actions relevant for regional co-management.

Some species of small pelagic fishes in the SSME appear to belong to one stock. For example, a study commissioned by this project showed that samples of *Auxis thazard* (frigate tuna), *Sardinella lemuru* (Bali sardine), *Rastrelliger kanagurta* (Indian mackerel), and *Selar crumenophthalmus* (bigeye scad) taken from Indonesia (Manado), Malaysia (Kudat), and Philippines (Puerto Princesa, Zamboanga, and Tawi-Tawi) did not show differences in population structure using genetic markers.⁴ This is strong evidence and served as the rationale for the joint management of small pelagic fish stocks in the SSME under this SAP.

⁴Pedrosa-Gerasmio I.R., Agmata A. and Santos M. 2012. Genetic population structure of some small pelagic fishes in the Sulu-Celebes (Sulawesi) Seas. A Report Submitted to the UNDP/GEF Sulu-Celebes Seas Sustainable Fisheries Management Project.

²Excerpts from the Transboundary Diagnostic Analysis (TDA)

³Carpenter and Springer 2005

II. PRIORITIZED TRANSBOUNDARY PROBLEMS AND ROOT CAUSES

The Transboundary Diagnostic Analysis (TDA) was conducted for the identification and prioritization of transboundary environmental problems and the analysis of their root causes. Unsustainable exploitation of fish, habitat and community modification, impacts of climate change, marine pollution, and alien and invasive species are the highest priorities for management intervention in SSME area. The root-causes of these transboundary problems are in the areas of governance and socio-economics. The spatial boundary for the analysis was expanded to include the watersheds surrounding the Sulu-Celebes Sea LME because of the impacts of the activities in the watershed that transcend to the marine ecosystem (Figure 2).

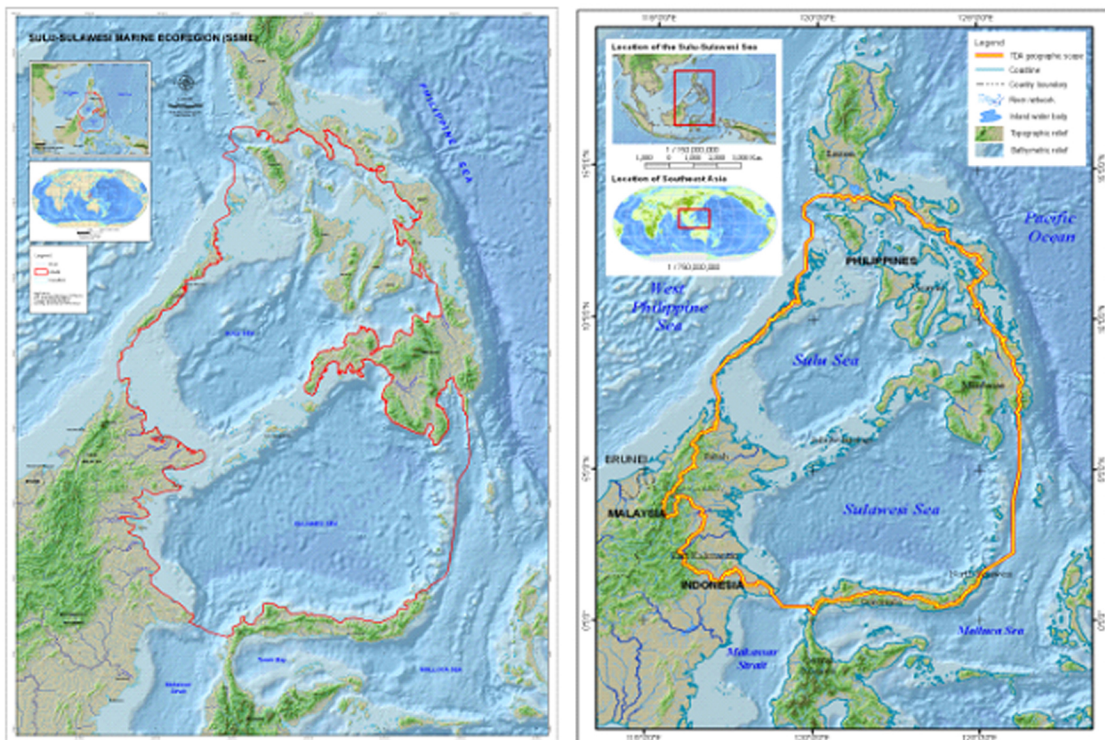


FIGURE 2. THE ORIGINAL BOUNDS OF THE SCS LME OR SSME (LEFT MAP) THAT WAS EXPANDED TO THE RIDGES (RIGHT MAP) TO INCLUDE THE WATERSHEDS.

Prioritizing environmental problems and finding their root-causes in a TDA towards formulating a Strategic Action Program (SAP) were done to address the root-causes of the problems in this region. Among programs suggested are monitoring and evaluation of management effectiveness (in the concept of adaptive management, integrated coastal management, and co-management between resource managers and resource users). Marine protected areas are among the advocated tool to protect biodiversity and improve fisheries productivity in the coastal zone.

The TDA updated the SSME Global International Waters Assessment (GIWA) Regional Assessment 56 findings conducted in 2002 in the Sulu-Celebes Sea LME under the Global Environment Facility (GEF)/United Nations Environment Programme (UNEP)/GIWA. The present TDA identified and prioritized transboundary environmental problems including analysis of their root causes. The outputs of this project serve as the bases in formulating the Strategic Action Program (SAP). The prioritized transboundary problems (TPs) of GIWA 56 were, 1) Unsustainable Exploitation of Fish, 2) Habitat Loss and Community Modification, 3) Pollution, 4) Freshwater Shortage, and 5) Global Warming.

The TDA process that was used in the SCS LME consisted of the following steps: 1) identification of the geographic scale of the physical boundary and time scale, 2) identification of TPs relevant within the bounds of the identified geographic and temporal scales, 3) prioritization of the TPs, 4) secondary research and validation, 5) finalization of the priority TPs, and 6) casual chain analysis.

The results of the TDA analysis were slightly different from the results of the GIWA in 2002. Climate change was ranked third (3rd) in the TDA from fifth (5th) in the GIWA findings (previous term was Global Warming). Marine pollution (previously Pollution) was considered lower in priority than climate change in the TDA. The previous five transboundary problems in GIWA became six in the TDA, of which, alien and invasive species was included. Summaries of each problem in the TDA, presented according to priority, are as follows (see also [Table 1](#)):

PRIORITY TRANSBOUNDARY PROBLEM # 1 – UNSUSTAINABLE EXPLOITATION OF FISH

Fisheries in the SCS countries are probably among the most diverse in the entire Coral Triangle with small pelagics consistently contributing to the total marine fisheries landings (more than 30%). However, fish stocks have declined, evident from the declining CPUE. Aquaculture (inland and marine), which has helped buffer the fisheries production, has seen a rapid development over the past 20 years although mostly production from aquatic plants. Total aquaculture production in the last decade for Indonesia and Philippines amounted to more than US\$18 million and US\$10 million, respectively. Malaysia contributed about US\$1 million total production over the past 10 years. The rapid growth of the aquaculture industry in the region has also led to the decimation of coastal ecosystems like mangroves and seagrass beds. The industry is also beset with pollution problems, causing impacts to coastal waters and resulting to fishkills. Among others, the problem of unsustainable exploitation of fish is rooted in weak governance and poverty incidence in the region (see also [Table 1](#)).

PRIORITY TRANSBOUNDARY PROBLEM # 2 – HABITAT LOSS AND COMMUNITY MODIFICATION

The SCS LME has a combined area of at least 124,000 km² of mangroves, seagrass beds, and coral reefs. Most coral reefs of the SCS LME have coral cover below 50% while vast expanses of mangroves have been converted to aquaculture ponds. Seagrasses are least studied but likewise suffer from degradation and destruction from coastal development. For coral reefs alone, the destruction of 1 km² entails economic losses from fisheries, ecotourism, and shoreline protection of some US\$137,000-1,200,000 over a 25-year period. MPAs are the advocated tool to protect biodiversity and improve fisheries productivity in the coastal zone. The lack of awareness of the importance of habitats and communities and poor coastal planning and management are among the underlying causes of habitat loss and community modification.

PRIORITY TRANSBOUNDARY PROBLEM # 3 – CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC) has shown a global trend of increasing temperatures and rising sea level (1.8-3.1 mm yr⁻¹ from 1961-1993, which will be 18-59 centimeters at the end of the 21st century) since the mid-1800. Frequency of extreme events in terms of rainfall and drought has also increased including changes in wind patterns. Large-scale shifts in ocean circulation will have its impacts on carbon dioxide uptake, primary productivity, and ultimately fisheries. These changes will put 20-30% of species under increased risk of extinction. Increased sea surface temperature alone will impact coral reefs through bleaching and when prolonged can result to extensive extinctions especially with temperature increases of more than 3°C. Coral reef fisheries in this respect will also be greatly affected. The presence of more than 40 million people in the SCS who depend on marine fisheries and the contribution of the fisheries sector to the gross domestic product (GDP), give an important perspective on the potential impact of climate change to the economy and to the welfare of the people. In the region, proximate climate change effects like intense typhoons and rainfall lead to loss of lives, property, and livelihood.

PRIORITY TRANSBOUNDARY PROBLEM # 4 – MARINE POLLUTION

Sedimentation is one of the highest forms of pollution on earth. About 1 billion tons of sediment come from the Philippines while 29 rivers in Borneo and Sulawesi Islands discharge about 4.2×10^9 metric tons of sediment or 20 to 25% of the global sediment export. In the coastal zone, coral reefs usually succumb to sedimentation while mangroves and seagrasses are less affected. Other pollution problems include solid waste, chemical contamination and oil spills, and eutrophication leading to harmful algal blooms and concomitant fish kills in coastal areas and aquaculture farms. Weak planning and governance, especially on enforcement and monitoring, are the main causes of this transboundary problem.

PRIORITY TRANSBOUNDARY PROBLEM # 5 – FRESHWATER SHORTAGE

Freshwater sources of the SSME areas in Indonesia, Malaysia, and Philippines mainly come from rivers, lakes, ground basins, and rain. Impacts of human activities in the watersheds and drainage basins, exacerbated by climate change, will compromise freshwater availability and its intended use. Dry spells from El Niño events, for example, limited the water availability and interrupted power generation in hydroelectric power plants in Mindanao (Philippine part of SCS LME). Economic production in this locality was considerably reduced. Health related concerns are also expected to arise with lack or shortage of freshwater and this is projected to become severe in the future.

PRIORITY TRANSBOUNDARY PROBLEM # 6 – ALIEN AND INVASIVE SPECIES

Increasing mobility through trade, business travel, migration, tourism and human interaction are among the key drivers in spreading alien species. It is estimated that around 10,000 species (generally planktonic forms of algae, fish, and invertebrates including bacteria) are being carried in ballast water around the globe. Alien species can be invasive and repress or exclude native species and disrupt ecosystems especially when they carry pathogens or are pathogenic themselves. There is a dearth of studies that assess the quantitative ecological and socio-economic impacts of invasive alien species and even the specific resilience of ecosystems especially in the SCS. Meanwhile, some alien species in certain situations may be beneficial if they become a new resource, especially as food items (e.g., tilapia). From the economics perspective, alien species contribute substantially to the aquaculture production of the three Southeast Asian countries (e.g., more than 8% of Indonesia's aquaculture production).



TABLE 1. SUMMARY RESULTS OF THE SCS-SFMP TDA (SEE ALSO THE CAUSAL CHAIN ANALYSIS IN THE TDA). ANALYSIS WAS NOT CONDUCTED ON THE TRANSBOUNDARY PROBLEM ON FRESHWATER SHORTAGE AND ALIEN AND INVASIVE SPECIES.

Transboundary Diagnostic Analysis			
Prioritized TP	Root causes (ultimate impacts for climate change)		
	Governance	Ecological	Socioeconomic
# 1 – Unsustainable Exploitation of Fish	<ul style="list-style-type: none"> • Lack of political will due to existing/prevaling economic model system which does not account the real economic value of the sector • Weak regulation of regional IUU fishing • Low priority of fisheries and the marine environment in national planning • Inconsistencies in government laws or regulations 		<ul style="list-style-type: none"> • Poverty • Increasing demand for small pelagic fishes for food, fish bait, fish-meal and feeds for aquaculture
# 2 – Habitat Loss and Community Modification	<ul style="list-style-type: none"> • Poor or lack of urban, agri-industrial, tourism, and land-use planning • Unregulated industrial development • Poor management, lack of policy on water management • Poor or lack of enforcement of regulations 		Lack of awareness on the importance of habitats and communities
# 3– Climate Change		<ul style="list-style-type: none"> • Increase in frequency and intensity of typhoons • Increase in frequency and volume of rainfall • Sea level rise • Ocean acidification • Increase in sea surface temperature 	<ul style="list-style-type: none"> • Loss of properties (houses, infrastructure, vessel), livelihoods and lives • Fluctuating prices or high (local) market price of fishery products • Poor fishermen trapped in the vicious cycle of poverty • Increase unemployment • Increase in irresponsible fishing practices • Displacement of human populations • Increase in morbidity • Poor welfare conditions • High investment costs in technology and capacity • Increase in poverty incidence • Potential positive effect: with the potential retreat of mangroves landward, there is also a potential expansion of seagrass beds and coral reefs and their related fisheries
# 4 – Marine Pollution	<ul style="list-style-type: none"> • Lack of political will and weak enforcement and monitoring (for chemical pollution) • Weak land-use planning coupled with weak governance (for suspended solids and solid waste) 		<ul style="list-style-type: none"> • Lack of funding (Indonesia, Philippines) for solid waste management

III. STRATEGIC ACTION PROGRAM RECOMMENDATIONS FOR REGIONAL FISHERIES MANAGEMENT

The Sub-Committee on Sustainable Fisheries of the Tri-National Committee of the Sulu-Sulawesi Marine Ecoregion has accepted the findings of the TDA at its 6th Annual Meeting in Tawau, Sabah, Malaysia during 19 to 20 March 2012. The Sub-Committee agreed for the National Coordinators and Technical Task Teams of Indonesia, Malaysia, and Philippines, Project Management Office, and Conservational International, to proceed in the preparation of the Strategic Action Program (SAP) for the SSME.

SCOPE AND LIMITATION OF THE SAP

This SAP focuses on the unsustainable exploitation of fish, the first priority of the six TPs identified in the TDA. Implementation of this SAP is hoped to provide the impetus for raising more interest and funding support to enable the Tri-Com to address the other five transboundary problems in the next phase of this project.

In addressing the next phase, an expanded SAP will be developed following the same process that the present SAP went through (using GEF guidelines). The expanded SAP will provide an opportunity on improving the governance structure for its implementation.

GLOBAL AND REGIONAL SIGNIFICANCE OF THE SULU-CELEBES SEA LARGE MARINE ECOSYSTEM STRATEGIC ACTION PROGRAM (SCS LME SAP)

The recommendations during the SAP formulation process also address the five goals of the Coral Triangle Initiative (CTI). SSME has been identified as the first priority seascape of the CTI, the most advanced seascape in the region. The SCS LME SAP also aligns with the Regional Plan of Action (RPOA) of the CTI. Detailed discussions on the unsustainable exploitation of fish in this SAP are in line with RPOA Goal 1 (Priority Seascapes Designated and Effectively Managed) and RPOA Goal 2 (Ecosystem Approach to Management of Fisheries and Other Marine Resources Fully Applied in the CTI). People in the region are engaged in subsistence fishing as well as commercial fishing including live fish trade, so the initiative of the SAP also addresses food security, which is in line with the objective of the World Summit on Sustainable Development (WSSD) and Code of Conduct for Responsible Fisheries (CCRF) in the region.

SAP VISION

The SAP vision was crafted with due regard and reference to the 50-year vision of the SSME Ecoregion Conservation Plan, which described the nine ecoregion's unique features that support human needs through collaborative management.

Six elements were considered in formulating the SAP vision according to the GEF guidelines. That it should describe the essence of the region and its inherent qualities; human activities need to be stated; it should point to important principles which actions will be based; encompass past, present, and future problems, issues and threats; cover wide geographic and time scales; and must be accepted by all stakeholders. The latter was achieved through iterative discussions in the regional meetings for the SAP. Thus,

by 2025, the Sulu-Sulawesi is a marine ecoregion that is ecologically healthy and delivers ecosystem services that provide equitable socio-economic and cultural benefits through generations, by collaborative and sustainable fisheries management across all political and cultural boundaries.

Fish stocks, as water resources, need to be seen in an improved state which is a sign of a solution to the transboundary problem of unsustainable exploitation of fish. This objective statement has to be understood by a wide range of stakeholders so that their participation in this formulation is also critical. The agreed water resource quality objective for the #1 transboundary problem in SSME is that:

small pelagic fish stocks in the SSME are healthy, abundant, and exploited sustainably.

Note that this statement supports the SAP Vision in a limited sense – only fish resources. The SAP vision statement, however, was formulated to accommodate would-be quality objectives from the other five priority transboundary problems. The countries intend to address the other five TPs in the second phase of this project.

TARGETS-ACTIVITIES-INDICATORS

Guidelines to the Ecosystem Approach to Fisheries (EAF) are detailed in FAO (2003),⁶ which translates “the economic, social and ecological policy goals and aspirations of sustainable development into operational objectives, indicators and performance measures.”

The ecosystem approach to the sustainable management of small pelagic fishes in the SSME basically extends the current practices to consider all components and entities significant to this system, i.e., biotic (including humans) and the abiotic components, taking into consideration long-term variability and effects even from non-fishery uses. This holistic approach attempts to ensure that ecosystem goods and services are sustained through generations (with wide stakeholder participation). While understanding of ecosystems is yet to be improved, operationalization of EAF may proceed with the precautionary approach (UNCED 1992).⁷

Both the resource quality objective and indicators (identified for the targets and activities) prescribe the information that will be gathered routinely in the management cycle. Indicators include those on process, stress reduction and environmental status.

Process indicators basically look at the progress in project activities. A set of milestones may be established to say concretely that progress is being achieved. Stress reduction indicators, on the other hand, specifically look into actual measures that are implemented on the ground, say, reduced fishing effort. Whether this has an impact on the ground will be determined by the environmental status indicator(s), which in this case, anticipates an increase or improvement in the fish stocks. All of these require a keen and well-funded monitoring and evaluation program.

The indicators for the activities and targets of the SAP are given in **Table 2**, where targets were developed to address the root causes of unsustainable exploitation of fish, the #1 TP identified in the TDA. The causal chain analysis that details the immediate, intermediate, and root causes of unsustainable exploitation of fish (and the TPs 2-4) are given in the TDA (separate report). While the SAP timeline is until 2025, many of the targets are actually set even earlier. This is a response to the World Summit for Sustainable Development (Johannesburg, 2002), where it was pledged to “maintain or restore stocks to levels that can produce the maximum sustainable yield with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015.”

A list of indicators has been compiled in one of the Project’s Technical Advisory Group meeting. This consists of 20 sets of indicators that cover mostly socio-economics, and the rest on governance, ecological aspects, and the fishery resources (**Annex 1**). The SAP targets and indicators will further be evaluated at the country level (Indonesia, Malaysia, Philippines) to further align them with other country objectives or commitments and ensure an appropriate set of indicators.

⁵GEF guidelines refer to Ecological Quality Objectives (EcoQO) or Water Resource Quality Objective (WRQO) and fisheries in this case is not an ecological quality but is considered a water resource.

⁶FAO 2003. *Technical Guidelines for Responsible Fisheries Number 4, Supplement 2. The ecosystem approach to fisheries.*

⁷“In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities.

Where there are threats of serious or irreversible damage, lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation.” Principle 15 of the Rio Declaration of the UN Conference on Environment and Development (Rio de Janeiro, 1992).

TABLE 2. RESULTS OF THE ITERATIVE CONSULTATIONS AND WORKSHOPS WITH KEY SSME STAKEHOLDERS TO COME UP WITH TARGETS AND ACTIVITIES FOR THE SAP INCLUDING THEIR INDICATORS.

Theme 1: Science-based, Social, and Management Interventions*

SAP Targets and Proposed Activities	Indicators	Supporting National Targets		
		Indonesia	Malaysia	Philippines
<p>By 2020, management of SPF stocks using the EAFM framework in the SSME is in place</p> <ul style="list-style-type: none"> • Document TEK and best practices and incorporate them in the management of SPF stocks • Incorporate findings in the demo site activities into the subnational plans • Incorporate the results of the population genetic studies on SSME small pelagic fish species into the EAFM strategy or framework • EAFM is integrated into national and subnational plans <p>By 2020, the scientific bases for EAFM are established</p> <ul style="list-style-type: none"> • Determine spawning and nursery grounds of small pelagics in the SSME • Establish baselines of indicators for the status of SPFs in the SSME (e.g. CPUE, length at first maturity, exploitation rates) • Conduct 	<p>Fish landings/catch are stable or increasing with constant CPUE [5-yr trend]</p> <p>Amount of national government funds allocated for SPF management is secured or increasing</p> <p>Extent and cover of habitats improving</p> <p>Water quality parameters improving</p> <p>Vulnerability of SPF and habitats to CC decreasing</p>	<p>By 2014, best practices and lessons learned from the Tarakan SSME are adopted</p> <p>By 2015, the hard and soft international fisheries laws are harmonized and synchronized with the national laws and local government laws</p> <p>By 2015, at least two (2) draft Ministerial Decrees and two (2) draft Technical Guidelines are developed under the Fisheries Management Law</p> <p>By 2014, a Status Report on Fisheries for SSME-Indonesia is finished</p> <p>By 2015- a climate resilient MPA network for fisheries, incorporating critical habitats such as nursery and spawning grounds has been designed</p> <p>By 2013, initiate the policy harmonization of the EAF with the Ecoregion (biodiversity)</p>	<p>By 2020, inputs raised in this body is included in the review and amendments of the concerned policy (e.g., National Agro-Food Policy)</p> <p>By 2020, all identified research/ studies are completed in time before the review of national or state policies</p>	<p>By 2016, selected coastal municipalities/ cities in Philippines SSME have integrated fishery resource management incorporated into their development plans, consistent with the concept of integrated coastal area management under the Philippine Fisheries Code (RA 8550).</p> <p>By 2015, the fishing mortality of small pelagics has been determined in selected site</p> <p>By 2014, the vulnerability of the small pelagic fisheries sector to climate change has been initially studies (utilized for management)</p>

assessments or studies on the impacts of disturbance on the SPF stocks in the SSME (e.g. marine pollution, habitat loss and degradation) <ul style="list-style-type: none"> • Conduct vulnerability assessment of small pelagic fish to climate change impacts 		conservation) and FMA No. 716 (fisheries management) approaches		
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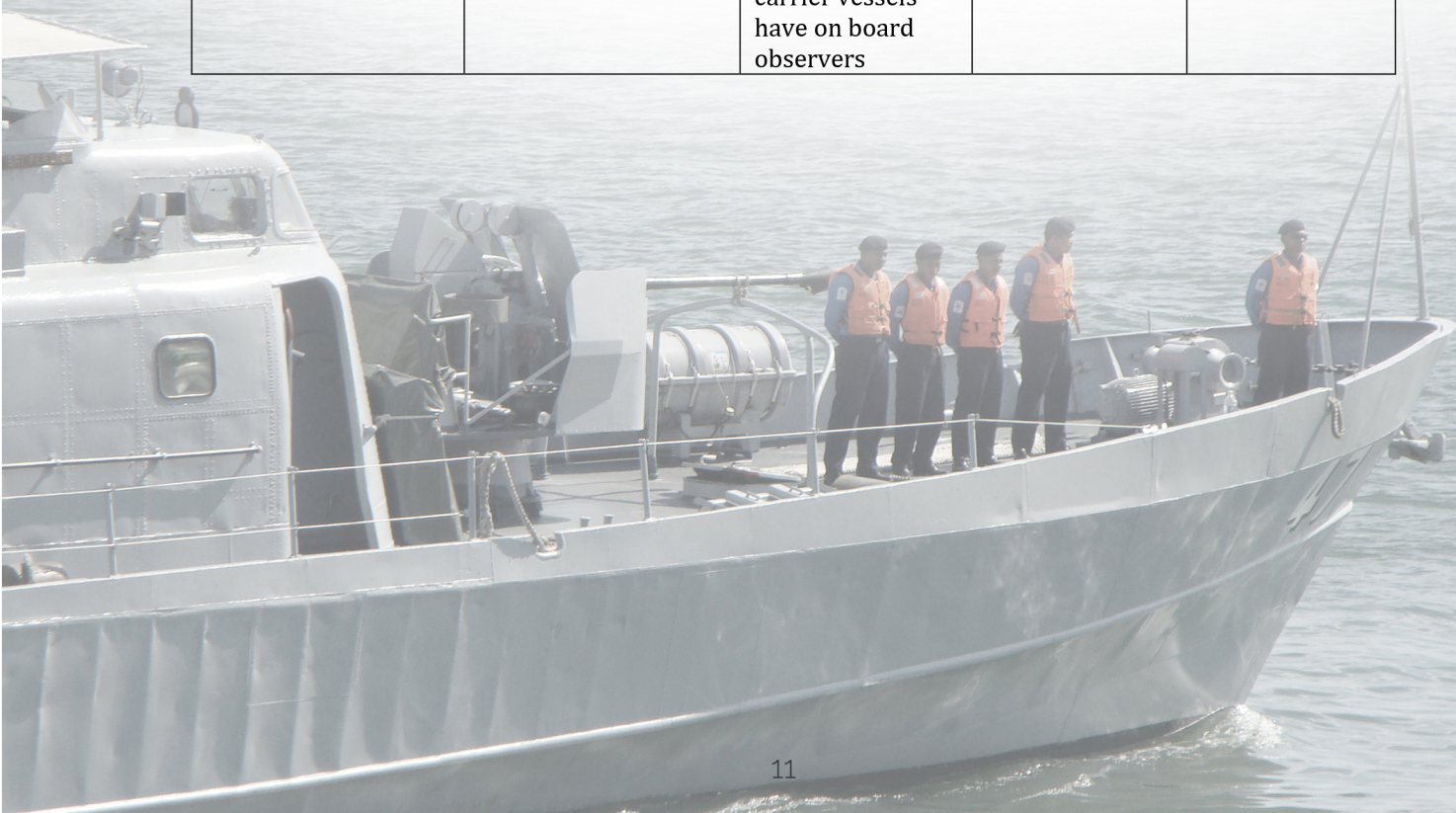
Theme 2: Resource Valuation

SAP Targets and Proposed Activities	Indicators	Supporting National Targets		
		Indonesia	Malaysia	Philippines
<p>By 2020, the total economic value of small pelagic fisheries in SSME is determined</p> <ul style="list-style-type: none"> • Conduct a value chain analysis of SPFs in the SSME (source to markets) • Gather primary data and establish the methodology (also using reliable secondary data) to calculate the statistics • Note: use TEV in the national accounting system 	<p>Improved gov't support with appreciation of fisheries TEV</p> <p>X number of published studies</p>	<p>By 2015, resource valuation study on fisheries is conducted in the demonstration sites (Tarakan and Kwandang) of the Project</p>	<p>See also Theme 5: Livelihood Development</p>	<p>By 2015, a study of the Total Economic Value (TEV) of the fisheries and marine environment has been initiated in selected sites.</p>

** The six (6) themes of the SAP came out from classifying all the options or proposed solutions to address the 12 root causes of the transboundary problem on Unsustainable Exploitation of Fish. All options or proposed solutions were elicited in a brainstorming session with key stakeholders from Indonesia, Malaysia, and Philippines.*

Theme 3: Monitoring, Control, and Surveillance (MCS)

SAP Targets and Proposed Activities	Indicators	Supporting National Targets		
		Indonesia	Malaysia	Philippines
<p>By 2020, strengthen law enforcement through cooperation & exchange of information among marine law enforcers (trans-border)</p> <ul style="list-style-type: none"> • Apply the RPOA strategy on IUU fishing in the SSME • Improve bi- or multilateral coordination to combat IUU fishing in the SSME • Adopt the relevant MCS activities in the SSME CAP on sustainable fisheries 	<p>Patrolling effort is regular or improved</p> <p>Apprehension records</p>	<p>By 2014, the port monitoring system of Tarakan and Kwandang are established or improved</p> <p>By 2015, a small scale fishers in the SSME Indonesia areas are registered in Tarakan and Kwandang</p> <p>By 2015, vessel record (log) and catch documentation in the Indonesian SSME areas are improved</p> <p>By 2014, MoU in combating IUU fishing are drafted and communicated</p> <p>By 2016, 5% of commercial fishing boats and carrier vessels have on board observers</p>	<p>By 2020, capacity of concerned agencies and coordination among them is strengthened and adequately financed</p>	<p>By 2016, a local and inexpensive technology for VMS has been initiated</p> <p>By 2016, selected Philippine SSME municipal waters have effective marine law enforcement</p>





Theme 4: Information, Education, and Communication (IEC)

SAP Targets and Proposed Activities	Indicators	Supporting National Targets		
		Indonesia	Malaysia	Philippines
<p>Starting 2016, SSME targeted stakeholders are able to actively participate in managing small pelagic fisheries (SPF)</p> <ul style="list-style-type: none"> • Disseminate government regulations to the regional level • Translate laws, scientific results, and other policies for target audience • Develop and prepare IEC campaigns that incorporate TEK 	<p>X number of IEC materials disseminated</p> <p>X number of IEC materials developed and popularized</p> <p>Amount of government funds spent for IEC is secured or increased</p>	<p>By 2015, initiate the socialization of technical and scientific information, including policies to effect positive behavior change in the demonstration site</p> <p>By 2016, improve the coordination and management of fishery data and integrated in one department</p>	<p>By 2018, at least 8 (number of) champions are groomed, starting the campaign and awareness program among different sectors (incentives e.g. honorifics - giving titles)</p>	<p>By 2015, an IEC program with strong value formation has been developed and implemented in Zamboanga City</p>

Theme 5: Livelihood Development

SAP Targets and Proposed Activities	Indicators	Supporting National Targets		
		Indonesia	Malaysia	Philippines
<p>By 2020, sustainable alternative/diversified livelihood sources are implemented in the SSME</p> <ul style="list-style-type: none"> • Identify studies of the impact of fishery regulations on the livelihood of fishers • Conduct consultations among stakeholders affected by fishery regulations on the acceptable alternative livelihood • Implement identified alternative livelihood activities • Follow-up on the alternative livelihood program 	<p>X number of livelihoods implemented</p> <p>Those involved in successful livelihood programs become less reliant on fishing</p> <p>Improved efficiency (less waste) with value added to products</p> <p>X publications on impact of fishing regulations on livelihood</p> <p>Note: successful livelihood program will result in reduction in fishing effort/fleet</p>	<p>By 2015, 2 microfinancing scheme for small businesses in the demo sites are established and strengthened</p> <p>By 2015, 3 fisheries-related cooperatives in the demo sites are strengthened</p> <p>By 2015, 3 alternative livelihoods are provided to small-scale fishers</p> <p>By 2015, improve the SPDN system (diesel fuel package station for small-scale fishers) in the SSME areas especially in the demonstration sites</p> <p>By 2015, at least 50% of households in the demonstration sites are empowered with women having alternative livelihoods</p> <p>By 2015, at least two (2) private-public partnerships with the demonstration sites are established</p>	<p>By 2017, a critical review and evaluation of the effectiveness of alternative livelihood projects/programs have been conducted</p>	<p>By 2016, sustainable fisheries livelihood support programs are developed and initiated in selected Philippine SSME sites.</p>

Theme 6: Capacity Building

SAP Targets and Proposed Activities	Indicators	Supporting National Targets		
		Indonesia	Malaysia	Philippines
<p>By 2025, all echelons of management including local communities in the SSME know and appreciate EAFM where decision-makers and resource users are empowered</p> <ul style="list-style-type: none"> • Conduct EAFM training including cross-learning for local decision makers down to the community • Develop SSME capacity to train trainers on resource valuation • Learn the ways/techniques in popularizing science and policies for the community (journalism, mass media) • Conduct training for public prosecutors/investigators on IUU fishing • Conduct basic fishery law enforcement training for local enforcers and users with periodic refresher courses • Conduct skills and financial management training for local communities 	<p>More efficient/effective law enforcers and prosecutors/investigators result to less violations</p> <p>Successful local entrepreneurs become less reliant on fishing</p> <p>The empowered spectrum of stakeholders has a collective sense of environmental stewardship</p>	<p>By 2014, at least 50% of small-scale fishers in the demonstration sites (Tarakan and Kwandang) are trained and participating in MCS</p> <p>By 2015, training on EAFM implementation for extension workers in the demonstration site and SSME area</p> <p>By 2019, local community and local government officers in the demonstration site and SSME area are trained on the EAFM concept</p> <p>By 2015, cross visit has been undertaken within the SSME area of Indonesia for EAFM best practices</p>	<p>By 2020, a network has been formalized in Sabah under the SSME National Committee of Malaysia for sustainable fisheries management</p> <p>By 2020, a Fisheries Council is established, working with the District office, among others, as part of its support system (representation from the private sector)</p>	<p>By 2015, data collection and data management system for fisheries are established and functional (strengthen BAS) and standardize data collection method useful for fisheries management</p> <p>By 2015, the reconstitution of BFAR, as line bureau under the Philippine Fisheries Code (RA 8550), is fully implemented</p>

The SAP activities identified in the tables above are programmed for the first three (3) years of SAP implementation. Costing of each activity per country is detailed in [Annex 2](#). As the SAP timeline is until 2025, the succeeding plan of implementation will be developed after results and lessons learned are gained from the first three years of SAP implementation. This will also ensure that adjustments and new technologies are appropriately incorporated into the succeeding phase of implementation, essentially allowing for adaptive management.

Managing any resource will cost. Management practices which are sustainable and integrated will guarantee a return of investment. Moreover, the level of benefits will outweigh investments or costs in the medium and long-term. The same principle will be adopted in the Sustainable Fisheries Management Project of the Sulu-Celebes Sea (SCS).

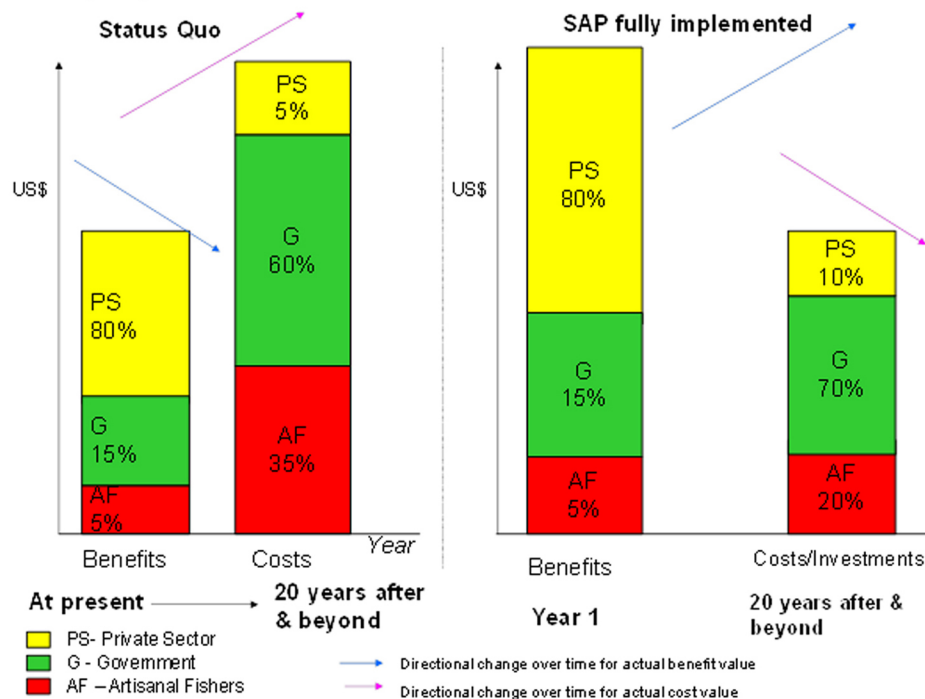


FIGURE 3. ILLUSTRATION OF INVESTMENTS OR COSTS VERSUS BENEFITS (COST-BENEFIT ANALYSIS) FOR THE FISHERIES OF THE SULU-CELEBES SEA WITH AND WITHOUT THE SAP IMPLEMENTATION. SEE TEXT FOR EXPLANATION.

THE STATUS QUO

The left side of Figure 3 (present to 20 years+) illustrates the scenario where there is no sustainable management intervention for the small pelagic fishery in the SCS (status quo). Clearly, the total amount of benefits (in terms of food source, income/taxes, export, gross value-added, aesthetic value, tourism receipts, and the likes) that will be derived from the resource is smaller than the investments or costs (including costs for apprehensions and trials of violators, among others) that will be spent in managing the resource. The lack of SAP and its non-implementation will cause the total benefit value to continuously decline and total cost value to continuously increase over the years.

In terms of sharing of benefits, the private sector reaps most, followed by the government sector with the artisanal fishers benefiting the least. A different scenario, however, can be seen in terms of who shoulders the cost. The government shells out the biggest cost followed by the artisanal fishers and ironically, the private sector, which benefited the most, takes the least expense.

SAP FULLY IMPLEMENTED

With the full implementation of the SAP, the scenario described above will be reversed (right side of Figure 3). Accruing benefits to the stakeholders will now be far greater than the investments required to manage the small pelagics. The total value of benefits is expected to increase over time while the total amount of investments will continue to decline over the years. While share of the sectors may remain the same in terms of percentage, the actual monetary value is bigger compared to the status quo scenario. In terms of sharing of investment, the artisanal fishers will be spending less this time while the private sector has to increase their share. The government’s share might appear higher than the status quo as it has to subsidize the artisanal fishers at the beginning but it should be noted that the actual monetary value of what the government has to spend is actually lower compared to the status quo.

To further supplement this principle and provide actual data and evidence, it is recommended that part of the SAP will be the conduct of an actual cost-benefit analysis in the pilot areas, with the intent to expand the study to the entire SCS.

IV. ADAPTIVE MANAGEMENT

Positive results are expected from any management measures and so the gathering of indicators of the progress and performance is necessary to track results. As previously described, the Strategic Action Program has three types of indicators:

Process indicators – indicators of progress in implementation of activities with stakeholders

Stress reduction indicators – indicators of the results of a management measure (e.g., reduction of IUU fishing)

Impact indicators – indicators of the improvement of the environment, resource, and human community resulting from the management measure

The National Coordinators and the Technical Task Teams of Indonesia, Malaysia, and the Philippines have prepared the indicators of the SAP as presented in Annex 1. This listing of indicators and method of data-collection will be reviewed to ensure that actions, particularly those that reduce the stressors, achieve the targeted improvement of marine fishery resources, particularly of the shared small pelagic fish stocks.

The framework that is followed in the SAP implementation for sustainable fisheries in particular and in the management of the Sulu-Celebes (Sulawesi) Sea Large Marine Ecosystem in general is adaptive management. The SAP for sustainable fisheries is a progressive document that guides the actions of the resource managers and that is refined as results of management are reported back by resource managers to policy-makers (Figure 4). The regional review of the recommendations in this version of the SAP and the operationalization of the regional management, following the guidelines of the Ecosystem Approach to Fisheries (FAO 2003), will be the first step in adaptive management of shared stocks in the Sulu-Sulawesi Large Marine Ecosystem.

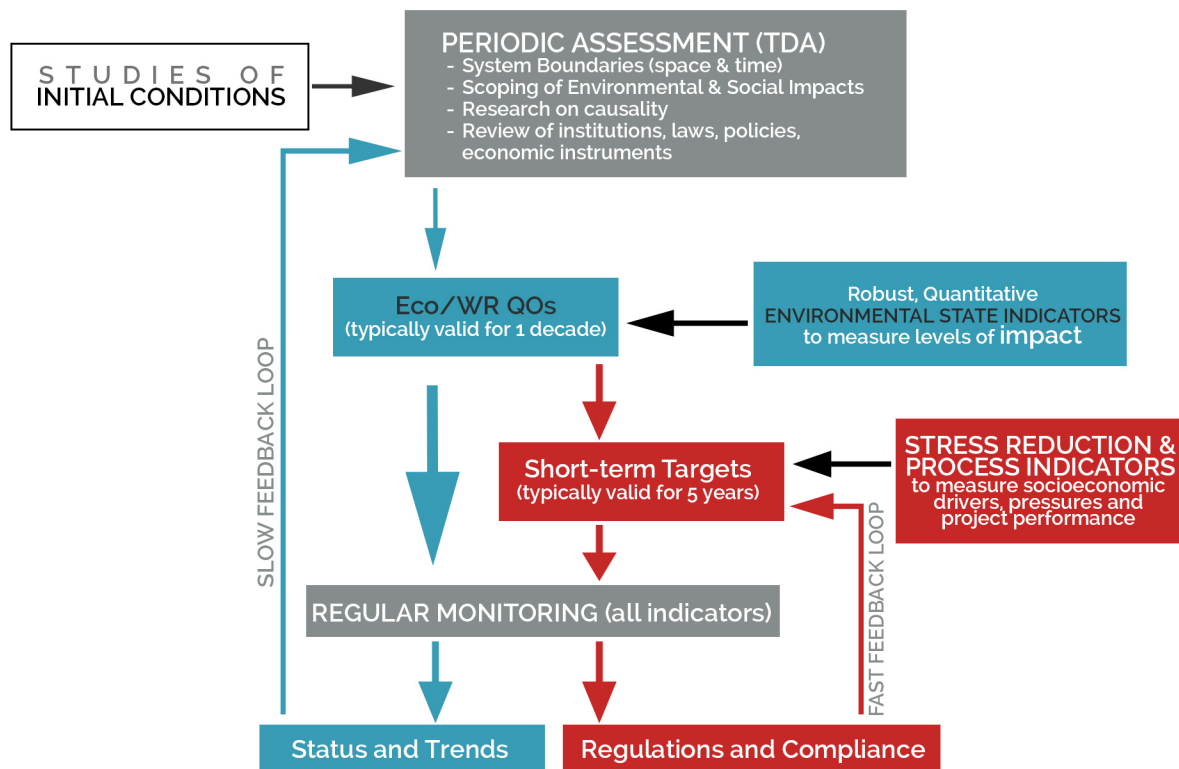


FIGURE 4. MONITORING AND EVALUATION IN THE GEF ADAPTIVE MANAGEMENT CYCLE.

V. INSTITUTIONAL STRENGTHENING TO IMPLEMENT AND COORDINATE THE STRATEGIC ACTION PROGRAM

GOVERNANCE SETUP OF THE SULU-SULAWESI MARINE ECOREGION (SSME)

This Regional Strategic Action Program (SAP) pursues the objectives and goals of the Sulu-Sulawesi Marine Ecoregion Conservation Plan (ECP).

The Tri-Com of the SSME serves as a forum to coordinate and harmonize the implementation of the ECP. The Committee also reviews, updates, and revises the ECP when necessary. The Tri-Com's task is to approach the ECP implementation from a multidisciplinary standpoint. As such, it 1) is composed of a maximum of 16 delegates from the three signatory countries, 2) may create specialized sub-committees, working groups, and task forces, and 3) is convened once every two years.

Under the Committee is the Sub-Committee on Sustainable Fisheries (SF Sub-Com), along with the Sub-Committees on Threatened, Charismatic and Migratory Species, and Marine Protected Areas and Networks. The SF Sub-Com is composed of a maximum of 15 members (five from each country), and may invite external experts for assistance in its performance of duties. It meets once a year prior to regular meetings of the Committee.

STRENGTHENING COORDINATION

The SF Sub-Com's mandate under its Terms of Reference (ToR) is limited to addressing management and technical issues, and providing technical advice and recommendations to the Tri-Com for the formulation of policies, development and implementation on sustainable fisheries, aquaculture, living aquatic resources exploitation, trade, and livelihood systems in the SSME. Coordination remains the sole function of the Tri-Com.

The successful implementation of this SAP shall, however, require a more specialized and focused management, and more dedicated monitoring and evaluation. This then requires the strengthening of the SF Sub-Com to meet the institutional demands of implementing the SAP and optimize its contribution to obtaining the goals and objectives of the ECP.

INSTITUTIONAL STRENGTHENING

Given the above premises, institutional strengthening will require amendments to the existing terms of reference of the SF Sub-Com to imbue it with the coordination function with regards the implementation of the SAP. As the SF Sub-Com is being tasked beyond its recommendatory functions, and is expected to closely monitor the implementation of the SAP in relation to the implementation of the individual National SAPs, a twice-a-year meeting should be necessary. Enabling the SF Sub-Com to actively coordinate and monitor SAP implementation shall also require a dedicated secretariat. See [Figure 5](#) (arrows from below).

Some of the current challenges of fisheries management in SSME are the lack of success indicators in the fishery management system, the lack of a well-defined integrated management program, and the lack of communication between three countries in the context of sharing responsibilities and roles in managing the fish resources. In this regards, when formulating an institutional design using such fishery co-management plan, board of governments (fisheries forum) and fisheries resource users need to work together. Usually, a mediator is required to assist the two stakeholders to formulate a co-management plan, at least in the early stages. The mediator is generally an individual or working group who originates from a research organization or a non-governmental organization.



FIGURE 5. THE PROPOSED INSTITUTIONAL STRUCTURE TO STRENGTHEN THE SSME SUB-COMMITTEE ON SUSTAINABLE FISHERIES.

Capacity development needed for managing fish resources in SSME can be driven from the issues and problems related to the fisheries including ecological, economics, social, and institutional.⁸ All of the issues and problems can be identified from the TDA, which has been also undertaken for SSME. Using the identification of ecological, social, economic, and institutional issues and problems, three types of time frameworks can be then set up for determining the need of capacity development during short, medium, and long terms. From these time frameworks, a set of capacity development programs can be identified and categorized into four domains of capacity development, namely, 1) policies, plans, and strategies; 2) institutional mechanism; 3) data collection; and 4) fisheries co-management plan. **Figure 5** shows the approach of capacity development needed (arrow from the resource person box) for managing fish resources in the SSME.

The SSME Tri-Com currently provides a forum for discussion only and there is a need for the governance structure to become more robust. It was identified in the SSME CAP that the Tri-Com’s institutional challenges are rooted in its limited funding and manpower; limited capacity of members to manage a regional program; limited electronic information and communication mechanisms between the regional, national, and local stakeholders; limited exposure to and networking with regional and international forums and organizations; lack of monitoring, surveillance, and control activities; and the lack of a process to evaluate the performance of the SSME program and its regional management organizations.

This SAP recognizes the existing limitations of the SSME Tri-Com and as an immediate intervention, suggests capacity building of the Tri-Com Secretariat as it rotates among the three countries to handle projects, coordinate among its Sub-Committees, and manage the day-to-day business of the Tri-Com.

⁸*Institutional Strengthening for Fisheries Management in the Sulu-Sulawesi Seas. Center for Coastal and Marine Resources Studies, Bogor Agricultural University, Indonesia (1 February 2012).*

In order to achieve the above, certain strategic amendments would have to be made to the ToR of the SF Sub-Com. These amendments will have to be endorsed by the Tri-National Committee.

The following are the proposed recommended amendments to be made to the existing set of ToR of the Sub-Committee on Sustainable Fisheries:

- To include “co-ordination” as part of the SF Sub-Com’s duties to address management and technical issues that relate to sustainable fisheries, aquaculture, living aquatic resources exploitation, trade and livelihood systems in the region, and provide technical advice and recommendations for policy development and implementation. (Section 2 of the existing Mandate);
- To “establish task forces, working groups and appoint advisors”, as a forum to provide technical advice and recommendations to the SSME Tri-National Committee for the formulation of policies, development and implementation on sustainable fisheries, aquaculture, living aquatic resources exploitation, trade, and livelihood systems in the SSME. (Section 3, paragraph 1);
- The SF Sub-Com to meet twice a year (Section 5); and
- To establish a secretariat under the working mechanism (Section 6).

These proposed amendments are to empower the SF Sub-Com, to ensure the effective implementation of program and activities under the mandate of the Tri-National Committee.

The SSME Tri-National Committee Secretariat shall be strengthened to enable it to facilitate the operations of the SSME Tri-National Committee (Tri-Com) for the implementation of its projects, programs, and plans under its Sub-Committees on Sustainable Fisheries, MPAs and Networks, and Threatened, Charismatic, and Migratory Species.

Strengthening of the SSME Tri-Com will continue in the SAP implementation. A feasibility study to strengthen the Tri-Com will be undertaken taking into consideration the recommendations from the institutional strengthening study, lessons from the SAP implementation, and foreseeable governance needs of expanding the coverage of the SAP to progressively encompass the remaining five transboundary problems identified in the TDA.



Annex 1. Indicators developed by the Technical Advisory Group (TAG). The operational objectives are to be achieved in the demonstration sites where the corresponding indicators, data requirements, and methodology are provided.

Operational Objectives	Indicator/s	Data requirements	Methodology
<p><i>Fishery resources</i></p> <p>Increased (5-10 % at end of project) fish stocks of small pelagics (3-5 species) at demonstration sites</p>	<p>Catch per Unit of Effort (CPUE) and/or other applicable indicators depending on availability of financial resources (e.g., assessments through fish population dynamics, etc.)</p> <p>Exploitation rate (E)</p>	<p>Time series data on:</p> <ul style="list-style-type: none"> - catch - effort, e.g., number of active gear licence and no licence, number of fishermen in the community/village <p>Length and weight frequency data - size of fish by length and weight</p>	<p>Proposed methodology at demonstration sites:</p> <p>Small-scale: Gather data every other 2 days by enumerators at landing sites</p> <p>Commercial-scale landings: (vessel 70 GRT or more)</p> <ul style="list-style-type: none"> i. Train fishing captains/operators to record fishing effort and catch; ii. Gather record books of fishing captains/operators every week iii. Gather data for 4 random times/month at fish landings
<p>Better understanding of:</p> <ul style="list-style-type: none"> i. stocks of small pelagic fisheries in the SCS ii. estimate of populations levels of target species groups 	<p>Study on stock definition</p> <p>Trends in spatial and temporal scales of small pelagic fishes</p> <p>Stock size/abundance</p>	<p>Molecular genetics data</p> <p>Fisheries statistics: catch, effort – from start of fishery (or last 20 years)</p> <p>Biomass</p>	<p>mtDNA and microsatellite DNA analysis</p> <p>Gather fisheries statistics from local and regional agencies</p>

<p>iii. biology and ecology of target groups of small pelagic fishes</p>	<p>Studies on diet and feeding ground, reproduction Studies on distribution and migration</p>	<p>Diet, location of feeding ground, size at first maturity, gonado-somatic index, spawning season, habitats and location of spawning ground, information on presence of small pelagic fishes throughout the year</p>	<p>Take a representative sample of fishes from landing sites on a regular basis (at least 1 to 2 times a month). Examine gut contents, stage gonads (I to VII).</p> <p>Interview fishermen and coastal villagers for information on migration, feeding ground, etc</p> <p>Survey estuarine areas, mangrove forests, and seagrass beds for presence of juvenile and adult small pelagic fishes</p>
<p>Ecological aspect Important habitats for small pelagic fishes are protected</p>	<p>Zoning plan or spatial plan Area of habitats protected</p>	<p>Area of habitats (e.g., mangrove/estuaries, seagrass beds, coastal waters) under some zoning plan Area of habitats protected (e.g., marine protected area, fisheries sanctuary, etc)</p>	<p>Gather maps of spatial plans</p> <p>Gather information on marine protected areas, fisheries sanctuaries, closed areas, etc</p>
<p>Socio-economics per capita income at demonstration sites increased by 10 percent</p>	<p>Profit from fishing activity per unit vessel per year (= rev/yr - cost/yr) Income gained from fishery-related activity (ice-making, storing, processing, marketing, supplying fishing</p>	<ul style="list-style-type: none"> ▪ Price of catches/kg ▪ Cost of fishing/year (including tax, fishing fee, retribution, subsidy, incentives by Government) ▪ Catch/vessel/year ▪ Type of business ▪ Price of fishery product/kg ▪ Cost of production/year ▪ Total production/yr ▪ Revenue from supplying 	<ul style="list-style-type: none"> ▪ gather data from fish landing sites, using interviews, survey forms/questionnaire at start and annually (middle, end of project) ▪ gather data from a representative sample of people who are engaged in fishery-related activities at the fish landing site and fishing village, by interviewing or surveying using a questionnaire at start and annually (middle,

increased contribution of the fishery to the national economy	equipment and logistics)	fishing equipment and logistics <ul style="list-style-type: none"> Cost of supplying fishing equipment and logistics/yr Government tax to the supplier 	and end of project)
increased economic contribution to the community	total fishery profit	<ul style="list-style-type: none"> Price of catches/kg Cost of fishing/year (including tax, fishing fee, retribution, subsidy, incentives by Government) Catch/vessel/year Number of vessels 	<ul style="list-style-type: none"> Gather data from fish landing sites and statistics from national, provincial, and district offices Analyze data, using appropriate economic tools
increased exports	receipts of landings or markets	Amount collected by the municipality from fishing community	<ul style="list-style-type: none"> Gather data from fishing operators, trades, or fishing cooperatives at fish landing sites Gather statistics from national, provincial, and district offices Analyze data, using appropriate economic tools
increased income from non-fishing activity	total value of export of small pelagic fishery products	Amount of exports per destination per year	<ul style="list-style-type: none"> Gather data from fishing operators, traders, or fishing cooperatives Gather data from national, provincial and district statistics Analyze data, using appropriate economic tools
Assured food security in the demonstration site	economic activities and employment in the area supply and demand within the demonstration sites	type of economic activity (non-fishing activity, e.g., factory work, trading dry goods, etc) income per unit time Food production data (supply) and population (demand)	<ul style="list-style-type: none"> Gather data from a representative sample of fishing village and community Analyze data, using appropriate economic tools
	Affordability	Price of small pelagic fish/kg	Market surveys

	Household goods and services	Types of goods and services available	Household survey
	Household market orientation	Knowledge on different market goods	Household survey
Improvement in health	Decreased mortality rate from common diseases, e.g., influenza, tuberculosis, per	Morbidity numbers by diseases Incidences of water borne diseases	Gather annual statistics from health centers or hospital in municipalities/districts office
Improvement in education	Increased enrolment in basic primary and secondary education. Decreased in school drop outs	Population in fishing community Enrolment data Drop-out rate	Gather annual statistics from elementary and high schools in municipalities/districts office Gather annual statistics from elementary and high schools in municipalities/districts office
improvement in lifestyle	ownership and access to technologies (e.g., mobile phones, satellite TV, internet) improved hygiene and sanitation facilities	Number of application to technologies services/fishing community Number of sanitation facilities/fishing community	Gather data from technologies supplier and provider Survey of a <u>representative sample</u> of the fishing community
behavioral changes	Compliance with fishing regulations Increased enforcement activities	Reduced incidences apprehension of illegal fishing	Gather data from coast guard reports, from newspaper items, fishing, and fisheries management offices
improved equity of fishers	Increased percentage of catch across small scale	Catch data of small-scale fishermen	Gather data from a <u>representative sample</u> of small-scale fishermen at fish landings

	vs. commercial fishers	Catch data of commercial fishermen	Gather data from fishing vessels at fish landings
	Increased percentage distribution of catch or income between fishing vessel operator and fishermen	Distribution of catch or income for vessel operator and fishermen	Gather data from fishing vessels at landing sites or from fishing operators
Gender equity	Increased participation of women in all aspects of decision-making	% women participating in meetings	Gather data from meeting reports
Indigenous peoples' rights to fishing grounds (if applicable)	Agreements, policies, memoranda of understanding	Number of agreements, policies	Gather local/state ordinances/rulings on fishing rights
Improved social capital			
Governance			
<i>Management activity</i>			
Integrated Coastal Management (ICM) plans for fisheries management, prepared and implemented at each demonstration site and initiated at each replication site	Status of Local ICM Plans with fisheries management plans in Demonstration and Replication Sites	Progress reports Meeting reports of the ICM Committee for Fisheries Management Memorandum of Understanding	Conduct interviews with the local governments, fisheries agencies, and inter-sectoral committees (formed in the project) Review MoU content Review reports of the National Coordinating Units and Site Coordinators
Establishment of new or strengthening of existing local inter-sectoral committees for Effective implementation of local ICM plans	Status of inter-sectoral committees in each Demonstration site Level of participation and inputs from all stakeholders and relevant sector are in the ICM plans	Progress reports Meeting reports of the ICM Committee for Fisheries Management Memorandum of Understanding	Conduct interviews with the local governments, fisheries agencies, and inter-sectoral committees (formed in the project) Review MoU content Review reports of the National Coordinating Units and Site Coordinators



Annex 2. The SAP workplan detailing the targets, activities, indicators, and financial needs per country for the implementation of the ecosystems approach to fisheries (EAF) management of small pelagic fish stocks in the Sulu-Celebes Sea Large Marine Ecosystem.

Summary Table

SAP Themes	Value USD (per country)	Implementation (years)
Science-based, social, and management interventions Target 1 – Management of SPF stocks Target 2 – EAFM established in selected sites	US\$ 140,000 US\$ 7,850,000	1 2-3
Resource Valuation	US\$ 166,667	1
Monitoring, Control, and Surveillance (MCS)	US\$ 700,000	1-3
Information, Education, and Communication (IEC)	US\$ 250,000	1
Livelihood Development	US\$ 650,000	1-3
Capacity Building	US\$ 750,000	1
Investments Needed per Country	US\$ 10,506,667	Over 3 years
SAP process to address the remaining 5 Transboundary Problems: - Habitat loss and community modification - Climate change - Marine pollution - Freshwater shortage - Alien and invasive species	US\$ 800,000	2-3 years
GRAND TOTAL for SSME	US\$ 32,320,001	Over 3 years

Theme 1: Science-based, Social, and Management Interventions

Targets	SAP Activities	Available investments	Investment needs/country
By 2020, management of SPF stocks using the EAFM framework in the SSME is in place	Document TEK and best practices and incorporate them in the management of SPF stocks [1 year]	Fisheries Adaptation to Climate Change tools (FishACT + TEK); PAWB and NCIP (PH)	US\$ 50,000 per country
	Incorporate findings in the demonstration site activities into the subnational plans [1 year]	SSME Demonstration Sites	US\$ 20,000 per country
	Incorporate the results of the population genetic studies on SSME small pelagic fish species into the EAFM strategy or framework [1 year]	Commissioned by SCS SFM Project	US\$ 20,000 per country
	EAFM is integrated into national and subnational plans [1 year]	Pilot testing of EAFM in Bali strait, Tarakan & Bitung (ID) Demonstration site to Kudat (MY) + National Steering Committee and National TWG for EAFM (MY is Chair of Goal 2 = EAFM) Regional exchange program under CTI for EAFM	US\$ 50,000 per country
			Subtotal: 140,000
By 2020, the scientific bases for EAFM are established	Determine spawning and nursery grounds of small pelagics in the SSME [2 years]	Biological studies in establishing SPF catch (ID); Ichthyoplankton survey (BFAR) in Zamboanga Peninsula to Tawi-Tawi (PH); Tagging of SPF in Semporna (MY) UMS + WWF + SEAFDEC + Sabah Parks with a suite of studies covering many aspects of EAFM (MY)	US\$ 2,000,000 [1,000,000 per country x 2yrs]
	Establish baselines of indicators for the status of SPFs in the SSME (e.g. CPUE, length at first maturity, exploitation rates) [3 years]	National Stock Assessment Program SPF catch; DOST-funded study in Zamboanga Peninsula to Bohol Sea (PH);	US\$ 2,400,000 [800,000 per country x 3yrs]
		Biological studies; acoustic surveys and fish stock assessment (ID) Baseline data available in demonstration sites (I-M-P)	

	<p>Conduct assessments or studies on the impacts of disturbance on the SPF stocks in the SSME (e.g. marine pollution, habitat loss and degradation) [3 years]</p> <p>Conduct vulnerability assessment of small pelagic fish to climate change impacts [3 years]</p>	<p>Studies on marine environment (I-M-P)</p> <p>DOE studies on impact of oil rigs and u/w pipelines (Malampaya to Batangas, PH)</p> <p>Fisheries Adaptation to CC tools (FishACT + TEK) (PH)</p>	<p>US\$ 3,000,000 [1,000,000 per country x 3yrs]</p> <p>US\$ 450,000 [150,000 per country x 3yrs]</p> <p>Subtotal: 7,850,000</p>
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Theme 2: Resource Valuation

Targets	SAP Activities	Available investments	Investment needs/country
By 2020, the total economic value of small pelagic fisheries in SSME is determined	<p>Conduct a value chain analysis of SPFs in the SSME (source to markets) [1 year]</p> <p>Gather primary data and establish the methodology (also using reliable secondary data) to calculate the statistics [1 year]</p> <p>Note: use TEV in the national accounting system</p>	Preliminary data (I-M-P) like fish catch, effort	<p>US\$ 166,667 per country</p> <p>Subtotal: 166,667</p>

Theme 3: Monitoring, Control, and Surveillance (MCS)

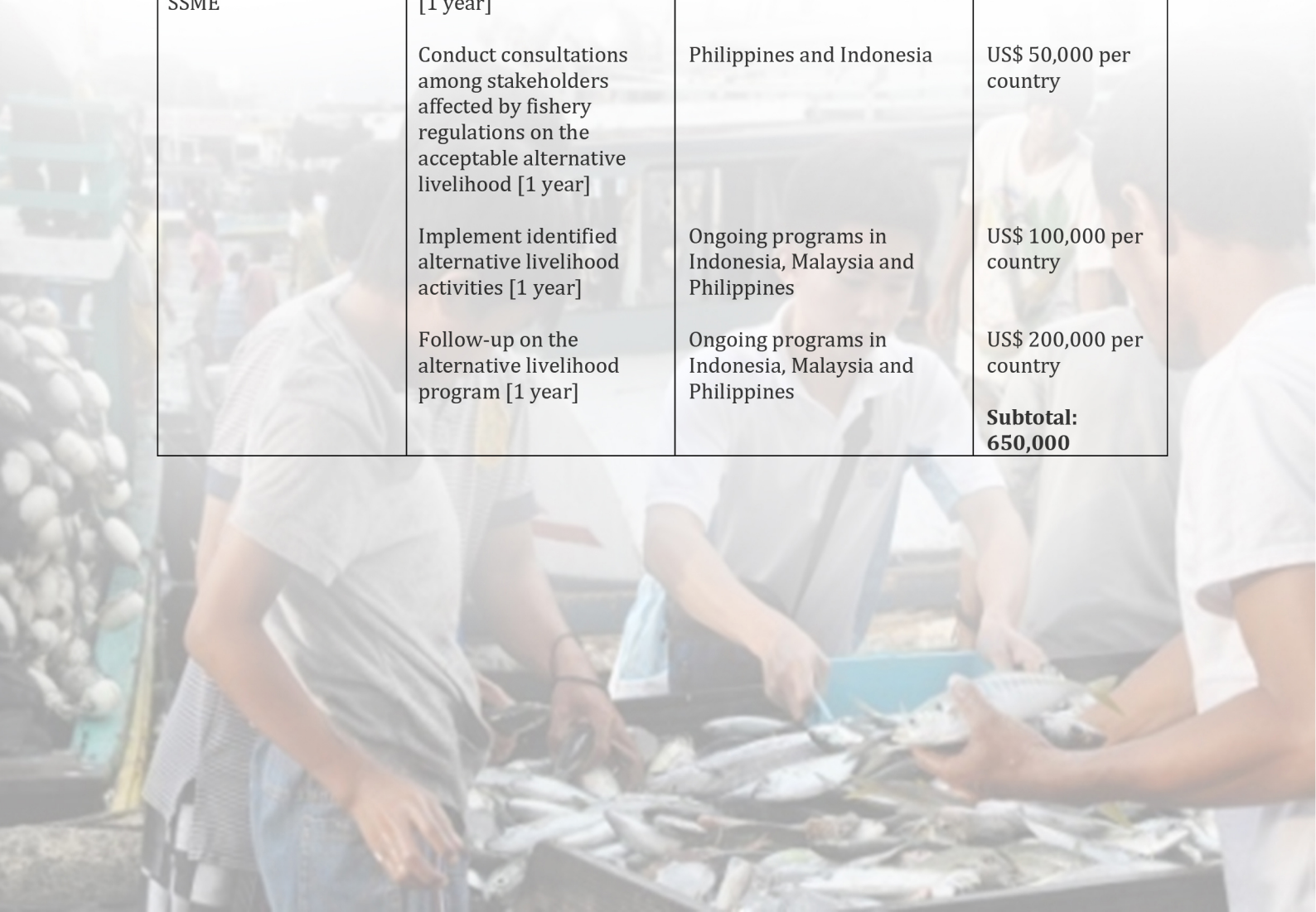
Targets	SAP Activities	Available investments	Investment needs/country
By 2020, strengthen law enforcement through cooperation & exchange of information among marine law enforcers (trans-border)	<p>Apply the RPOA strategy on IUU fishing in the SSME [1 year]</p> <p>Improve bi- or multilateral coordination to combat IUU fishing in the SSME [2 years]</p> <p>Adopt the relevant MCS activities in the SSME CAP on sustainable fisheries [3 years]</p>	<p>Tuna and live reef fish (MY under CTI)</p> <p>ID-PH; MY-PH; MY-ID</p> <p>Tuna (PH, ID)</p> <p>VMS for deep-sea vessels (MY)</p> <p>VMS for tuna longline and purse seiners >60 gross tons (ID)</p>	<p>US\$ 50,000 per country</p> <p>US\$ 200,000 [100,000 per country x 2yrs]</p> <p>US\$ 450,000 [150,000 per country x 3yrs]</p> <p>Subtotal: 700,000</p>

Theme 4: Information, Education, and Communication (IEC)

Targets	SAP Activities	Available investments	Investment needs/country
Starting 2016, SSME targeted stakeholders are able to actively participate in managing SPFs	Disseminate government regulations to the regional level [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 50,000 per country
	Translate laws, scientific results, and other policies for target audience [1 year]		US\$ 100,000 per country per year
	Develop and prepare IEC campaigns that incorporate TEK [1 year]		US\$ 100,000 per country
			Subtotal: 250,000

Theme 5: Livelihood Development

Targets	SAP Activities	Available investments	Investment needs/country
By 2020, sustainable alternative/diversified livelihood sources are implemented in the SSME	Identify studies of the impact of fishery regulations on the livelihood of fishers [1 year]	Indonesia	US\$ 300,000 per country
	Conduct consultations among stakeholders affected by fishery regulations on the acceptable alternative livelihood [1 year]	Philippines and Indonesia	US\$ 50,000 per country
	Implement identified alternative livelihood activities [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 100,000 per country
	Follow-up on the alternative livelihood program [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 200,000 per country
			Subtotal: 650,000



Theme 6: Capacity Building

Targets	SAP Activities	Available investments	Investment needs/country
By 2025, all echelons of management including local communities in the SSME know and appreciate EAFM where decision-makers and resource users are empowered	Conduct EAFM training including cross-learning for local decision makers down to the community [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 200,000 per country
	Develop SSME capacity to train trainers on resource valuation [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 100,000 per country
	Learn the ways/techniques in popularizing science and policies for the community (journalism, mass media) [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 50,000 per country
	Conduct training for public prosecutors/investigators on IUU-Fishing [1 year]	Ongoing programs in Indonesia (Public prosecutors) and Philippines	US\$ 150,000 per country
	Conduct basic fishery law enforcement training for local enforcers and users with periodic refresher courses [1 year]	Ongoing programs in Indonesia, Malaysia and Philippines	US\$ 100,000 per country
	Conduct skills and financial management training for local communities [1 year]	PH & ID (+) Kudat (plan for entrepreneurial skills development)	Subtotal: 750,000



Based on strong evidence that Indonesia, Malaysia, and Philippines are sharing stocks of small pelagic fishes (*Auxis thazard*, *Sardinella lemuru*, *Rastrelliger kanagurta* and *Selar crumenophthalmus*) studied under the Sulu-Celebes Sea Sustainable Fisheries Management Project (SCS-SMP), the scale of conservation and management should also be at a tri-national level, requiring the participation and cooperation from all the three countries exploiting these resources.

