SUSTAINABLE TUNA FISHERIES FOR BLUE ECONOMY

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SUSTAINABLE TUNA FISHERIES FOR BLUE ECONOMY

Prepared by: James Lenoci
for the GEF/UNDP/WCPFC Project:
Sustainable Management of Highly Migratory Fish Stocks
in the West Pacific and East Asian Seas
in collaboration with PEMSEA

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Sustainable Tuna Fisheries for Blue Economy

GEF/UNDP/WCPFC Project: Sustainable Management of Highly Migratory Fish Stocks in the West Pacific and East Asian Seas

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Executive Summary

The concept of the blue economy is rooted in the decoupling of socioeconomic development and environmental degradation. Particularly for developing countries where economies are heavily reliant upon resource exploitation, sustainable use of biodiversity leads to broader sustainable development through facilitating resilient ecosystems and participatory management of scarce resources. In 2012 PEMSEA's country partners expressed interest in blue economy and agreed upon the "Changwon Declaration Toward an Ocean-based Blue Economy: Moving Ahead with the Sustainable Development Strategy for the Seas of East Asia", during the Fourth Ministerial Forum on the Sustainable Development Strategy for the Seas of East Asia in July 2012. This was followed up with a Blue Economy Forum in November 2017.

The purpose of this report is to provide an overview of how management of highly migratory tuna stocks in the East Asia Seas region is transforming towards a blue economy, as part of the second phase of the UNDP supported, GEF-financed West Pacific East Asia (WPEA) project being implemented by the Western and Central Pacific Fisheries Commission (WCPFC) along with national implementing partners from the three beneficiary countries of Indonesia, the Philippines and Vietnam.

Regionalism plays an important role in the sustainable management of highly migratory tuna stocks under a blue economy. The full membership and proactive involvement by Indonesia and the Philippines in the WCPFC has added a great deal of value to the regional cooperation in the Western and Central Pacific Ocean (WCPO). And, the commitment by Vietnam as a cooperating non-member has further strengthened collaborative governance of tuna fisheries in the region. These large, diverse southeast Asian countries provide a much broader outlook to the discussions on regional management of tuna fisheries in the WCPO; considering their large populations and extensive domestic markets, developed private sector, vast fleets of small-medium size vessels and long-standing economic ties throughout the ASEAN region. The WPEA project has facilitated more inclusive involvement of EAS countries in regional management of migratory tuna stocks – one of the foundations of a sustainable blue economy.

The investment in improved data collection through support from the WPEA project has demonstrated the benefits of making science-based management decisions. The reliability of stock assessments has improved as a result, enabling more informed decisions. For instance, the updated assessment of bigeye stocks has concluded that this species is probably not over-fished, as previously estimated; however, taking a precautionary approach, certain management measures have been put into place. Research has also been made on reducing bycatch from purse seine fishing operations, particularly

ones using drifting FADS. Recommendations on biodegradable materials and less entangling FADs are delivering science-based guidance for protecting these fragile marine ecosystems.

The ecosystem approach to fisheries management (EAFM) has long been promoted globally and is gaining traction for highly migratory tuna stocks. The WPEA project has provided support for implementing EAFM on pilot scales within the beneficiary countries. The results of these pilots and integration of EAFM principles in the national tuna management plans increase the likelihood that intrinsic values of marine ecosystems support tuna stocks are protected and factored into adaptive management strategies. Technical assistance on advancing progress on harvest strategies for tuna fisheries has made a valuable contribution with respect to the shift towards more science-based decision making regarding management of tuna stocks in the WCPFC convention area.

The impacts of climate change could potentially affect tuna distribution, because of temperature and acidity perturbations, and increase costs for operators, e.g., due to more intense storms and the need to replace or reinforce shore-based infrastructure. The impacts could potentially be more far-reaching, e.g., affecting food security through detrimental effects to coral reef systems, resulting in declining coastal fisheries that in turn would increase demand of tuna and other species. Improving the resilience and adaptive capacity of the tuna industry and coastal communities, is an important component of progressing towards a blue economy. Moreover, the EAS countries are investing in integrated coastal management (ICM), an important tool for a sustainable blue economy.

The blue economy also requires effective stakeholder engagement, including with the private sector, to ensure social and economic benefits, through food security, livelihoods and poverty alleviation, equity and political stability. The WPEA project has engaged the private sector in some activities, including market-based approaches such as eco-labeling. There is room for further engagement and improved integration of donor funding among public and private sector initiatives.

The WPEA project has set the groundwork for sub-regional collaborative governance mechanism involving the EAS countries, addressing the unique issues associated with the shared tuna resources in the region; there is a need that such a mechanism continues after GEF funding ceases. Recommendations for advancing progress towards sustainable tuna fisheries for blue economy include:

For Sustainable tuna fisheries in the context of the blue economy:

Recommendation No. 1: Establish a framework for a sustained sub-regional collaborative governance coalition among the EAS countries. The GEF funds provided a catalysis for sub-regional governance of highly migratory tuna stocks; it would be advisable to sustain such a coalition, a joint voice representing EAS issues within the WCPO region.

Recommendation No. 2: Set clear, achievable and measurable targets for progressing further towards achievement of sustainable tuna fisheries for blue economy in the EAS region of the WCPFC convention area. With varying definitions of the blue economy, it would be advisable for the EAS partners to agree upon a “roadmap” for progressing towards a blue economy. This could be done before the WPEA project closes, providing an agreed work program for the sub-regional governance coalition.

To address gaps and major issues:

Recommendation No. 3: Strengthen collaboration on certain technical activities. Cross-collaboration among the three beneficiary countries in EAFM, harvest strategy, climate change predictive and adaptive capacities, and risk assessment should be increased. This might be a more efficient use of project resources, further cultivates sub-regional collaboration, and addresses the transboundary context of sustainable management migratory tuna stocks in the EAS.

Recommendation No. 4: Coordinate with Ministry of Environment stakeholders regarding climate change and biodiversity conservation activities. The project teams in the three beneficiary countries should develop collaborative working arrangements with Ministry of Environment officials, regarding strengthening climate change predictive and adaptive capacities, and reducing bycatch of endangered, threatened, and protected (ETP) species.

Recommendation No. 5: Develop and implement plan for increasing the capacities and involvement of subnational stakeholders. For example, the tuna fisheries value chain should be addressed in integrated coastal management processes. Mechanisms for enhancing food security for coastal communities should be put in place; such as securing a portion of allowable catch, requiring greater retention of bycatch from purse seine fishing operations, etc.

To scale up and replicate best practices:

Recommendation No. 6: Identify and operationalize strategic partnerships with complementary projects and programs, including but not limited to (1) FAO-GEF Programme on Global Sustainable Fisheries Management and Biodiversity Conservation in the Areas beyond National Jurisdiction (ABNJ), (2) the World Bank-GEF Ocean Partnerships for Sustainable Fisheries and Biodiversity Conservation, (3) the EAFM Working Group of the Coral Triangle Initiative, and (4) USAID Oceans and Fisheries Partnership on the Catch Documentation and Traceability (CDT) system and EAFM. Partnering with complementary projects, possibly providing incremental funding for specific activities might be a more sustainable implementation strategy than implementing relatively small actions, such as funding prior studies and limited scope field trials.

Recommendation No. 7: Establish collaborative partnerships with the private sector on application of market-based approaches. There are private sector initiatives in each of the three beneficiary countries, including involvement in projects, such as catch documentation and traceability system, performance monitoring and ensuring sustainably sourced tuna, certification and labeling. It would be advisable to establish collaborative partnerships prior to project closure, increasing the likelihood that progress will be maintained towards achievement of the conditions for a blue economy.

Recommendation No. 8: Assess sustainable financing alternatives for maintaining adequate levels of data collection. Government funding streams for data collection structures, including enumerators, samplers, etc., remain tenuous and/or uncommitted in the 3 beneficiary countries. It would be advisable to assess sustainable financing alternatives.

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Abbreviations and Acronyms

ABNJ	Areas beyond National Jurisdiction
ASEAN	Association of Southeast Asian Nations
BET	Bigeye tuna
BFAR	Bureau of Fisheries and Aquatic Resources (Philippines)
CBD	Convention on Biological Diversity
CMM	Conservation and Management Measures (WCPFC)
CoC	Chain of Custody
CTI	Coral Triangle Initiative
D-FISH	Directorate of Fisheries (Vietnam)
DGCF	Directorate General of Capture Fisheries (Indonesia)
EAFM	Ecosystem Approach to Fisheries Management
EAS	East Asian Seas
EEZ	Economic Exclusion Zone
ETP	Endangered, Threatened or Protected species
EU	European Union
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization
F/FMSY	Fishing mortality rate relative to maximum sustainable yield
FIP	Fishery Improvement Project
FMA	Fisheries Management Area
GEF	Global Environment Facility
GSP	Generalized Scheme of Preferences (European Union)
GT	Gross tonnage
HCR	Harvest Control Rule
ICM	Integrated Coastal Management
IUU	Illegal, Unreported and Unregulated fishing

LME	Large Marine Ecosystem
MMAF	Ministry of Marine Affairs and Fisheries (Indonesia)
MT	Metric ton
NTMP	National Tuna Management Plan
PEMSEA	Partnerships in Environmental Management for the Seas of East Asia
POWP	Pacific Ocean Warm Pool
RFMO	Regional Fisheries Management Organization
RFV	Record of Fishing Vessels
SC	Scientific Committee (WCPFC)
SDG	Sustainable Development Goal
SKJ	Skipjack tuna
SPC	Secretariat of the Pacific Community
SSB/SSBMSY	Spawning stock biomass relative to maximum sustainable yield
TCC	Technical and Compliance Committee (WCPFC)
TOR	Terms of Reference
UNCLOS	United Nations Convention on the Law of the Sea
UNCSD	United Nations Conference on Sustainable Development
UNDP	Western and Central Pacific Ocean
USD	United States Dollar
VDS	Vessel Daily Scheme
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean
WPEA	West Pacific East Asia
WWF	World Wide Fund for Nature
YFT	Yellowfin tuna

REPORT ON SUSTAINABLE TUNA FISHERIES FOR BLUE ECONOMY

1 Introduction

1.1 Blue economy theme and role of sustainable tuna fisheries

The concept of the blue economy gained momentum during preparation of the "Rio+20" United Nations Conference on Sustainable Development (UNCSD) held in Rio de Janeiro in June 2012. The Rio+20 conference focused on two key themes: (1) further development and refinement of the Institutional Framework for Sustainable Development, and (2) the advancement of the "Green Economy" concept. Many coastal countries advocated for addressing issues that are more relevant to their sustainable development which are largely focused on the marine environment.

Conceptualization of the blue economy follows the same desired outcome of the green economy, i.e., "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities", and follows the same principles of low carbon, resource efficiency and social inclusion, but is more geared towards marine resources, through the following (UNCSD 2012):

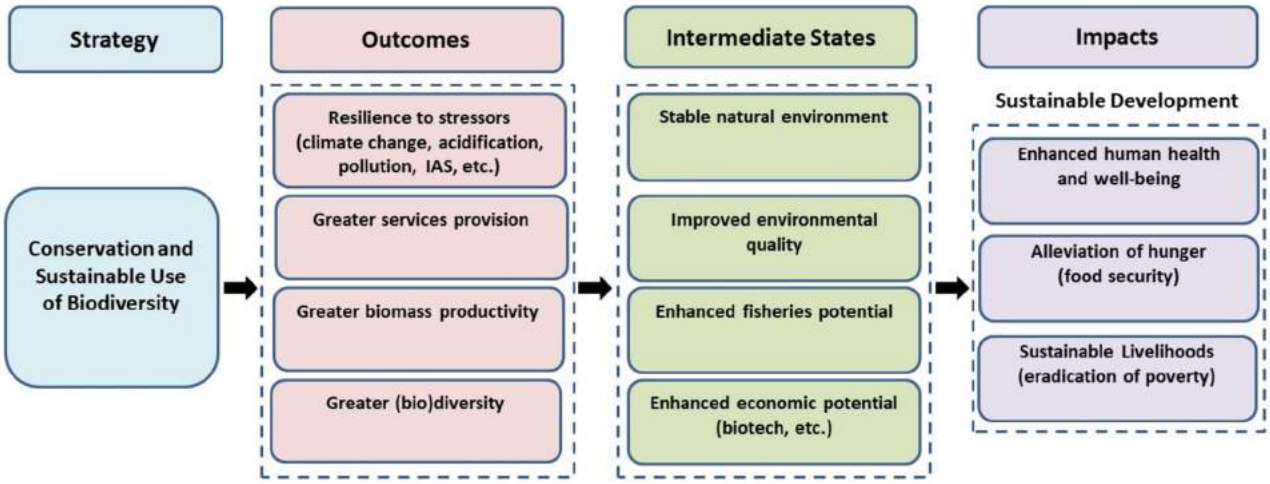
- Optimize the benefits received from the development of their marine environments, e.g., fishery agreements, bioprospecting, oil and mineral extraction.
- Promote national equity, including gender equality, and in particular the generation of inclusive growth and decent jobs for all.
- Have their concerns and interests properly reflected in the development of seas beyond national jurisdiction; including the refinement of international governance mechanisms and their concerns as States proximate to seabed development.

The concept of the blue economy is rooted in the decoupling of socioeconomic development and environmental degradation. Particularly for developing countries where economies are heavily reliant upon resource exploitation, sustainable use of biodiversity leads to broader sustainable development through facilitating resilient ecosystems and participatory management of scarce resources, as illustrated in the theory of change diagram below in **Figure 1**.

In 2012 PEMSEA's country partners expressed interest in blue economy and agreed upon the "Changwon Declaration Toward an Ocean-based Blue Economy: Moving Ahead with the Sustainable Development Strategy for the Seas of East Asia", during the Fourth Ministerial Forum on the Sustainable Development Strategy for the Seas of East Asia in July 2012. In recent years, the private sector has become more involved with progress towards a blue economy. The following ten categories of blue economy related investment needs were highlighted in a report by Whisnant and Reyes (2015) for private sector capital and expertise opportunities:

- Coastal Transport
- Ecotourism / Sustainable Tourism
- Energy

Figure 1. Blue Economy: Theory of Change.



Note: Adapted from UNCSD 2012

- Enterprise and Livelihood Development
- Fisheries and Food Security
- Habitat Protection, Restoration and Management
- Integrated Coastal Management (ICM) Development and Implementation
- Natural and Man-made Hazard Prevention and Management
- Pollution Reduction and Waste Management
- Water Use and Supply Management

1.2 Objectives, rationale, expected outcomes

The objective of this report is to provide input to the regional State of Oceans and Coasts (SOC) report and highlight WCPFC's contribution of sustainable tuna fisheries on establishment of a blue economy, through:

a. Increasing awareness of the benefits of tuna fisheries, and how human activities, natural hazards, and climate change can impact its sustainability, and the welfare of fisherfolk and coastal communities;
b. Improving direction in ocean stewardship and governance aimed at ensuring sustainable tuna fisheries, and safeguarding our natural wealth and communities; and
c. Supporting evidence-based, region-wide ocean policies and multi-country responses to address threats and transboundary issues, and co-manage shared resources, in particular tuna fisheries.

The principle outputs of the report include:

a. Summary of the state of tuna fisheries in the EAS Region, and its role and contribution to national economies, and income and livelihood of coastal communities;
b. Assessment of the anthropogenic pressures and threats on tuna, and impacts of unsustainable fishing practices and other human activities;
c. Discussion of how natural hazards and climate change can affect the sustainability of tuna fisheries;
d. Examination of the policies, governance, and supporting mechanisms that drive innovations and sustainability;
e. Examples of best practices in support of blue economy development, and their environmental, economic and social benefits; and
f. Discussion of investment and partnership opportunities in blue economy development in the tuna fisheries sector in East Asia.

1.3 Scope

The first part of the report presents an assessment of the status of tuna fisheries in the EAS region and in the three participating countries of the UNDP-supported, GEF-financed West Pacific East Asia (WPEA) project, and the pressures, threats and drivers of change that affect the sustainability of tuna fisheries in the region.

The second part focuses on the response made by WCPFC and the three participating countries in the WPEA project to promote sustainable tuna fisheries, and address risks and needs. This section includes discussions on policies, laws and plans adopted and implemented, institutional arrangements, major actions taken, and supporting governance mechanisms.
The third part highlights the best practices and examples of innovative and sustainable activities and shows the ongoing transformations in the tuna fisheries industry towards blue economy.

The fourth part discusses the outcomes and impacts of the WPEA project, the policies plans, and the blue economy initiatives made by the participating countries.

The project closes with a summary of the main conclusions, and presents lessons learned, major challenges, and recommendations.

The report draws upon information that is available in the public domain. Considering that sustainable fisheries for blue economy is in the early stages of development, there are limited case studies available. Moreover, there is limited implementation experience of applying the ecosystem-based approach to management of tuna fisheries.

2 State of Tuna Fisheries

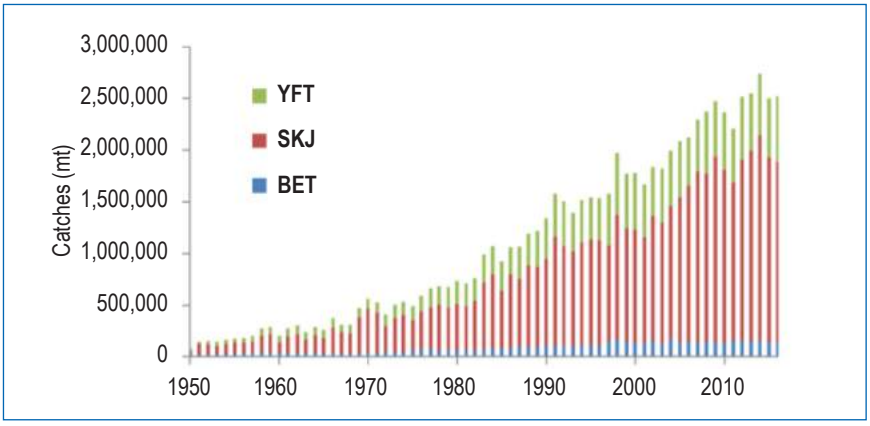
REPORT ON SUSTAINABLE TUNA FISHERIES FOR BLUE ECONOMY

2.1 Status and condition of tuna fisheries

2.1.1 Tuna production (volume and value)

The global catch of major tuna species in 2016 was 4.9 million tons, a 2% increase from 2015, with skipjack tuna (SKJ) comprising 57%, yellowfin (YFT) 30%, bigeye (BET) 8% and albacore 4%. Bluefin tuna accounted for only 1% of the global catch (ISSF 2018). Approximately 53% of world tuna production is from the western and central Pacific Ocean (WCPO); there has been marked increase in production over the past 35 years from the WCPO, particularly with respect to skipjack tuna (see Figure 2). The WCPO region (FAO 71) has the highest volume of tuna landings among all FAO statistical regions.

Figure 2. Tuna production in the WCPO region 1950-2016



The WCPO region contains stocks of four tuna species that are commercially harvested:

- Albacore (Thunnus alalunga)
- Bigeye (Thunnus obesus
- Skipjack (Katsuwonus pelamis)
- Yellowfin (Thunnus albacares)

Indonesia:

The cumulative tuna catches from Indonesian fishery management areas that fall within the WCPFC Statistical Area (FMA 713, 714, 715, 716 and 717) was 525,238 metric tons in 2016 (see **Table 1**), which is about 10.7% of the global tuna catch.

Table 1. Indonesia tuna catch in WCPFC Statistical Area, 2000-2016

Year	Skipjack (MT)	%	Yellowfin (MT)	%	Bigeye (MT)	%	Total tuna
2000	220,717	64%	105,317	31%	16,167	5%	342,200
2001	203,101	64%	96,911	31%	14,876	5%	314,888
2002	195,213	64%	93,147	31%	14,299	5%	302,659
2003	199,129	64%	95,016	31%	14,585	5%	308,730
2004	262,179	64%	125,100	31%	19,204	5%	406,483
2005	173,203	70%	63,625	26%	10,688	4%	247,515
2006	217,310	76%	55,920	20%	12,612	4%	285,842
2007	243,118	76%	67,773	21%	10,999	3%	321,890
2008	255,918	76%	63,055	19%	15,613	5%	334,586
2009	279,985	72%	92,887	24%	15,762	4%	388,635
2010	273,637	76%	73,846	21%	10,771	3%	358,253
2011	270,101	68%	114,442	29%	12,901	3%	397,444
2012	272,052	61%	151,789	34%	19,476	4%	443,317
2013	351,901	67%	146,646	28%	20,446	4%	518,993
2014	322,840	67%	136,210	28%	23,868	5%	482,918
2015	262,927	61%	146,196	34 %	22,953	5%	432,076
2016	336,455	64 %	160,092	31 %	28,344	5%	525,238

Source: WCPFC 2017b. Annual report to 13th SC session, August 2017

Philippines:

For the Philippines, the reconciled cumulative total tuna catches from Philippine waters in 2016 was 143,557 metric tons (see **Table 2**). An additional 71,394 metric tons were recorded from Philippine flagged purse seine vessels operating in Papua New Guinea waters.

Table 2. Philippines reconciliation of 2016 tuna catch estimates by gear and species

Gear	Skipjack (MT)	Yellowfin (MT)	Bigeye (MT)	Total (MT)
Purse seine	41,415	15,967	908	58,290
Ringnet	26,475	8,290	636	35,401
Hook-and-line	7,818	31,781	1,177	40,776
Others	6,420	2,546	124	9,090
Total:	**82,127**	**58,584**	**2,845**	**143,557**

Source: WCPFC 2017c. Annual report to 13th SC session, August 2017
Note: Provisional catch estimate does not include catches of Philippine flagged purse seine vessels in PNG which accounts for around 71,394 MT for 2016.

Vietnam:

The cumulative tuna catch in 2016 in Vietnam's EEZ for the three species of bigeye, yellowfin and skipjack was 123,076 metric tons (see **Table 3**).

Table 3. Vietnam tuna catch caught in Vietnam's EEZ for three fisheries in 2016

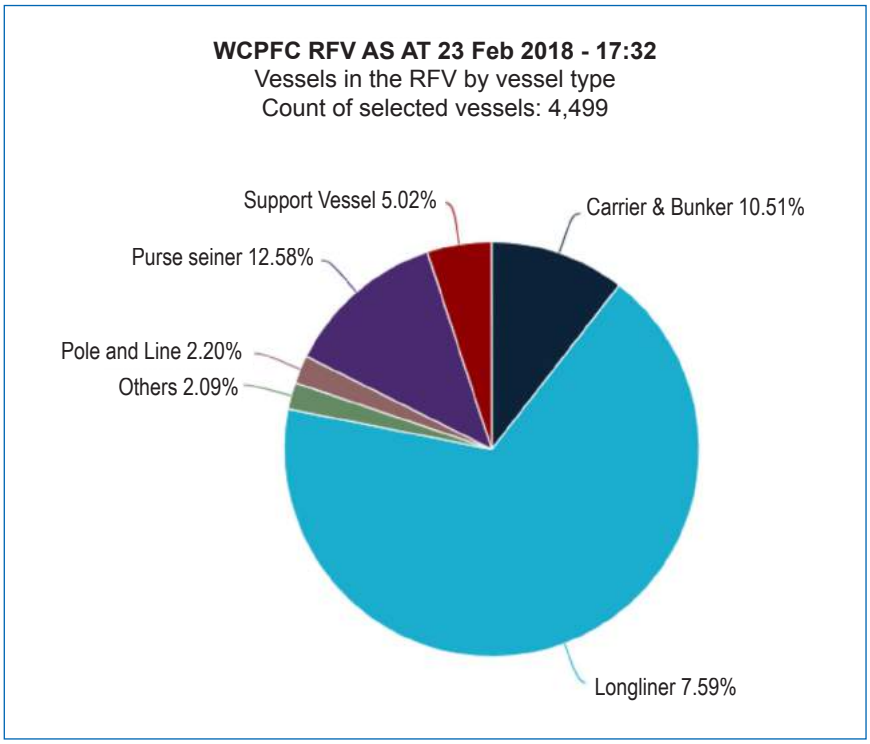
Gear	Skipjack (MT)	Yellowfin (MT)	Bigeye (MT)	Total (MT)
Gillnet	1,671	771	44,997	47,439
Purse seine	2,918	6,617	48,564	58,099
Longline/Handline	1,115	16,423	N/A	17,538
Total	5,704	23,811	93,561	123,076
Proportion (%)	4.63%	19.35%	76.02%	100%

Source: WCPFC 2017d. Annual report to 13th SC session, August 2017

2.1.2 Fishing boats/fleet structure

According to WCPFC's Record of Fishing Vessels (RFV) database, there were 4,499 registered vessels as of 23 February 2018, with longliners making up two-thirds of the total number (see **Figure 3**)

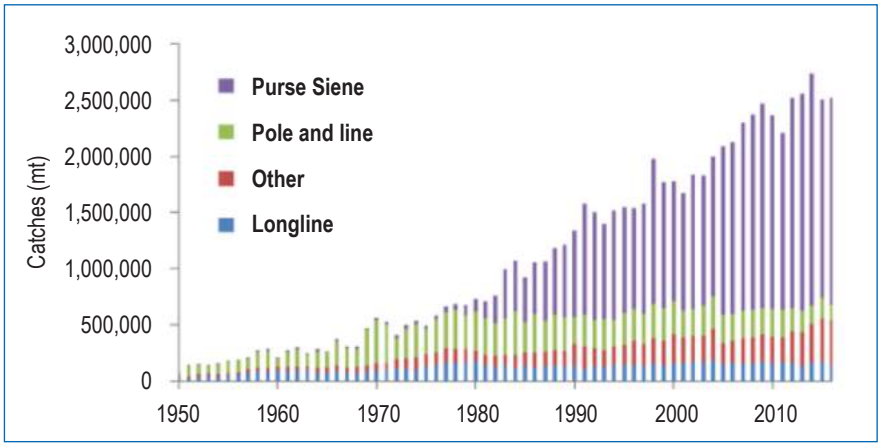
Figure 3: Vessels in WCPFC's Record of Fishing Vessels (RFV) database



2.1.3 Fishing gears

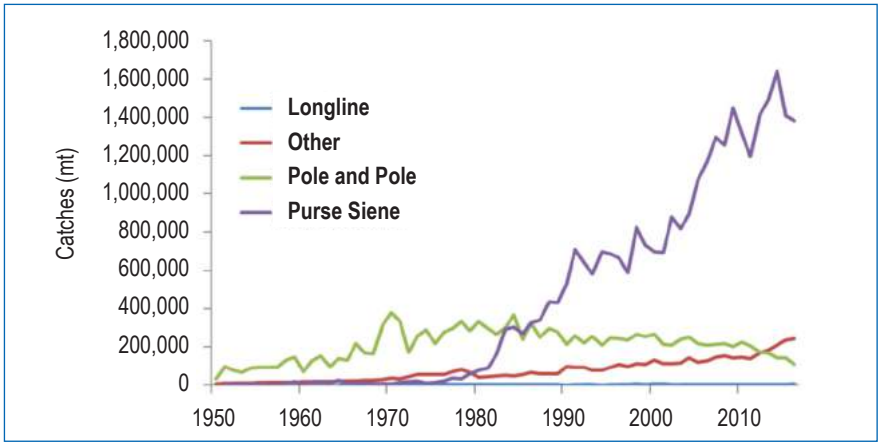
In terms of fishing gear, 65% of the catch in 2016 in the WCPO was made by purse seining, followed by longline (12%), pole-and-line (8%), gillnets (3%) and miscellaneous gears (12%) – see **Figure 4**.

Figure 4. Breakdown of tuna production in the WCPO by gear, 1950-2106



Catches in 2016 from the WCPO skipjack tuna stock, the largest tuna fishery in the world, were 1,740,300 tons, of which purse seining accounted for 80%, which have increased steadily since 1980, whereas pole-and-line fishing has declined (see **Figure 5**).

Figure 5. Catches of skipjack tuna in the WCPO from 1950-2016 by gear type



2.1.4 Markets

Indonesia has a substantive domestic market, serving a population of more than 250 million. Exports have significantly grown over the past 10 years, but there has been a decline in frozen whole and skipjack fillets in 2015 and 2016, primarily due to a decrease in exports to Thailand which is the largest producer of canned tuna in the world – but is reliant upon imports of raw materials.

Tuna is the largest seafood export commodity of the Philippines in terms of value. There have been decreases in the supply of raw material to canneries and other processing plants in recent years because of the measures implemented by the Indonesian government to combat IUU fishing, but over the same period the Philippines obtained GSP+ status[1] from the European Union. The Philippines is best known for its high quality, fresh yellowfin tuna *(Thunnus albacares)* and is currently the largest supplier of fresh yellowfin tuna to the European Union (Seafood Trade Intelligence Portal, 2018).

In Vietnam, tuna exports in 2016 reached USD 500 million, with shipments to the United States worth USD 200 million, a year on year increase of 4.5%, and USD 110 million to the European Union, an increase of 11.5% over 2015 figures (SeafoodSource 2017). Frozen tuna loins were the primary product in terms of value, followed by canned tuna and frozen whole tuna. In 2014, Vietnam became the third major seafood exporter, overtaking Thailand as the leading southeast Asian exporter. The Vietnam Association of Seafood Exporters and Producers (VASEP) reports an export value in 2016 of USD 7.05 billion, indicating that the tuna experts comprise approximately 7% of the total (Seafood Trade Intelligence Portal, 2018).

2.1.5 Transshipment ports

Fishing ports in Indonesia are an important component to the fisheries system and supply chain. The Directorate General of Capture Fisheries (DGCF) classifies four types of fishing ports: Oceanic Fishing Ports (OFPs), Archipelagic Fishing Ports (AFPs), Coastal Fishing Ports (CFPs) and Fish Landing Centers (FLCs). FLCs are managed by provincial governments; the other three categories by the Ministry of Marine Affairs and Fisheries. Benoa (state-enterprise owned) is considered as the main tuna landing port, but Muara Baru, Bitung, Ambon and Sorong are also important.

The Philippines has eight main fish port complexes: (1) General Santos Fish Port Complex, (2) Navotas Fish Port Complex, (3) Iloilo Fish Port Complex, (4) Lucena Fish Port Complex, (5) Zamboanga Fish Port Complex, (6) Davao Fish Port Complex, (7) Sual Fish Port Complex, and (8) Camaligan Fish Port. The General Santos and the Navotas Fish Port Complex account for 83% of the landings landed at these fish ports (Seafood Trade Intelligence Portal, 2018). There are also city and municipal fish ports, and community fish landing centers managed under the local governments.

In Vietnam, tuna catches are landed at over 60 landing sites along the coast of 28 coastal provinces. For oceanic tuna, they are unloaded mainly at ten fishing ports in Binh Dinh, Phu Yen and Khanh Hoa provinces (VN-NTMP 2012).

2.1.6 Share in world tuna production

The top tuna-fishing nation the world is Indonesia. Considering 2012 global production, Indonesia accounted for 12%, i.e., 566,153 tons of the 4,610,007 tons worldwide (Macfayden et al. 2016). Most of Indonesia's catch, 77%, is in the

[1] GSP+ (Generalized Scheme of Preferences) is a special incentive arrangement for sustainable development and good governance issued to qualifying developing countries by the European Union.

WCPO, but much of the longline catch originates in the Eastern Indian Ocean. Catches were landed by several gear types, and there is a strong reliance on "other" gears, making up 32% of the total Indonesian catch in 2012 (see **Table 4**).

Table 4. Catches of tuna species by EAS countries and fishing method, 2012

Country	Tuna catches, tons							
	Pole & Line	Gillnet	Handline	Longline	Other	Purse seine	Troll	Total
Global Total:	438,965	186,743	148,383	615,175	217,248	2,932,763	70,730	4,610,007
Indonesia	135,938	10,870	24,930	69,583	180,899	132,419	11,514	566,153
Philippines			35,521	3,676	4,368	193,164		236,729
Vietnam		22,385		16,232		26,939		65,556

Source: WCPFC 2017b. Annual report to 13th SC session, August 2017

Tuna catches in the Philippines in 2012 were just under 250,000 tons, comprising approximately 5% of the global catch. The Philippines catch is made up by multiple gear types, but predominantly purse seines. The annual catch in Vietnam in 2012 was 65,556 tons, about 1.5% of the global total, and included gillnet, longline and purse seine catches.

2.1.7 Tuna canning industry

The three EAS countries of Indonesia, Philippines and Vietnam have significant tuna canning industries. In 2014, canned tuna exports from Indonesia were 70,814 tons (Seafood Trade Intelligence Portal, 2018), making the country the sixth largest exporter of canned tuna products. Indonesian canneries have seen a drop in raw materials in recent years because of the measures the government is taking on IUU fishing.

The Philippines also has a substantive tuna canning industry. The IUU fishing measures implemented by the government of Indonesia have also impacted raw material supply to Philippine canneries, but the GSP+ status[2] recently obtained has bolstered exports to the EU. Apart from GSP+ status, companies are facing increasing pressure to fulfill quality criteria, and ensuring sustainably and equitably sourced tuna. For instance, Greenpeace has published reports ranking performance of tuna canneries in Southeast Asia, including the Philippines and Indonesia.

The tuna canning industry in Vietnam, along with overall tuna exports, is growing. In 2016, the value of Vietnamese tuna exports was USD 500 million, a 9% increase from the previous year. Frozen tuna loins and canned tuna accounted for 47% and 30%, respectively (SeafoodSource 2017).

[2] GSP+ is a special incentive arrangement for sustainable development and good governance issued to qualifying developing countries by the European Union.

2.1.8 Contribution to ocean economy

The ocean economy is a major driving force in the EAS region, which harbors a large proportion of globally significant marine biodiversity, contains one-third of the worlds' mangroves, coral reefs and seagrass beds, produces 80% of global aquaculture and 40% of the world's capture fisheries, and attracts 26% of the world's tourists (PEMSEA 2017). According to draft National State of Oceans and Coasts reports presented at the November 2017 Blue Economy Forum organized by PEMSEA, the ocean economy in the region significantly contributes to the national economies, measured as percentage of gross domestic product (GDP); 28% in Indonesia, 7% in the Philippines and 20.8% in Vietnam (see **Table 5**).

Table 5. Breakdown of the Ocean Economy in Indonesia, the Philippines and Vietnam

Country	Ocean Economy (USD billion, 2015 estimate)	Share of Fisheries and Aquaculture to Ocean Economy (USD billion*)	% share of Ocean Economy to GDP	Employment in the Ocean Economy
Indonesia	182.54	14.70	28%	5.3 million
The Philippines	11.81	2.59	7%	1.6 million
Vietnam	38.23	12.11	20.8%	3 million

Source: PEMSEA 2017; *see Annex 1

A global estimate of the value of tuna fisheries concluded that the industry generates more than USD 40 billion a year for the global economy, with >70% attributed to the Pacific Ocean (see **Figure 6**).

Figure 6. Estimated global values from tuna fisheries, 2014

2.2 Pressures and threats

2.2.1 Drivers of change

Climate Change

Modeling conducted to date by the Secretariat of the Pacific Community (SPC) on two of the region's four tuna stocks, skipjack and bigeye, suggest that in twenty years the sizes of the stocks will not be affected by climate change, but the distribution of the stocks may begin to shift towards the central and eastern Pacific (Bell et al. 2011). Climate change could also result in increased operating costs for WCPO tuna fishing, associated with the predicted increase in intensity in storms, rendering vessel upgrade and reinforcement or relocation of shore-based facilities.

Markets and the Economy

The markets and value chains for canned tuna and fresh tuna in the WCPO are global, with consumers mostly in the United States, Japan and Europe. The price of tuna along the value chains is a key variable in defining the economic value of the WCPO tuna fisheries.

In terms of market, the demand for fish products (and other animal protein) is expected to continue to rise as the global population increase. A World Bank study (2013) notes that global fish markets will increasingly be influenced by demand in China, which is expected to account for 38% of food fish consumption by 2030.

Food safety and price will likely remain key priorities of consumers, but the growing preference for sustainably sourced fish and traceability are expected to be increasingly important driving factors. Over the long term, eco-labels are likely to be a prerequisite for entry to many markets, with little difference in price (Conservation International 2015).

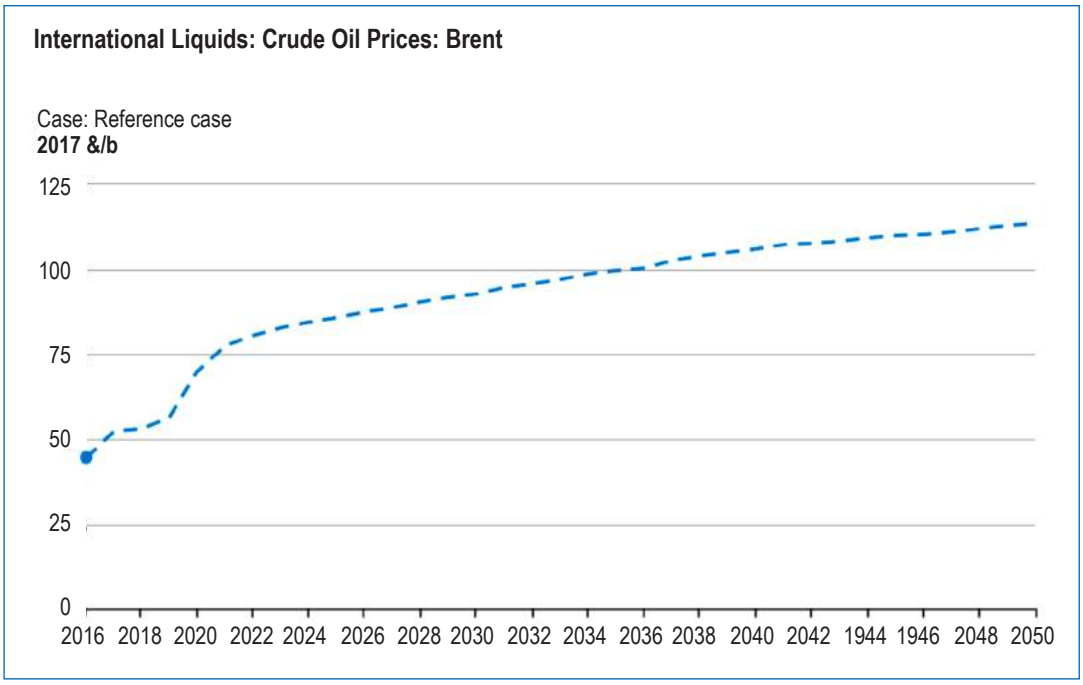
Demand for canned tuna has leveled off or declined in mature markets of the United States, Japan and Europe, but consumption is increasing in many emerging markets, driven by the low price for this source of animal protein.

The most significant global economic driver impacting operating costs along WCPO tuna fishery value chains is the cost of fuel. Although crude oil prices are on an increasing trend, after sharp declines in recent years, and the longer-term forecast is continued increase, more than doubling in real terms by 2050 according to forecasts made by the U.S. Energy Information Administration (see **Figure 7**).

Harvesting Technology

Significant improvements to tuna fishing technology have been made over the past over the past 50 years to increase efficiency; including continuous improvement to fishing gear and procedures, improvements in fishing vessels and navigational instrumentation, introduction of high-efficiency freezers, improvements in searching and catch rates through use of sonar, helicopters, global positioning system, and establishment of fish aggregating device (FAD) fishing in the 1990s. One issue that is receiving increased levels of attention is the need to develop improved technologies for purse seining that can reduce bycatch on drifting FADs.

Figure 7. Crude oil price forecast, 2017-2050



Source: U.S. Energy Information Administration

Fisheries Monitoring and Surveillance Technology

Advances in fisheries monitoring and surveillance technologies offer opportunities for improving enforcement capacities and providing much needed information on IUU fishing in the region. With required investment, continued improvement of monitoring and surveillance technologies are expected to reduce enforcement costs in coming years; including expansion of satellite tracking systems, use of unmanned aircraft, and electronic monitoring systems for fishing catch and effort.

Demographics

Populations of the countries in the EAS region are expected to continue to rise in coming years. Fish is one of the main components of food security in rural areas, supplied from stressed coastal fisheries. The effects of overfishing of the coastal fisheries will likely be exacerbated by the predicted detrimental impacts of climate change on coral reef systems. Potential declines of coastal fisheries will likely be met with increased demand on tuna fisheries.

External Governance

Under the United Nations Fish Stocks Agreement, the basis for establishing the WCPFC, states are obliged to adopt measures to ensure long-term sustainability of straddling fish stocks and highly migratory fish stocks and promote the objective of their optimum utilization (United Nations 1995).

2.2.2 Current issues

Oceanic tuna stocks in East Asia face several threats, rooted in a greater demand for fish from rapidly growing domestic population and increasing exports, which has substantially increased fishing pressure on the marine fishery resources in the past two decades, both within the sub-region and the wider WCPO. The major threats facing the fisheries sector are resource depletion and environmental degradation linked to:

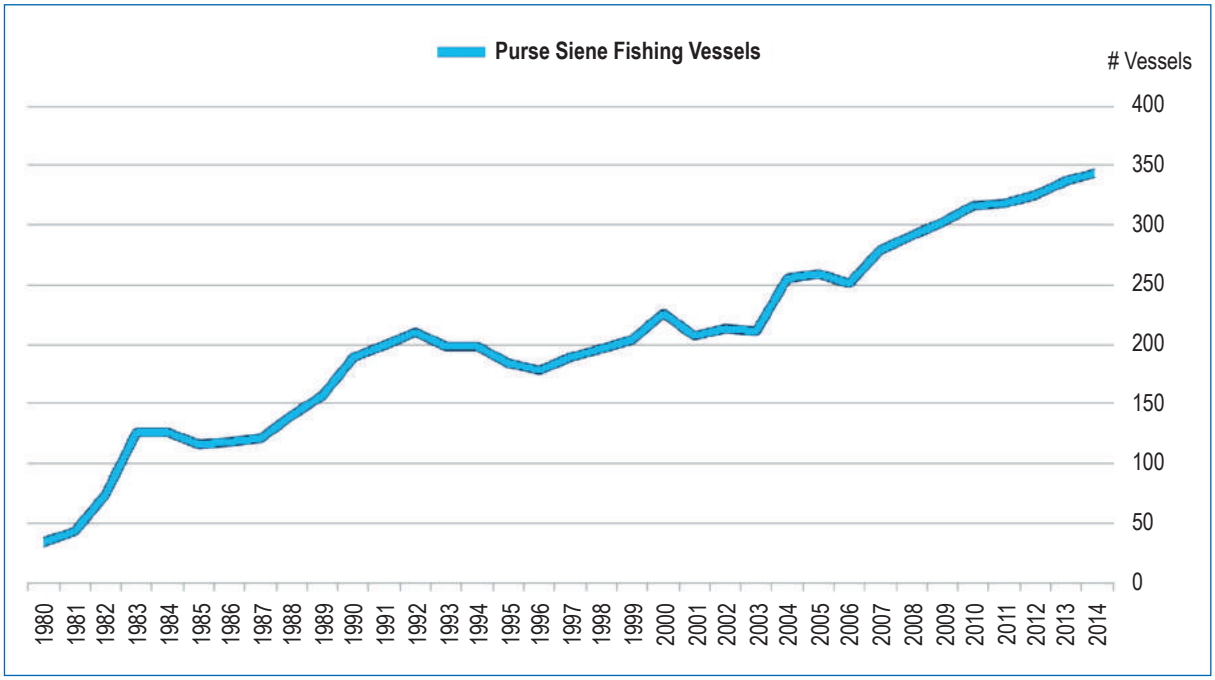
1. Incomplete participation in the governance and compliance frameworks for oceanic tuna resources in the sub-region, the WCPFC;
2. Inadequate scientific knowledge about oceanic ecosystems and their relationship with fisheries resources; and
3. The advancing climate change-driven shifts in fisheries catch and area.

Illegal, Unreported and Unregulated (IUU) fishing is exerting considerable pressure on tuna fisheries. This is compounded by ineffective surveillance and monitoring, incomplete reporting to the WCPFC, and gaps in the regulatory frameworks. These threats are being exacerbated by climate change that is predicted to expedite perturbations in ocean regimes, strengthening of the El Niño-Southern Oscillation (ENSO) phenomenon, and ocean acidification.

Pressure from purse seine fishing

The exponential increase in purse seine fishing (supply to the canned tuna industry) continues to be a threat to tuna fisheries, with increased juvenile catch and bycatch. The number of purse seine vessels in the WCPO have increased from 34 in 1980 catching about 100,000 MT to 344 in 2014 catching more than 2 million MT (see **Figure 8**).

Figure 8. Number of purse seine vessels registered in WCPO, 1950-2014

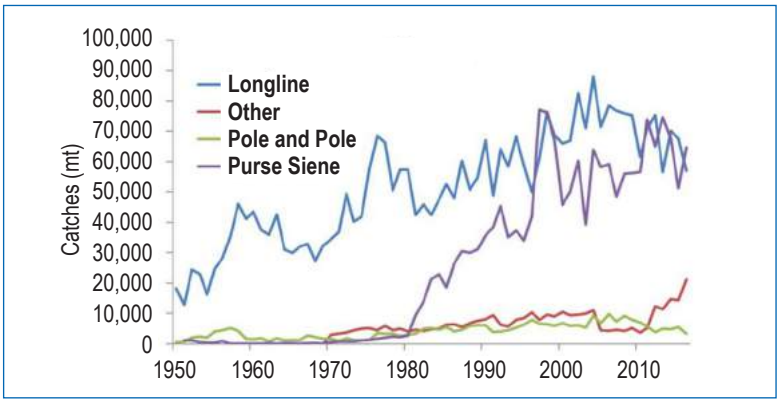


Source: WCPFC Tuna Fishery Yearbook, 2014; adapted from World Bank 2016

Decline of the bigeye stock

The biomass of the bigeye stock has shown a steady decline since the 1970s, reaching overfished status in the last 5 years. At the same time, the growth of purse seining and particularly FAD technology has taken a larger share of the bigeye catch, representing 41% of the WCPO bigeye catch in 2014 (see **Figure 9**).

Figure 9. Catches of bigeye tuna in the WCPO from 1950 to 2016 by gear type



Source: ISSF 2018

Based on updated stock assessments made by SPC, the bigeye fishery is now considered not over-fished, but the commission is taking a precautionary approach and has implemented specific management measures in 2017 (WCPFC 2017a).

Other stocks approaching limits recommended by scientists

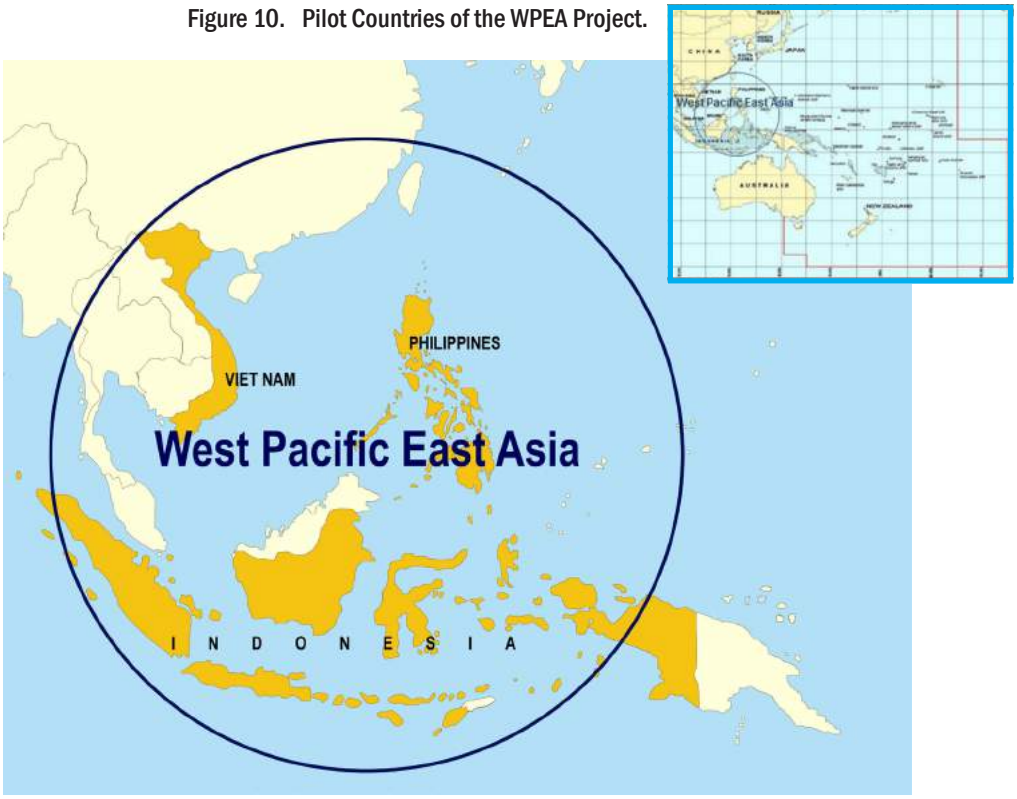
Albacore, skipjack and yellowfin stocks are relatively healthy but at the limit and cannot continue to support the growth in fishing effort and catch seen the past, according to current scientific assessments (ISSF 2018). Fish stock assessments show that the biomass of tuna is now at the threshold of overfishing.

2.2.3 Transboundary issues

Oceanic tunas are widely distributed throughout the Pacific Ocean, the Atlantic Ocean, and other oceans of the world, from approximately 600N to 600S and are designated as highly migratory species under the United Nations Convention on the Law of the Sea (UNCLOS). Their effective conservation and management is complicated by their migratory/highly mobile nature and the many nations and regions involved in their harvest; hence their sustainable management requires cooperation among nations, either directly or through international organizations. Article 64 of UNCLOS underscored the importance of multilateral cooperation for the long term and sustainable management of the region's marine resources and the protection and conservation of its ecosystems.

The Western and Central Pacific Fisheries Commission (WCPFC) was established in 2004 as the relevant regional fisheries management organization (RFMO) in the Western and Central Pacific Ocean. The area of competence (Convention Area) of the Commission comprises all waters of the Pacific Ocean north and west of prescribed boundaries, to the coasts of Asia and is indicated in Figure 10 below, which includes the East Asian Seas (EAS) as well as the Pacific Ocean Warm Pool (POWP) Large Marine Ecosystems.

Figure 10. Pilot Countries of the WPEA Project.



2.2.4 Emerging and escalating issues

Emerging and escalating issues include, but are not limited to the following:

- Climate change: potential distribution shifts, including skipjack and bigeye distribution shifting towards the central and eastern Pacific.
- Supply: approaching global limits.
- Demand: modest increase expected, considering flat supply and population growth.
- Global price: slow increase in canned and fresh tuna;
- Harvesting costs: fuel costs expected to remain on increasing trend.
- Harvesting technology: improvements in purse seining, reducing bycatch on drifting FADs.
- Fisheries monitoring and surveillance: further advances in technology expected, further reducing enforcement costs; however, capital investment demands are high.
- Demographic changes: demand on tuna fisheries expected to increase as coastal fisheries decline because of over-fishing and climate change.
- External governance: trade preferences of foreign partners could shift to other producers.
- WCPFC might take measures to conserve bigeye stocks, if over-fishing determined.
- Increasing catch of tuna in the Open Ocean or high seas, taken beyond the exclusive economic zones (EEZs) of maritime countries or Areas Beyond National Jurisdiction (ABNJ)

3 Response: Governance Mechanisms

REPORT ON SUSTAINABLE TUNA FISHERIES FOR BLUE ECONOMY

3.1 Policies and regulations

3.1.1 National Policies and Legal Frameworks

Management, utilization and conservation of tuna resources are regulated under national policies and legal frameworks, including but not limited to the following[3]:

Indonesia:

- Act No. 31 of 2004 as amended by Act - Act No. 45 of 2009 on fisheries;
- Act No. 5 of 1983 on the Indonesian Exclusive Economic Zone;
- Law No. 32 Year 2004 on Regional Government;
- Act No. 6 of 1996 on Indonesian Waters;
- Law No. 21 Year 2009 on the ratification of Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Approval of the implementation of the provisions of the convention union of nations marine law dated 10 December 1982 relating to the conservation and management of fish stocks and the stocks are limited stocks of fish stocks away);
- Law No. 17 Year 2008 on the voyage;
- Government Regulation No. 54 Year 2002 on Fisheries Business;
- Government Regulation No. 60 of 2007 on Conservation of Fish Resources;
- residential Decree No. 9 of 2007 on Ratification of the Agreement for the Establishment of the Indian Ocean Tuna Commission (Agreement on the establishment of the Indian Ocean Tuna Commission);
- Presidential Decree No. 109 of 2009 on the Ratification Convention for the Conservation of Southern Bluefin Tuna;
- Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas in 1993, the Food and Agriculture Organization.

[3] National policies and legal frameworks obtained from the national tuna management plans of the 3 EAS countries.

To carry out the provisions of the above regulations, the Ministry of Maritime Affairs and Fisheries Minister has issued various regulations such as capture fisheries business, fishing gear, fisheries management area, vessel's marking and registration, fishing logbook, catch certificate, vessels monitoring, etc.

In addition, Indonesia also has the Indonesian Ocean Policy (Presidential Decree Number 16 of 2017), Medium Term Development Plan, National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated (NPOA-IUU), Establishment of Marine Protected Areas of about 20 million hectares, including various provisions concerning environment, trade and ship that can also support the implementation of sustainable management of tuna resources in the Indonesia FMA and the high seas.

Philippines:

- Republic Act 10654 - An Act to Prevent, Deter And Eliminate Illegal, Unreported And Unregulated Fishing, Amending Republic Act 8550
- Philippine Fisheries Code 1998;
- Agriculture and Fisheries Modernization Act 1997;
- Local Government Code 1991.

The Philippine Fisheries Code 1998 provides the basic fisheries management framework; the Agriculture and Fisheries Modernization Act 1997 addresses fisheries development as a component of the agricultural sector; and the Local Government Code 1991 provides guidelines for local autonomy and decentralization which includes fishery functions. A specific law on handline fishing, Republic Act 9379, was also enacted in 2007 to provide a framework that considers the unique characteristics of handline fishing vessels. Regulations implementing the Philippine Fisheries Code are in the form of Implementing Rules and Regulations (IRR) and Fisheries Administrative Orders (FAO) issued by the Department of Agriculture. Aside from these basic fisheries-related laws, national policies are part of the general framework for sustainable fisheries management. These national policies include the National Marine Policy, Philippine Agenda 21, the Medium-Term Philippine Development Plan (MTPDP), and the (draft) Philippine National Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing (NPOA-IUU). Several laws and policies relating to the environment, trade, and safety of fishing vessels also form part of the general framework for the effective management of fisheries and control of fishing activities in the Philippines.

Vietnam

- Vietnamese Fisheries law, 2003;
- Decree No. 59/2005/ND-CP regarding the conditions of trading and production of fisheries related occupations;
- Decree No. 14/2009/ND-CP regarding the revision and supplement of some articles of Decree 59/2005/ND-CP;
- Decree No. 32 / 2010/ND-CP on the management of fishery activities of foreign fishing vessels in all marine areas of Vietnam;
- Decree No. 33/2010/ND-CP on management of fishing activities of organizations and individuals in all marine areas of Vietnam;
- Decree No. 52/2010/ND-CP on the import of fishing vessels, and Decree 31/2010/ND-CP on administrative violations in fisheries sector;
- The fisheries sector strategies up to 2020 and visions to 2030 was adopted by the Primary Minister at the Decision No. 1690/QD-TTg dated 16/9/2010. .

3.1.2 International Multilateral Agreements

The three EAS countries have demonstrated commitment to sustainable management of natural resources and transboundary governance through membership and ratification of various international multilateral agreements, including but not limited to those listed below in **Table 6**:

Table 6: Multilateral agreements

Agreement	Indonesia	Philippines	Vietnam
United Nations Convention on the Law of the Sea	Ratified 3 Feb 1986	Ratified 8 May 1984	Ratified 25 Jul 1994
Convention on the Conservation of Migratory Species of Wild Animals or CMS/ Bonn Convention	Non-party	Party since 1994	Non-party
Convention on Biological Diversity	Ratified 8 Aug 1994	Ratified 8 Oct 1993	Ratified 16 Nov 1994
Regional Plan of Action on Eliminating Illegal, Unreported and Unregulated Fishing	National Plan of Action 2012-2016	National Plan of Action approved in 2013	Draft National Plan of Action prepared in 2017
SDS-SEA	Member	Member	Member

3.1.3 Compliance with WCPFC conservation and management measures

There has been continued improvement with respect to compliance of WCPFC Conservation and Management Measures (CMMs) by Indonesia and the Philippines – both full members of WCPFC. With a longer-term goal of becoming a member of the WCPFC, Vietnam is taking steps towards compliance with the relevant CMMs. The WPEA project has supported Vietnam with translation of seven of the relevant CMMs; WWF has also provided resources for supporting translation. The project has also supported representatives from the three beneficiary countries to participate in WCPFC scientific committee (SC) and technical and compliance committee (TCC) meetings.

During the bridging period between the first and second phases of the project, in December 2013 Indonesia became a full member of the WCPFC. Together with the Philippines and Vietnam, which remains a cooperating non-member, there is now a stronger regional voice at the commission regarding issues associated with the East Asian Seas region of the convention area. The joint workshops and other regional meetings the project has arranged among the three beneficiary countries cultivated communication lines among key fisheries management stakeholders, creating a solid foundation for sub-regional governance.

3.1.4 Monitoring and enforcement systems

Monitoring has improved in each of the three beneficiary countries, but certain areas require further attention. There also have been advances in the legal frameworks and implementation of vessel monitoring systems (VMS). In Indonesia, the scientific database for archipelagic waters fish resources has been further developed.

Indonesia:

- The legal foundation of implementation of fishing logbook is the Ministerial Decree No. 48/PERMEN-KP/2014, approved on 17 October 2014.
- Coverage of artisanal fleet landings is the same as documented in the previous target. Catch data on targeted species and key bycatch species are documented. Port sampling, observer, logbook, and surveys are regularly carried out. The Observer Program was authorized in May 2016 by WCPFC/PEMSEA. There are shortcomings with respect to logbook coverage and quality among small and medium scale fishing operators.
- Database developed starting in 2010 and has been regularly updated and refined, e.g., including bycatch data.
- VMS Scheme was approved through Ministerial Decree, dated 04 June 2014. Catch Certification was approved through Ministerial Decree, dated 29 June 2012. These regulations support efforts to reduce IUU fishing in Indonesia.

Philippines:

- The approximate 100 landing areas cover at least 30% of the tuna catch, including from small and medium scale operators.
- The Philippine Fisheries Code of 1998 (RA8550) as amended by RA10654 (series of 2015), Section 119 requires all catcher vessels 30GT and up operating in national waters to be covered by the Vessel Monitoring Measure (VMM). The full implementation of the new law will be expected to be realized in 4-years, by 2019.
- A national elogbook (or eReporting) system has been developed and pilot testing is ongoing for PH vessels operating in WCPFC-HSP1 (high seas). Adoption of the PH elogbook or eReporting system is expected to be realized upon the full implementation of the Catch Documentation and Traceability System.
- A Technical Working Group for tuna fisheries (TWG-Tuna) was established by BFAR. The current administration needs to approve continuation of the group.

Vietnam:

- Logsheet data following WCPFC's template now covers tuna fishing fleets in three main provinces (i.e. Binh Dinh, Phu Yen and Khanh Hoa). Other provinces using national logsheet format. Logsheet data not authorized by government and not yet submitted to WCPFC.
- All 9 provinces having tuna fisheries are participating in monitoring landing data.
- Shark, swordfish, marlin, etc. are documented in the 3 main provinces, starting in 2015.
- The TUFMAN-1 system is an offline system, not yet integrated. There are discussions to adopt the online version developed by SPC (TUFMAN-2). This is not included in the 2017 annual work plan. Discussion of next phase, funding by New Zealand government, including financing the online system.
- Nationally, a technical working group has been established for restructuring tuna fisheries management, transferring more responsibilities to local level.
- A national VMS has been established and installed 3000 offshore fishing vessels as a trial.

3.1.5 Relationship with coastal and marine ecosystem management

Traditionally, management of tuna fisheries has involved a rather narrow group of fisheries centered stakeholders. More inclusive stakeholder involvement is needed under a blue economy approach. For instance, addressing the

entire value chain requires engagement with coastal zone management, where, for example, most of the processing plants and employment base are located. The EAS countries have made significant progress towards implementing integrated coastal management (ICM), including through support from PEMSEA. For example, in the Philippines, Executive Order No. 533 on "Adopting Integrated Coastal Management as a National Strategy to Ensure the Sustainable Development of Country's Coastal and Marine Environment and Resources and Establishing Supporting Mechanisms for its Implementation" is a significant step towards mainstreaming ICM. And, in Vietnam, the "Strategy for Integrated Coastal Zone Management to 2020, Vision Toward 2030 and Action Plan" provides a framework for expanding implementation of ICM. There have also been substantive advances towards broader uptake of the Ecosystem Approach to Fisheries Management (EAFM), e.g., mainstreaming of EAFM under the amended Fisheries Code of the Philippines and adoption of EAFM in the Coral Triangle Initiative.

There has been limited inclusion, however, of tuna fisheries management within the implementation of multi-sectoral management approaches such as ICM and EAFM. For instance, in most cases, ICM is regulated through local government units, whereas policies and management plans on tuna fisheries have mostly involved central level stakeholders. To incorporate coastal and marine management priorities, stakeholder involvement needs to extend to the subnational level.

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3.1.6 Harmonization with biodiversity conservation and food security needs

Advancing towards sustainable tuna fisheries for blue economy is closely aligned with Target 6 under Strategic Goal B of the Aichi biodiversity targets:

Strategic Goal B: "Reduce the direct pressures on biodiversity and promote sustainable use"

Target 6: "By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem-based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits"

The beneficiary countries have developed national biodiversity strategies and action plans (NBSAPs) to address the Aichi targets and other biodiversity conservation priorities.

With respect to food security, there has been limited direct linkage with sustainable tuna fisheries. In most Southeast Asian countries, there has been a strong emphasis on expanding aquaculture as part of national food security strategies.

3.1.7 Related SDG targets

Among the 17 Sustainable Development Goals (SDGs), Goal 14 is most relevant to sustainable tuna fisheries for blue economy: ***"Conserve and sustainably use the oceans, seas and marine resources for sustainable development".*** Targets 14.4 and 14.6 address sustainable fisheries:

Target 14.4: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics	**Indicator 14.4.1:** Proportion of fish stocks within biologically sustainable levels
Target 14.6: By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation	**Indicator 14.6.1:** Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing

Achievement of sustainable tuna fisheries requires cross-sectoral support and partnerships, closely linked with priorities associated with socioeconomic development and natural resource management. Understandably, there are several other relevant SDGs, including but not limited to the following:

Goal 12: Ensure sustainable consumption and production patterns	
Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources	**Indicator 12.2.1:** Material footprint, material footprint per capita, and material footprint per GDP
Goal 13: Take urgent action to combat climate change and its impacts	
Target 13.2: Integrate climate change measures into national policies, strategies and planning	**Indicator 13.2.1:** Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)
Goal 13: Take urgent action to combat climate change and its impacts	
Target 17.14: Enhance policy coherence for sustainable development	**Indicator 17.14.1:** Number of countries with mechanisms in place to enhance policy coherence of sustainable development

3.2 Institutional arrangements

3.2.1 Mandated national government agencies

Indonesia:

Ministry of Marine Affairs and Fisheries (MMAF). The ministry and its specific directorates and departments play an important role in regulating the fishery and aquaculture sector.

- Directorate General of Capture Fisheries is mandated to formulate and implement policies and technical standardization in the capture fisheries.
- Directorate General of Surveillance is mandated to formulate and implement policies and technical standardization in the surveillance of marine and fisheries resources.
- Directorate General of Processing and Marketing of Fish and Fisheries Products is mandated to formulate and implement policies and technical standardization in the processing and marketing of fish and fish products.
- Agency of Research and Development of Marine Affairs and Fisheries is mandated to carry out research and development activity in the marine affairs and fisheries.
- Agency of Human Resource Development is mandated to carry out education, training and extension in the Marine Affairs and Fisheries.
- National Commission for Fish Resources Assessment.

In addition to the MMAF, there are various other related agencies that have responsibilities associated with management of tuna fisheries, including but not limited to the following:

- Ministry of Transportation, in documents of Vessels;
- Ministry of Commerce, in international trading provisions;
- Ministry of Environment and Forestry, in conservation;
- Ministry of Foreign Affairs, in international fisheries cooperation (bilateral and multilateral) as well as membership in regional and international organizations;
- National Commission on Fish Stock Assessment;
- Indonesian Police and Navy in Fisheries Law Enforcement; and
- Indonesian Institute of Sciences (LIPI) in research activities.

Philippines:

The **Bureau of Fisheries and Aquatic Resources (BFAR)**, under the Department of Agriculture, is the government agency responsible for the development, improvement, management and conservation of the country's fisheries and aquatic resources. BFAR is given the responsibility to manage, conserve, develop, protect, utilize, and dispose of all fisheries and aquatic resources beyond municipal waters. Apart from BFAR, there are other government agencies with fisheries-related functions, which are involved in addressing issues including protection of fish habitat, management of fish ports, registration of fishing vessels, regulation of fish trade, and fisheries negotiations:

- Department of Environment and Natural Resources (DENR)
- Maritime Industry Authority (MARINA), an attached agency of the Department of Transportation
- Philippine Fisheries Development Authority (PFDA), under the Department of Agriculture

- Philippine Ports Authority (PPA), an attached agency of the Department of Transportation
- Department of Trade and Industry (DTI)
- Department of Foreign Affairs (DFA)

There are also several key research and policy support agencies, including:

- National Fisheries Research and Development Institute (NFRDI) , under the Department of Agriculture
- DENR Biodiversity Management Bureau
- Philippine Council for Agriculture and Aquatic Resource Research and Development (PCAARRD), an attached agency of the Department of the Department of Science and Technology (DOST)
- Philippine Coast Guard, under the Department of Transportation
- Philippine Statistics Agency

The enforcement agencies given the responsibility to enforce fisheries laws are the Philippine Coast Guard, Philippine Navy, Philippine National Police Maritime Group, and the Philippine Air Force.

Vietnam:

The Fisheries Law assigns the **Ministry of Agriculture and Rural Development (MARD)** to regulate the offshore fisheries. The central government is responsible for drafting decrees and assigns MARD to issue circulars for bringing the law into practice nationwide. Supporting agencies include the Vietnam Administration of Seas and Islands (VASI) and the Ministry of Natural Resources and Environment (MONRE).

3.2.2 Local governments

Indonesia:

Indonesian marine waters are divided among separate fisheries management areas (FMAs); the status of fish stocks in each FMA are assessed and allowable catch and number of fishing vessels regulated at the FMA level. Provincial governments have authority and responsibility to manage the fishery resources up to 12 nautical miles while District / City Governments has authority and responsibility to manage fish resources to one fourth from provincial authorities (4 nautical miles). In recent years, some of the autonomy previously devolved to subnational authorities have been reversed through the adoption of *Indonesian Law No. 23/2014 on Regional Governance*.

Philippines:

Local government units, particularly municipal and city governments, play a crucial role in the management, conservation, development, protection, and utilization of all fish and fishery resources municipal waters. As part of the Philippine policy of decentralization, local governments are given the autonomy to exercise fisheries functions, including policy formulation and enforcement. The municipal waters are only up to 15 km from the shore, and commercial fishing vessels are not allowed within the municipal waters. Commercial fishing boats are those with greater than 3 gross tons. The local government units (LGUs) have jurisdiction within the 15 km municipal waters.

Vietnam:

The Provincial People's Committee (PPC) is responsible to manage the nearshore fisheries bordered by the line 24 nautical miles far from the shoreline. The PPC has the right to enact the specific regulations which harmonize with the particularly provincial conditions.

3.2.3 National tuna associations: activities; contribution to sustainable fisheries

Indonesia:

There are at least six (6) expected roles could be taken by Indonesia tuna associations, such as:

1. As a pioneer to change mindset of fishing industries, so that production oriented could be combined into sustainable oriented approach.
2. As a liaison to communicate and disseminate various government and international policies in tuna management to tuna fishing industries.
3. As a representative of fishing industries and to be a government partner in developing public policies concerning tuna fisheries management.
4. As a pioneer to increase effective implementation of various government and international policies in tuna management practices.
5. As a pioneer in catch data collection which is intended to protect the interest of tuna fishing industries.
6. As a communication and coordination forum among members.

Indonesian Tuna Association (ASTUIN). ASTUIN aims to safeguard the tuna industry, covering all the aspects of the tuna supply chain. To strengthen the durability of the tuna industry they are focusing on sustainable use of tuna resources. In addition, they act as an intermediary between the Indonesian government and private companies, as well as other national and international related organizations.

National Indonesian Fishermen Association (HNSI). The National Indonesian Fishermen Association, Himpunan Nelayan Seluruh Indonesia (HNSI) in Indonesian, was officially established on 21 May 1973.

Philippines:

The National Tuna Industry Council (NTIC), the SOCKSARGEN Federation of Fishing and Allied Industries Inc (SFFAII), various cooperatives, fisherfolks, and non-governmental institutions are some of the key stakeholders in achieving the goal of effective management and conservation of tuna resources in the Philippines.
The NTIC was created in 2000 to act as overall coordinating body to oversee the development of the tuna fisheries industry in the country. The NTIC has the following functions:

a. Formulate a Strategic Action Plan for the development of the tuna industry consistent with the AFMA and the Fisheries Code of 1998, and other relevant laws. Such plan should include regional and international agreements for the sustainable development of the tuna industry;
b. Review and recommend policies affecting the industry including those that affect bilateral and multilateral fishing relations, as well as those that will promote sustainability;

c. Review and recommend policies affecting trade relations including those that will affect the competitiveness of the industry;
d. Call on any government agency or academe such as the Department of Trade & Industry (DTI), National Economic Development Authority (NEDA), Department of Foreign Affairs (DFA), and the University of the Philippines (UP), to assist in the formulation of the strategic action plan and review of policies and implementation of projects and programs;
e. Coordinate with private and public entities to be affected by the action plan;
f. Recommend government programs and projects that will benefit the industry; and
g. Establish an integrative and consultative structure for inter-agency and intersectional collaboration.

The NTIC is composed of the following:

- Department of Agriculture (DA)
- Bureau of Fisheries and Aquatic Resources (BFAR)
- Philippine Fisheries Development Authority (PFDA)
- Five (5) Representatives from the Fishing or Producing Sector: Four (4) from the purse seining; One (1) from the handline operations
- Five (5) Representatives from the Processing: Four (4) from the canning; One (1) from the fish frozen processing sector

Vietnam:

An important association in Vietnam is the Vietnam Association of Seafood Exporters and Producers (VASEP), a non-governmental organization established in 1998, based on the principles of voluntary, autonomy and equality. VASEP members include leading Vietnamese seafood producers and exporters with companies providing services in seafood sector. The mission of the association is to improve value, quality and competitive capacity of Vietnamese seafood, to enhance source of raw material for seafood export, to represent and to protect legal interests of members.

3.3 Tuna management plans

The three EAS beneficiary countries of the WPEA project, Indonesia, Philippines and Vietnam, have developed and approved national tuna management plans (NTMPs). This is the first time management plans for tuna fisheries have been formulated in these countries – another positive step towards achieving sustainable management of migratory tuna stocks.

Country	Date of NTMP	Responsible Agency:
Indonesia	November 2012	MMAF, Directorate General for Capture Fisheries
Philippines	May 2012	Department of Agriculture, Bureau of Fisheries and Aquatic Resources
Vietnam	November 2012	Department of Capture Fisheries and Fisheries Resources Protection

3.3.1 Objectives, actions, and targets Ecosystem-based approach

Indonesia:

The NTMP for Indonesia was developed with the intention to reach sustainable tuna fisheries both capture and processing industries. To achieve the goals, the plan has following objectives:

a. To undertake best efforts to maintain tuna utilization remains at the limit of the rate of sustainable exploitation, supported by scientific evidence and socio-economic factors that can be obtained.
b. Implementing catch data collection and analysis to support the decision-making process to utilize and conserve of tuna resources in a rational way.
c. Improving the application of code of conduct for responsible fisheries in tuna catching, processing and marketing.
d. Improving the compliance of Indonesia flagged vessels which fishing in Indonesia FMA, high seas and waters under the jurisdiction of other states.
e. Undertaking best efforts to combat IUU fishing through effective controlling measures and law enforcement.
f. Utilizing scientific data on tuna stocks, both from national and regional research institutions to improve adopted management measures.

The NTMP for Indonesia is under implementation, including development of a harvest strategy for tuna in Indonesian archipelagic waters, with the assistance of WCPFC, ACIAR, CSIRO Australia, MDPI (a local NGO) and other relevant experts.

Philippines:

The fundamental objective of the NTMP for the Philippines is to promote the effective conservation, management, and equitable use of tuna resources in the Philippines for the sustainable development of the tuna industry in the Philippines. To attain this goal, the NTMP provides for the following specific objectives:

a. Ensure that tuna stocks are maintained at sustainable levels by taking into account best scientific evidence available and relevant environmental and socio-economic factors;
b. Ensure effective data collection and analysis that would support management decisions for the rational use and conservation of tuna fisheries;
c. Promote the socio-economic development of the tuna industry not only by encouraging responsible fishing practices but also by securing the trade of and market for tuna products and upholding just share of fish workers in utilizing tuna resources;
d. Exercise effective jurisdiction over Philippine-flagged vessels fishing for tuna resources in areas under the jurisdiction of other States, and on high seas areas managed by regional fisheries management organizations;
e. Prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing for tuna stocks by adopting effective monitoring, control and surveillance measures; and
f. Support the use of environmentally sound technology and relevant research on tuna fisheries.

The NTMP for the Philippines is being updated. A draft version updated plan was discussed at the 18th Tuna Congress held in General Santos City in 2017; comments from NGOs and the industry sector called for improvements, including more specific plans for recovery of tuna stocks, e.g., through fishing effort regulations, compliance to FAD closure regulations, and limits on juvenile tuna catches.

Vietnam:

The NTMP for Vietnam was officially approved by Ministerial Decision No. 3562/BNN-TCTS, dated on 01 September 2015 by the Minister of Ministry of Agriculture and Rural Development. The overall goal of the NTMP is that tuna fisheries are managed within regional standards through application of conservation and management measures to develop tuna fisheries sustainably in Vietnam. To achieve this goal, the NTMP provides for the following specific objectives:

In 2013-2015:

- The legal regulations and institutional arrangements for the tuna and tuna fisheries are revised and supplemented compatibly with the fisheries law and with international agreements and conventions.
- The vessel monitoring system (VMS) for tuna fisheries in the Vietnamese EEZ are established and operated.
- The landings of tuna fishing vessels are enumerated and reported for the production traceability.
- The logbook and fishing report program is enforced and maintained.
- The stock assessments and biological sampling for tuna are implemented regularly.
- Fleet structure and fishing effort of tuna fisheries are monitored and updated monthly.
- Establish and operate an advisory body for managing tuna fisheries in Vietnam.

In 2016-2020:

- Ensure effective data collection and analysis that would support management decisions for the rational use and conservation of tuna fisheries
- Ensure that tuna stocks are maintained at sustainable levels by taking into account best scientific evidence available and relevant environmental and socio-economic factors.
- The eco-label certificate of the Marine Steering Council (MSC) was provided for the tuna and tuna products originated from Vietnam.

3.3.2 Ecosystem-based approach

The ecosystem-based approach to fisheries management (EAFM) is among the key principles of the NTMP's for the three beneficiary countries.

The WPEA project is providing resources in support of implementation EAFM. In Indonesia, the selected area for a field trial is in the Sikka District, NTT Province. The pilot will compare FAD and non-FAD methods on the impacts to ecosystems; certain mitigation measures will be recommended based on the results of the trial in NTT, e.g., the use of FADs. An EAFM strategy is envisaged to be formulated based on the results of the field EAFM trial, and the NTMP will be updated with more details on scaling up EAFM.

In the Philippines, the NTMP is being revised with more emphasis on implementation of EAFM. An EAFM pilot is tentatively planned in Davao, under the WPEA project.

In Vietnam, the NTMP does not include specific activities associated with EAFM. Pilot implementation of EAFM for a site/fishery is planned under the WPEA. A National Plan of Action is under development for sea turtles and for sharks.

Observer trips were conducted in 2015 (20 trips, including 4 for longline and 16 for handline fisheries) under the Fishery Improvement Project (FIP) led by WWF with some support from WPEA project. In 2016, 20 observer trips were conducted.

Application of EAFM modeling to EAS EEZs to complement those for the Pacific Ocean Warm Pool (POWP) Large Marine Ecosystem (LME) have not progressed as envisaged in the design of the WPEA project. Preliminary ecosystem models e.g., SEAPODYM, EcoSim are available for the POWP LME but have not been applied in a regional management context. National applications of SEAPODYM were being developed for Indonesia and possibly Vietnam but require considerable further work before application.

3.4 Stock and annual catch assessments

The project has supported annual national tuna catch estimate workshops in the three beneficiary countries that have been attended by a broad mix of national, subnational, and private sector fisheries stakeholders. The stakeholder workshops convened by the project also have provided opportunities for increased external communication, e.g., through involving private sector operators and subnational authorities.

Stock assessments for the WCPO are conducted by SPC, the science provider for WCPFC, and results are included in the proceedings of the Scientific Committee regular sessions (WCPFC 2017a).

Bigeye:

In 2017, SPC conducted a new assessment which incorporated two substantial changes: A revised growth curve (based on otolith age readings), and a new regional structure in the model. These changes had a substantial impact on the results, which were more optimistic than in the previous assessment. The 2017 analyses were done using 72 different models that made different assumptions. These were then examined by the SC which weighted the different runs to give preference to the new growth curve over the old one. The new assessment indicated the median ratio of Frecent/FMSY is estimated at 0.83 (range: 0.61-1.32), indicating that overfishing is likely not occurring (across all model runs, there is a 23% chance that FMSY is being exceeded).

Yellowfin:

A new yellowfin assessment was conducted in 2017. New developments to the stock assessment include addressing relevant recommendations of the 2014 yellowfin stock assessment report, investigation of an alternative regional structure, exploration of uncertainties in the assessment model, particularly in response to the inclusion of additional years of data and improving diagnostic weaknesses of previous assessments. The results were similar to those from the previous (2014) assessment and indicated that the yellowfin stock is not in an overfished state as spawning biomass is above the SSBMSY level (SSBlatest/SSBMSY = 1.39, range between 0.80 and 1.91 across different models).

Skipjack:

The last skipjack assessment was conducted in 2016. The 2016 SC meeting was not able to reach consensus regarding which model runs should be used to characterize stock status. This report reflects the view held by most SC members for

using the "reference case" model, which is largely consistent with previous assessments, i.e., fishing mortality rates have increased significantly since the beginning of industrial tuna fishing but are estimated to have decreased moderately in the last several years. The ratio Frecent/FMSY is estimated to be 0.45, indicating that overfishing is not occurring.

3.5 Capacity development and knowledge management

Capacity development is one of the main added values delivered through the WPEA project. The funds allocated for increased data collection have strengthened monitoring and enforcement capacities in the three beneficiary EAS countries. The project has facilitated sub-regional discussions and capacity building on developing harvest strategies, and each of the three countries are considering harvest strategies for national tuna fisheries.

At the time of project preparation, there was no sub-regional repository for data on highly migratory fish stocks[4], lessons learned and best practices in oceanic fisheries management in the EAS; this impedes the exchange of knowledge on shared stocks which was required to improve the sub-regional management regime. Establishing a sub-regional knowledge platform on shared tuna stocks and stock assessment at a sub-regional level were therefore priorities.

From a regional perspective, the project has provided representatives from the three beneficiary countries several opportunities for improving external communication; for example, the annual SC and TCC meetings convened by the WCPFC. The project has also funded participation in the UNDP-GEF/PEMSEA hosted East Asian Seas Congress in Vietnam in November 2015, and the GEF IW meeting in Sri Lanka in 2016. The project has also made advances towards increasing collaboration with PEMSEA with respect to knowledge management; there are a few shortcomings in knowledge management, including but not limited to the following:

- Limited information shared via WCPFC mechanisms, meetings and WPEA website;
- Limited outreach to stakeholders at national and sub-regional level;
- Limited participation in knowledge sharing events at international and EAS regional level, including IW:Learn; and
- Provincial/FMA profiles as key information products in the tuna fishery are incomplete and not widely disseminated.

3.6 Stakeholder participation

There is a core group of stakeholders that the project has maintained since the first phase started in 2010: the national and subnational fisheries management agencies and institutions in the three beneficiary countries. This is unsurprising, as the project is a fisheries initiative. The project has facilitated involvement of key national, sub-regional, and regional stakeholders, through arranging stakeholder workshops, supporting participation in WCPFC SC and TCC meetings, and funding participation in regional and global conferences. These have been effective platforms for enhancing regional and sub-regional stakeholder cooperation.

[4] SEAFDEC maintains a database for SE Asian tunas for its 11 members but it is recognized as incomplete and will hitherto focus more on neritic rather than oceanic tunas; the ASEAN TWG is not known to be involved in any database activity

Private sector operators and associations of fishing companies have been regularly invited to project stakeholder workshops. And, there has been some direct involvement, e.g., in Vietnam as part of the fisheries improvement project managed by WWF Vietnam. The specific lists of private operators listed in the project document have not been particularly followed up on, and there is no evidence of facilitating an increase in involvement by 5 companies in each country, as called for in the project results framework.

The expanded scope of the second phase of the WPEA project, as reflected in the long list of stakeholders indicated in the stakeholder engagement discussion of the project document, calls for broader stakeholder engagement than during the first phase. For aspects such as climate change adaptation, engaging with relevant enabling stakeholders, including the Ministry of Environment officials in the beneficiary countries has not materialized as envisaged. The national coordination teams are largely unfamiliar with Ministry of Environment efforts with respect to adaptation strategic planning. Incorporating climate change risks associated with tuna fisheries management would be substantive additions to the national level plans and strategies.

At the program level[5], there have been positive developments with respect to collaboration with the program manager, PEMSEA Resource Facility. For example, WCPFC issued a USD 45,000 grant to the PEMSEA Resource Facility on 23 November 2016, for development and implementation of a WPEA project portal and monitoring and evaluation reporting system.

With respect to involvement of the private sector:

Indonesia:

The project document includes a list of 30 private companies. Fishing associations and private companies have been regularly invited to project stakeholder workshops, but there has been no specific monitoring of involvement of the list companies or plans to expand involvement by an additional 5.

Philippines:

The project document includes a list of 16 private companies. Fishing associations and private companies have been regularly invited to project stakeholder workshops, but there has been no specific monitoring of involvement of the list companies or plans to expand involvement by an additional 5. The SOCKSARGEN Federation of Fishing Industries, Inc. (SFFAII), which has been involved in project activities, has approximately 100 members.

Vietnam:

The project document includes a list of 9 private companies. Fishing associations and private companies have been regularly invited to project stakeholder workshops, but there has been no specific monitoring of involvement of the list companies or plans to expand involvement by an additional 5. Under the FIP managed by WWF, there are more than 9 companies involved.

[5] The WPEA project is part of the GEF-financed program entitled: "Reducing Pollution and Rebuilding Degraded Marine Resources in the East Asian Seas through Implementation of Intergovernmental Agreements and Catalyzed Investments" (GEF Program ID 4936).

3.7 Financing mechanisms

National governments have increased financial commitments with respect to monitoring and data collection. Some examples include:

Indonesia:

The Indonesia Government approved establishment of a research installation in the important port city of Bitung. Although a research installation does not have an independent budget as a research center or institute has, there is still an increased likelihood that the government will continue to support the staff at the Bitung installation.

Box 1. Synopsis of proposed project funded by New Zealand MFAT[6]

Draft Grant Funding Arrangement: Western Pacific East Asia – Improved Tuna Monitoring
Between New Zealand Ministry of Foreign Affairs and Trade (NZ-MFAT) and WCPFC
Activity Code: A12423
Maximum Grant Amount of NZD 4,912,052 (approx. USD 3,425,000)

The Activity will supplement and complement the Sustainable Management of Highly Migratory Fish Stocks in the West Pacific and East Asian Seas (WPEA-SM) project currently undertaken by the Recipient and funded by United Nations Development Programme – Global Environment Fund (UNDP-GEF).

Goal: To improve monitoring and management of tuna catches in Indonesia, Philippines and Vietnam and contribute to reduced Illegal, Unreported and Unregulated (IUU) fishing.

Outcomes:

Long Term:
- National and international co-operation for the management of highly migratory fish stocks in the Western Pacific and East Asian Seas (Indonesia, Philippines and Vietnam) results in the sustainable management of Western and Central Pacific Ocean (WCPO) stocks and reduced IUU fishing.

Medium Term:
- Integrated fishery monitoring programmes for tuna species implemented by Philippines, Indonesia and Vietnam which are compliant with WCPFC requirements.
- Uncertainties in WCPO catch and stock estimates reduced.
- Improved national catch estimates and stock assessments inform national fisheries management and harvest strategies.

Short-term:
- Vietnam, Philippines and Indonesia governments provide adequate resources for tuna monitoring and assessments within coordinated and supportive, policy and legal frameworks.
- Strengthened national capacities in fishery monitoring and catch estimation.
- Improved national data and knowledge management systems and processes for catch estimation and stock assessment.

[5] New Zealand Ministry of Foreign Affairs and Trade, draft Grant Funding Arrangement, Western Pacific East Asia – Improved Tuna Monitoring, Koru record ID: 42450; CT File: GRA-1043-1; Activity Code: A12423; file date: 31.10.16.

Philippines:

In 2014, the Philippine Government substantially increased funding for data collection; during this second phase of WPEA, the project has not supported the salary of enumerators.

Vietnam:

The Vietnam Government reportedly[7] approved to extend funding for the data collection program, with the second phase scheduled to start in 2018.

Although government support has increased in recent years, continued financing is tenuous and uncommitted over the medium to long term. Continued donor support includes a follow-up project funded by the Government of New Zealand: "Western Pacific East Asia – Improved Tuna Monitoring" – see **Box 1.**

[7] According to testimonial evidence provided during midterm review interviews in 2017.

4 Response: Blue Economy Development

4.1 Best Practices

4.1.1 Conservation and management measures adopted and implemented

There has been continued improvement with respect to compliance of WCPFC Conservation and Management Measures (CMMs) by Indonesia and the Philippines – both full members of WCPFC. With a longer-term goal of becoming a member of the WCPFC, Vietnam is taking steps towards compliance with the relevant CMMs. The WPEA project has supported Vietnam with translation of seven of the relevant CMMs; WWF has also provided resources for supporting translation.

CMM compliance information contained in 2016 annual reports (WCPFC 2017b,c,d) submitted to the WCPFC in preparation for the 13th Regular Session of the WCPFC Scientific Committee in August 2017, is summarized below.

CMM 2005-03: CONSERVATION AND MANAGEMENT MEASURE FOR NORTH PACIFIC ALBACORE

Philippines: The annual Philippines catch for North Pacific albacore in 2016 was about 79 MT, mainly contributed by municipal hook-and-line fishery vessels less than 3 GT targeting yellowfin tuna. With increased port sampling coverage through the National Stock Assessment Program, the Philippines will be able to better quantity fishing effort in the coming years.

CMM 2017-06: CONSERVATION AND MANAGEMENT MEASURE TO MITIGATE THE IMPACT OF FISHING FOR HIGHLY MIGRATORY FISH STOCKS ON SEABIRDS (replacing CMM 2012-07)

Indonesia: According to Minister Regulation No. 12/2012, Indonesian longline vessels operating in high seas need to utilize tori line. In 2016, there were not reported interactions with seabirds in the WCPFC convention area by Indonesia-flag vessels.

Philippines: There were no reported seabird interactions in 2016, as no Philippine-flag longline vessels were operating in the WCPFC convention area.

CMM 2009-03: CONSERVATION AND MANAGEMENT FOR SWORDFISH

Philippines: Philippines does not have vessels that mainly targets swordfish, but the Philippine fleet does have some records of catches for this species of around 15MT in 2016 as by-catch for our hook-and-line fishery that were mainly operating in Philippine waters and none of our vessel was operating south of 20°S.

CMM 2011-03: CONSERVATION AND MANAGEMENT MEASURE FOR PROTECTION OF CETACEANS FROM PURSE SEINE FISHING OPERATIONS

Indonesia: According to log book data reported in 2016 (as submitted to the Secretariat) there were no (zero) interactions of cetaceans with purse seine fishing operations.

Philippines: In 2016, there was a total of 17 instances that a cetacean was unintentionally encircled by a purse seine net and these were all released alive but subsequently died[e.g. (Indo-Pacific bottlenose dolphin – 1 and bottlenose dolphin –7 instances encircled and released but subsequently died); (long-beaked common dolphin – 4 and rough toothed dolphin – 4 instances encircled and released but subsequently died); (false killer whale – 1 instance encircled and released but subsequently died).

CMM 2011-04: CONSERVATION AND MANAGEMENT MEASURE FOR OCEANIC WHITETIP SHARK

Indonesia: According to Minister Regulation No. 12/2012, No. 59/2014 as amended by Minister Regulation No. 34/2015 it is regulated that landing of oceanic whitetip shark and hammer head sharks are prohibited.

Philippines: Philippines has already prohibited its vessels from retaining on board, transshipping, storing on a fishing vessel, or landing any oceanic whitetip shark, in whole or in part, in the fisheries covered by the Convention and require its vessels to release any oceanic whitetip shark that is caught as soon as possible after the shark is brought alongside the vessel, and to do so in a manner that results in as little harm to the shark as possible In 2016, there was one instance that an oceanic white-tip was unintentionally encircled in the purse seine net during the purse seine operation. The oceanic whitetip shark was released but subsequently died.

CMM 2012-04: CONSERVATION AND MANAGEMENT MEASURE FOR PROTECTION OF WHALE SHARKS FROM PURSE SEINE FISHING OPERATIONS

Philippines: Since 1998, whale sharks are considered protected species in the Philippines under Fisheries Administrative Order No. 193 or the Ban on the taking or catching, selling, purchasing and possessing, transporting and exporting of Whale Sharks and Manta Rays (FAO 193 series of 1998). In 2016, there were three (3) reported alleged incidents that a whale shark was encircled in the purse seine net during the purse seine operation. Based on available reports these whales sharks were released (2 – released alive and 1- unknown condition).

CMM 2013-08: CONSERVATION AND MANAGEMENT MEASURE FOR SILKY SHARKS

Philippines: Since the effectivity of CMM 2013-08 (July 1, 2014), Philippines has already prohibited its vessels from retaining on board, transshipping, storing on a fishing vessel, or landing any silky sharks, in whole or in part, in the fisheries covered by the Convention and require its vessels to release any silky shark that is caught as soon as possible after the shark is brought alongside the vessel, and to do so in a manner that results in as little harm to the

shark as possible. Based on available reports for 2016, there was a total of 105 releases for silky shark (Silky sharks – 92 released dead, 13 released alive and 1 –fully utilized). These were incidentally caught silky sharks during the purse seine operation.

CMM 2017-08: CONSERVATION AND MANAGEMENT MEASURE FOR PACIFIC BLUEFIN TUNA (replaced CMM 2014-04)

The Philippines does not conduct fishing activities targeting Pacific bluefin tunas in the area north of 20° N. However, in some years, there are by-catches of Pacific Bluefin tunas in areas south of 20° N. These fishing vessels utilize handline/hook-and-line fishing gears. For 2016, one (1) piece of Pacific bluefin tuna was reported caught weighing around 215kgs. Philippines has improved its catch documentation mechanisms to monitor all tuna landings throughout the country.

CMM 2008-03: CONSERVATION AND MANAGEMENT OF SEA TURTLES

Indonesia: There were no interaction sea turtles with purse seine fishing operations, according to information cont2016 log book and national observer report.

Vietnam: In 2016, the Ministry of Agriculture developed a national action plan for Conservation and Management of Sea.

CMM 2010-07: CONSERVATION AND MANAGEMENT MEASURE FOR SHARKS

Vietnam: The Ministry of Agriculture is working on a national action plan for conservation and management of sharks, compliant with WCPFC CMM 2010-07.

4.1.2 Application of innovative approaches

Apart from improved data collection, the WPEA project is addressing several cross-cutting issues and innovative approaches, including climate change adaptation, EAFM, eco-labelling, and harvest strategies.

Indonesia is developing a tuna harvest strategy to apply to Indonesian Archipelagic waters, to implement Indonesian Fishery Act No. 31/ 2004 as amended to Indonesian Fishery Act No 45/2009. While these waters are not managed by any RFMO, they contribute an estimated 40% of the total Indonesian tuna catches, necessitating the development of a tuna harvest strategy that was compatible with relevant RFMOs. Indonesia had conducted several workshops since 2015 to progress the development of the strategy and had involved a broad range of stakeholders. A new fisheries national data collection system called “One Data Policy” and coordinated by the Ministry of Marine and fisheries Affairs (MMAF) was also implemented in January 2017.

With the amended Fisheries Code (RA10654) in the Philippines, approved October 2015, the new law has addressed most of the CMMs including issues/concerns on FADs. The project is providing technical assistance for reviewing the current policy on FADs. Currently there is 100% observer coverage for Philippine-flagged vessels fishing in WCPFC-HSP1 and in Pacific Island Countries. Observer coverage for Philippine-flagged vessels operating in Philippine waters is limited, only during the FAD closure and with the help of WPEA funding support.

For Vietnam, an overview report was prepared for provinces Khanh Hoa, Binh Dinh, and Phu Yen. Under the national restructuring program, supply chain analyses have been completed for 4 other provinces. The monitoring system for landing data has been established. And, a study on chain-of-custody has been conducted under the FIP managed by WWF.

Limited time and resources were allocated for some of the innovative approaches showcased under the WPEA project. Development of collaborative partnerships are imperative for ensuring results catalyzed through the GEF funding will be sustained.

4.2 Opportunities for investments and partnerships

There are several private sector initiatives in the region – often facilitated by international NGOs, including WWF, which is managing two fishery improvement projects (FIPs), one in Indonesia and one in Vietnam. The Indonesia FIP is an overarching program that covers several gear-specific FIPs and applies a holistic approach to improvements in Indonesian tuna fisheries. Fisheries involved include the Indonesian purse seine and longline fishery for albacore, yellowfin and bigeye tuna, pole and line fishery for skipjack and yellowfin tuna, and handline fishery for yellowfin tuna. The goal of these FIPs is to reach Marine Stewardship Council certification. WWF Vietnam is managing a FIP for longline/handline fisheries, with more than nine 9 companies involved.

The Asian Seafood Improvement Collaborative (ASIC), which is an industry-driven initiative including operators from Indonesia, Philippines, Vietnam, and Thailand, is developing a fisheries improvement protocol that is tailored to the circumstances facing Asian seafood operators, something that is more attainable in the short-term than, for example, certification through the Marine Stewardship Council (MSC).

There are also opportunities with partnerships among complementary donor funded projects and programs, including but not limited to the following:

- FAO-GEF Programme on Global Sustainable Fisheries Management and Biodiversity Conservation in the Areas Beyond National Jurisdiction (ABNJ)
- World Bank-GEF Ocean Partnerships for Sustainable Fisheries & Biodiversity Conservation
- UNDP-GEF Pacific Islands Oceanic Fisheries Management Project (PIOFMP)
- Coral Triangle Initiative (CTI), the EAFM Working Group
- USAID Oceans and Fisheries Partnership: development of a transparent and financially sustainable electronic Catch Documentation and Traceability (CDT) system to help ensure that fisheries resources from Southeast Asia are legally caught and properly labelled. This supports efforts on fisheries management and marine biodiversity conservation. There are two pilot sites: General Santos City, Philippines, and Bitung, Indonesia.

There are other projects and programs operating at the national level, including the USAID supported Smart Seas project in the Philippines.

5 Outcomes and Impacts

5.1 Progress in achieving objectives and targets of the WPEA project

Strengthening sub-regional governance is one of the main aims of the WPEA project, and the numerous joint activities, including the annual three-country workshops, have helped forge a long-lasting collaborative sub-regional arrangement. Expectations of the form and structure of the sub-regional governance arrangements after GEF funding ceases are unclear, however. The project has also been successful in demonstrating the benefits associated with investments in improved data collection. There are no quantifiable figures available regarding monitoring coverage, but there is sufficient anecdotal evidence to support progress towards achieving the objective of increased monitoring coverage.

As a follow-up project, the allocated 3-year implementation timeframe was concluded to be reasonable, considering that implementation arrangements were in place from the first phase and a certain degree of momentum had been achieved. The second phase, however, contains aspects that were not part of the first phase, including climate change analysis and planning, pilot implementation of ecosystem approach to fisheries management (EAFM), facilitation of market-based approaches, and development of harvest strategies. The level of preparedness for these aspects was generally low, rendering achievement of project outcomes over the 3-year timeframe an even larger challenge.

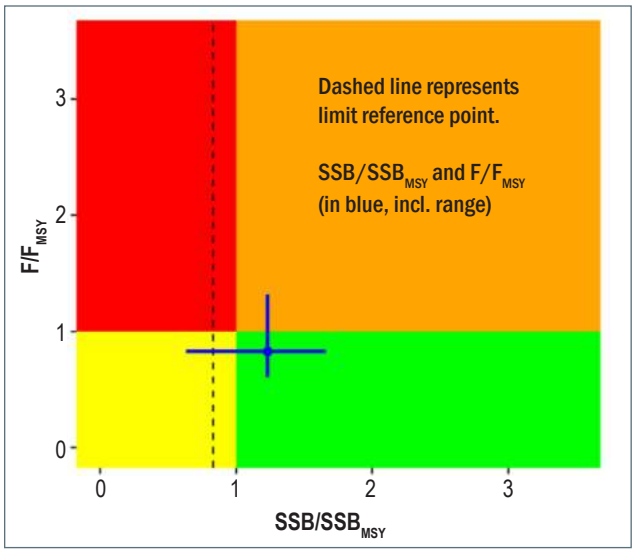
5.2 Tuna stocks: recovery?

In 2017, SPC conducted new stock assessments for selected species. There was an emphasis placed on bigeye stocks, as previous assessments concluded that this species was being over-fished. Provisional bigeye catches in 2016 were about 145,900 MT, a 5% increase from 2015. The main fishing gears are longline (5-year average ~44%) and purse seine (43%); bigeye catches in the WCPO by other gears are relatively minor. The latest assessment indicates that the Western Pacific bigeye tuna stock is not overfished, with biomass above the limit reference point established by WCPFC (see Figure 11). The management measures in place appear to be sufficient to prevent overfishing.

The SC13 noted that the amount of uncertainty in the stock status results is higher than for the previous assessment due to the inclusion of new information on different growth and regional structures. Applying a precautionary approach, the WCPFC issued conservation and management measures in 2017 to sustain bigeye stocks.

Fishing mortality for adult and juvenile yellowfin tuna was estimated to have increased continuously since the beginning of industrial tuna fishing (seen in the diagnostic case model). In general, these had been on average higher for juveniles, but in recent years adult fishing mortality had also increased. A significant component of the increase in juvenile fishing mortality was attributable to the Philippines, Indonesian and Vietnamese surface fisheries, which had the most uncertain

Figure 11. Estimate of SSB/SSB_{MSY} and F/F_{MSY} for WCPO bigeye



Source: ISSF 2018

catch, effort and size data. The work of the WPEA project to assist in enhancing the current fishery monitoring programme and improving estimates of historical and current catch from these fisheries remained important given the contribution of these fisheries in the overall fishing impact analyses from this assessment (WCPFC 2017a).

5.3 Improving sustainable fish catch and effort levels

The provisional total WCPCA tuna catch for 2016 was estimated at 2,717,850 MT, the second highest on record and nearly 120,000 MT below the previous record catch in 2014 (2,851,087 MT); this catch represented 79% of the total Pacific Ocean catch of 3,406,269 MT, and 56% of the global tuna catch (the provisional estimate for 2016 is 4,795,867 MT, and when finalised was expected to be the second highest on record) (ISSF 2018).

Indonesia: Tuna data collection based on ports sampling on selected sampling is continuing under WPEA project. To date there are 7 landing sites are observed to produce a catch composition by species by gear as well as its size distribution. This information will be used as references in the national annual catch estimate (by gear by species), Other research activities in this project are investigating to reduce of BET and YFT juvenile bycatch from Pole and line fishery, tuna supply chain and prior study on climate change for highly migratory species.

Philippines: The National Stock Assessment Program (NSAP) has continued to collect port sampling data (e.g. species composition, length frequency and vessel catch and effort information) in major tuna landing sites. In 2010 – 2013, the first phase of the WPEA project was able to increase port sampling coverage covering some of the major tuna landing areas around the country. During the second phase of the project, since 2014, the Philippine government through BFAR and the NFRDI gave more funding to support expansion of the NSAP which aims to cover / monitor almost all the tuna landing areas in the country to come-up with a more reliable data particularly for the diverse municipal tuna fisheries, for our WCPFC data obligation and for better fisheries management. Data from NSAP has been used as basis for coming up reliable tuna catch composition during the annual tuna catch estimates review workshops.

Vietnam: Total tuna catch caught in Vietnamese EEZ in 2016 was 123,000 MT for three gear types which is still below the maximum sustainable yield of more than 200,000 MT. Of those, skipjack tuna contributed 93,561 MT (76.02%), 23.811 MT of yellowfin tuna (19.35%) and 5,704 MT of bigeye tuna (4.63%).

5.4 Headway in reducing mortality of non-target species

Through improved data collection and reporting, more information is available on bycatch and the mortality of non-target species. The beneficiary countries are including information in their annual reports to the WCPFC; the Philippines provided detailed records in the summary of CMM compliance. Vietnam also included specific bycatch details, including billfish bycatch; for example, see **Table 7**.

The summary report of the SC13 (WCPFC 2017a) included information on the Global FAD Science Symposium (2017): *"What does well-managed FAD use look like within a tropical purse seine fishery?"* The Symposium documented general points and 'best-practices' under the three broad categories:

1. managing impacts on target species;
2. managing impacts on non-target species, coastal habitats, and the pelagic marine ecosystem; and
3. the management framework, including monitoring, compliance and surveillance (MCS).

Table 7. Estimation of billfish bycatch in Vietnam's EEZ for tuna gillnet fishery, 2012-2016

Year	Blue Marlin	%	Black Marlin	%	Striped Marlin	%	Swordfish	%
2012	420	1%	20	0%	0	0%	1,259	3%
2013	657	1%	31	0%	0	0%	2,189	3%
2014	657	1%	31	0%	0	0%	2,015	3%
2015	657	1%	31	0%	0	0%	2,015	3%
2016	3,319	7%	16	0%	257	1%	2,994	6%

Source: Annual report to the WCPCA, supporting the 13th Regular SC Session, August 2017

The Symposium concluded the following:

(i) that impacts of FADs and FAD management should be considered within the overall fisheries management framework and be guided by clear management objectives;
(ii) shifting purse seine effort from drifting FAD to free-school sets would be effective to reduce impacts on target species subject to overfishing and non-target species generally;
(iii) there is a need for improved data on FAD deployments and movements, to quantify impacts on species and the ecosystem;
(iv) non-entangling FAD designs would be effective in avoiding interactions with some non-target species; and
(v) 100% observer coverage of purse seine fishing and support vessels is necessary to fully document FAD use and impacts.

SC13 also noted that impacts of FADs and FAD management cannot be considered entirely independently of harvest strategies, issues related to fishing capacity, ecosystem structure, or management of all other fishing gears in tropical tuna fisheries. A recommendation was included in SC13 to develop a framework for management of FADs within the WCPO.

5.5 Social and economic benefits from sustainable fisheries management

5.5.1 Revenues; export earnings

Indonesia:

The export of fresh tuna products and frozen products almost tripled during the last ten years from 46,146 tons in 2004 to 132,732 tons in 2014, especially the exports of frozen whole fish which increased dramatically (Seafood Trade Intelligence Portal, 2018). The last two years however exports have decreased due to reduced exports to Thailand. The United States and Japan exceed Thailand in terms of import value. Japan and the United States mostly import larger fish whole or processed from handline and longline fisheries which command much higher prices, driving up import values. Japan imports fresh, high quality sashimi grade tuna, while the United States imports frozen tuna loins, steaks and fillets that enter the non-sashimi market segments.

Philippines:

Revenues from tuna commodities in 2016 totaled USD 274.26 million in 2016 (see **Table 8**).

Table 8. Tuna commodities in the Philippines, 2012-2016 (by volume, in MT)

Commodity	2012	2013	2014	2015	2016
Fresh/chilled/frozen, metric ton (MT):	22,910	20,177	28,808	26,815	22,381
Dried/smoked, MT	8,000	2,725	1,460	548	1,252
Canned, MT	38,796	29,660	58,660	73,411	66,284
TOTAL VALUE (million USD)	**455.10**	**664.50**	**459.83**	**414.42**	**274.26**

Source: Annual report to the WCPCA, 1 October 2017 (PSA Fisheries Statistics for 2012–2016)

Vietnam:

The total value of exported tuna products from Vietnam in 2016 was nearly USD 510 million, a 12% increase from the revenues generated in 2015 (see **Table 9**).

Table 9. Exported value of Vietnam's tuna products, 2014-2015 (USD)

Product code	2014	2015	2016	Compared with 2015 (%)
Tuna HS code 16 (1)	**232,290,169**	**208,849,526**	**225,605,543**	**+8.0**
Canned tuna (HS code 16)	177,017,676	150,398,750	153,031,643	+1.8
Other processed tuna (HS code 16)	55,272,492	58,450,776	72,573,900	+24.2
Tuna HS code 03 (2)	**251,944,395**	**246,122,926**	**284,180,745**	**+15.5**
Live /fresh/frozen/dried tuna (HS code 03) (ex. tuna HS code 0304)	58,764,847	43,185,413	43,421,515	+0.5
Tuna HS code 0304 (ex. surimi)	193,179,548	202,937,513	240,759,230	+18.6
Total tuna (1 + 2)	**484,234,564**	**454,972,451**	**509,786,288**	**+12.0**

Source: Annual report to the WCPCA, supporting the 13th Regular SC Session, August 2017

The exported tuna products from Vietnam were shipped to 101 foreign markets, with approximately 39% to the United States and 23% to the European Union (see **Table 10**)

Table 10. Vietnamese tuna exports in 2016

Market	Tuna exports in 2016 (1,000 USD)	Increased rate in 2016/2015 (%)
US	200,277	+5,3
EU	115,316	+18,4
Italy	33,711	+175,5
Germany	21,429	-21,8
Belgium	12,570	+45,4
ASEAN	43,394	+13,1
Thailand	30,282	+17,9
Israel	26,001	+49,9
China	20,945	+67,2
Japan	19,361	-5,2
Canada	10,090	+1,6
Mexico	8,421	-10,3

Source: Source: Annual report to the WCPCA, supporting the 13th Regular SC Session, Aug 2017

5.5.2 Community income and livelihoods

Tuna fisheries continue to generate substantive economic benefits for EAS countries. Sustainable management of tuna stocks is important at the national and subnational levels, as multitudes of livelihoods are supported through the extensive supply chains.

Indonesia:

The seafood sector in Indonesia contributed 8% to the nation's GDP in 2016 and is expected to increase. The capture fisheries and aquaculture sector employ around 2.6 and 2.4 million workers respectively, and over 1 million workers are involved in processing and marketing (Seafood Trade Intelligence Portal, 2018).

Philippines:

The Philippine fishing fleet consists of approximately 500,000 vessels of which over 98% are small, municipal vessels, below 3 GT. These vessels are responsible for approximately 1.2 million MT of the total catch in 2015 (cumulative fisheries, including tuna), which corresponds to 53% of the annual landings in the country. Tuna is by far the largest seafood export commodity of the Philippines in terms of value and offers a livelihood to thousands of fishermen.

Vietnem:

Overall, Vietnam became the third major seafood exporter, overtaking Thailand as the leading southeast Asian exporter in 2014. More than 5 million people are directly employed in the seafood sector and around 8 million people derive their income from the fisheries sector. The value of seafood exports has increased from USD 776 million in 1997 to USD 6.5 billion in 2015. For 2016, VASEP (Vietnam Association of Seafood Exporters and Producers) reports an export value of USD 7.05 billion, of which approximately USD 510 million or about 7% are tuna products. the seafood sector contributed 8% to the nation's economy, with aquaculture contributing considerably with, 65-70% to the total output ((Seafood Trade Intelligence Portal, 2018).

5.6 Improved food provisioning and contribution to food security

In most of the Southeast Asian countries, food provisioning and food security concerns are being addressed in the fisheries sector through expanding aquaculture, not specifically with respect to tuna fisheries. Although there are significant domestic consumption levels, tuna products have been mostly seen as export commodities. One of the reasons behind this perception is the fact that most policies on tuna fisheries are oriented towards commercial fishing operators. The large number of small and medium size fishing operators in the EAS countries are landing substantive quantities of tuna from municipal waters, and policies will need to address these catches as progress is made in achieving a blue economy.

Food security could potentially become more and more an issue if coastal fisheries decline, e.g., because of detrimental effects on coral reef systems due to climate change. Tuna fisheries might be further exploited to fill the resultant gap in supply previously met by coastal fisheries.

5.7 Improved governance and ecological and socioeconomic conditions

Two of the three beneficiary countries, Indonesia and Philippines are now full members of the WCPFC, with Indonesia joining in 2013, during the bridging period between the first and second phases of the WPEA project. Vietnam remains a cooperating non-member a commission and has increasingly made advances towards full compliance with relevant CMMs.

There are other regional commitments that also enhance the likelihood that EAS countries will work cooperatively towards sustainable ecosystem management of fisheries and marine ecosystems. For example, all three of the beneficiary countries have endorsed the Regional Plan of Action (RPOA) to Promote Responsible Fishing Practices including Combating Illegal, Unreported and Unregulated Fishing. And, Indonesia and the Philippines are members of the Coral Triangle Initiative (CTI), and Vietnam has associated country status.

At the national level, the project has facilitated the completion National Tuna Management Plans (NTMPs); and each of the NTMPs have been endorsed through Ministerial decree. By the end of this second phase of the project, each of the three beneficiary countries has plans to incorporate climate change, EAFM, and harvest strategy objectives into the NTMPs. These expanded plans would further enhance the institutional framework and governance structures required to achieve sustainable management of highly migratory tuna stocks.

The cooperation has mostly been among fisheries agency staff; the envisaged consultative forum consisting of cross-sectoral partners has not materialized as planned. Furthermore, there is a need to broaden participation among subnational stakeholders, who are responsible for advancing socioeconomic development priorities.

5.8 Synergies with other national policies and international agreements

Sustainable management of transboundary tuna fisheries is also consistent with the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA). The SDS-SEA provides an overarching framework for sustainable development of the EAS that aims to ensure the sustainable use of coastal and marine resources. The SDS-SEA incorporates the main principles, objectives and action programmes of a number of international and regional instruments and agreements, including the UN Convention on the Law of the Sea (UNCLOS), the UN Framework Convention on Climate Change (UNFCCC), Agenda 21, the Convention on Biological Diversity (CBD), the Global Programme of Action for Protection of the Marine Environment from Land-Based Activities (GPA), the World Summit on Sustainable Development, the UN Millennium Development Goals (MDGs), and a number of conventions associated with the International Maritime Organization (IMO). The SDS-SEA embodies a shared vision of the countries of the region for sustainable development of coasts and oceans and the proposed project is thus linked to the implementation of the SDS-SEA under a programmatic approach for the region.

The collaborative governance efforts are in line with the Regional Plan of Action (RPOA) of the Coral Triangle Initiative (CTI), e.g., through tuna stock and catch assessments, establishment of national tuna management plans and cooperation on measures to address illegal, unreported, and unregulated (IUU) fishing. The key institutions in charge of the regional agreements and frameworks are described below. The CTI officially launched a Regional Plan of Action in May 2009. The action plan has five overall goals covering priority seascapes, including promoting the ecosystem approach to management of fisheries (EAFM) and other marine resources, establishing marine protected areas, promoting climate change adaptation and protection and conservation of threatened species. The GEF funds the CTI in collaboration with the Asian Development Bank. Philippines and Indonesia are two of the six CTI countries included in the Coral Triangle area and the Plan of Action, whereas Vietnam enjoys associated country status. Within the EAFM goal, targets and priority actions specifically address tuna and tuna fisheries.

5.9 Improved cooperation among the countries involved in the project

One of the main strengths of the WPEA project has been strengthened cooperation among the three beneficiary countries of Indonesia, the Philippines and Vietnam. The project has provided a platform for regularly meeting, discussing measures aimed at improved transboundary management of migratory tuna stocks, and exchanging lessons learned. Indonesia and the Philippines are full members of the WCPFC and Vietnam is a cooperating non-member. Resources allocated by the project have allowed professional staff from the responsible national agencies to participate in SC and TCC meetings, which have further enhanced regional collaboration.

6 Conclusion and Recommendations

6.1 Overall assessment

Regionalism plays an important role in the sustainable management of highly migratory tuna stocks under a blue economy. The full membership and proactive involvement by Indonesia and the Philippines in the WCPFC has added a great deal of value to the regional cooperation in the Western and Central Pacific Ocean. And, the commitment by Vietnam as a cooperating non-member has further strengthened collaborative governance of tuna fisheries in the region. These large, diverse southeast Asian countries provide a much broader outlook to the discussions on regional management of tuna fisheries; considering their large populations and extensive domestic markets, developed private sector, vast fleets of small-medium size vessels and long-standing economic ties throughout the ASEAN region. The WPEA project has facilitated more inclusive involvement of EAS countries in regional management of migratory tuna stocks – one of the foundations of a sustainable blue economy.

The investment in improved data collection through support from the WPEA project has demonstrated the benefits of making science-based management decisions. The reliability of stock assessments has improved as a result, enabling more informed decisions. For instance, the updated assessment of bigeye stocks has concluded that this species is probably not over-fished, as previously estimated; however, taking a precautionary approach, certain management measures have been put into place. Research has also been made on reducing bycatch from purse seine fishing operations, particularly ones using drifting FADS. Recommendations on biodegradable materials and less entangling FADs are delivering science-based guidance for protecting these fragile marine ecosystems.

The ecosystem approach to fisheries management (EAFM) has long been promoted globally and is gaining traction for highly migratory tuna stocks. The WPEA project has provided support for implementing EAFM on pilot scales within the beneficiary countries. The results of these pilots and integration of EAFM principles in the national tuna management plans increase the likelihood that intrinsic values of marine ecosystems support tuna stocks are protected and factored into adaptive management strategies. Technical assistance on advancing progress on harvest strategies for tuna fisheries has made a valuable contribution with respect to the shift towards more science-based decision making regarding management of tuna stocks in the WCPFC convention area.

The impacts of climate change could potentially affect tuna distribution, because of temperature and acidity perturbations, and increase costs for operators, e.g., due to more intense storms and the need to replace or reinforce shore-based infrastructure. The impacts could potentially be more far-reaching, e.g., affecting food security through detrimental effects to coral reef systems, resulting in declining coastal fisheries that in turn would increase demand of tuna and other species. Improving the resilience and adaptive capacity of the tuna industry and coastal communities, is an important component of progressing towards a blue economy. Moreover, the EAS countries are investing in integrated coastal management (ICM), an important tool for a sustainable blue economy.

The blue economy also requires effective stakeholder engagement, including with the private sector, to ensure social and economic benefits, through food security, livelihoods and poverty alleviation, equity and political stability. The WPEA project has engaged the private sector in some activities, including market-based approaches such as eco-labeling. There is room for further engagement and improved integration of donor funding among public and private sector initiatives.

6.2 Lessons learned

There have been several constructive lessons learned through the WPEA project, including the value of collaborative regional governance and the benefits realized through increased investment in data collection. A few lessons learned that should be considered in follow-up activities and in designing similar projects include the following

- Implementing a regional project involving three countries and a regional management organization having coverage across the Western and Central Pacific is costly and coordination demands are high.
- Implementing activities such as fisheries improvement projects (FIPs) and EAFM pilots take time and require inclusive stakeholder engagement. The time allocated for these activities was underestimated.
- More efforts should have been placed at the project preparation phase in assessing ongoing FIPs and other initiatives among the private sector. It proved difficult to identify partners and contribute added value to ongoing initiatives during project implementation.
- Making meaningful contributions to the knowledge base or predictive capacity regarding the impacts of climate change on highly migratory tuna stocks in the WCPO requires input from specialists, and there are limited qualified experts available.
- The role of small and medium size fishing operators in the EAS countries is significant, and more involvement by these stakeholders would have been advisable.

6.3 Challenges

Through improved data collection and reporting, more information is available on bycatch and the mortality of non-target species. The beneficiary countries are including information in their annual reports to the WCPFC; the Philippines provided detailed records in the summary of CMM compliance. Vietnam also included specific bycatch details, including billfish bycatch; for example, see **Table 7**.

6.3.1 Gaps in policies, management plans, and enforcement

The WPEA project has set the groundwork for sub-regional collaborative governance mechanism involving the EAS countries, addressing the unique issues associated with the shared tuna resources in the region; there is a need that such a mechanism continues after GEF funding ceases. Specific gaps in policies, management plans and enforcement that should be addressed include:

- Harvest strategies for highly migratory tuna fisheries in the region are needed, to better secure these natural capital assets over the long-term.
- Investment in capacity development for subnational stakeholders is needed to bolster enforcement.
- Increased inclusion of coastal communities in the fisheries, e.g., through dedicated access arrangements, inshore FAD networks, and policies regarding food security and employment.

6.3.2 Information gaps

Responsible agencies among the beneficiary countries have continued some of the investments in improved data collection and further support through technical and financial cooperation assistance from the New Zealand government. There are, however, information gaps that remain, for example, the following areas requiring further improvement were outlined in an August 2016 report by SPC to the Thirteenth Regular Session of the Scientific Committee of the WCPFC (WCPFC-SC12-2016/ST WP-2 (rev. 1)):

Indonesia:

i. The need for more comprehensive review and consolidation of data from all potential sources in the catch estimation process (including industry and NGO data) which would help, inter alia, explain the trends in catches by gear;
ii. Compilation and submission of available aggregate and operational catch/effort data for recent years since the logbooks became mandatory in the Indonesian domestic tuna fisheries (2011- 2015), although this is acknowledged.

Philippines:

i. Improving logsheet coverage for the purse seine vessels fishing in the Philippines EEZ;
ii. More reliable estimates for the small-scale municipal gears;
iii. A better understanding of the extent of catches from the handline fisheries targeting large yellowfin tuna in some regions.

Vietnam:

i. enhancing the coverage of the establishment of logbook and port sampling data collection for their longline, purse seine and gillnet fisheries;
ii. the compilation and provision of aggregate and operational catch/effort data from the longline fishery from logbooks collected since 2011;
iii. a formal decision on their database system to manage their tuna fisheries data and resources required;
iv. a sustainable observer programme;
v. a review of data collection forms to consider, inter alia, inclusion of the WCPFC key shark species where relevant.

6.3.3 Environmental and socioeconomic governance capacity

The subnational government units in the EAS countries play important roles with respect to tuna fisheries. The vast number of small and medium size fishing operators are licensed and are monitored at the subnational government. And, services and infrastructure throughout the value chain, including processing plants, are regulated by local governments. Local authorities also have responsibilities for environmental governance, e.g., integrated coastal management. Capacity development activities should include subnational government units.

6.4 Recommendations

6.4.1 For Sustainable tuna fisheries in the context of the blue economy

Recommendation No. 1: Establish a framework for a sustained sub-regional collaborative governance coalition among the EAS countries. The GEF funds provided a catalysis for sub-regional governance of highly migratory tuna stocks; it would be advisable to sustain such a coalition, a joint voice representing EAS issues within the WCPO region.

Recommendation No. 2: Set clear, achievable and measurable targets for progressing further towards achievement of sustainable tuna fisheries for blue economy in the EAS region of the WCPFC convention area. With varying definitions of the blue economy, it would be advisable for the EAS partners to agree upon a "roadmap" for progressing towards a blue economy. This could be done before the WPEA project closes, providing an agreed work program for the sub-regional governance coalition, and linking to national programs that are contributing towards achievement of sustainable development goals (SDGs) and other international commitments.

6.4.2 To address gaps and major issues

Recommendation No. 3: Strengthen collaboration on certain technical activities. Cross-collaboration among the three beneficiary countries in EAFM, harvest strategy, climate change predictive and adaptive capacities, and risk assessment should be increased. This might be a more efficient use of project resources, further cultivates sub-regional collaboration, and addresses the transboundary context of sustainable management migratory tuna stocks in the EAS.

Recommendation No. 4: Coordinate with the environment, agriculture and fisheries agencies regarding climate change and biodiversity conservation activities. The project teams in the three beneficiary countries should develop collaborative working arrangements with the officials of the environment, agriculture and fisheries agencies, regarding strengthening climate change predictive and adaptive capacities, and reducing bycatch of endangered, threated, and protected (ETP) species.

Recommendation No. 5: Develop and implement plan for increasing the capacities and involvement of subnational stakeholders. For example, the tuna fisheries value chain should be addressed in integrated coastal management processes. Mechanisms for enhancing food security for coastal communities should be put in place; such as securing a portion of allowable catch, requiring greater retention of bycatch from purse seine fishing operations, etc.

6.4.3 To scale up and replicate best practices

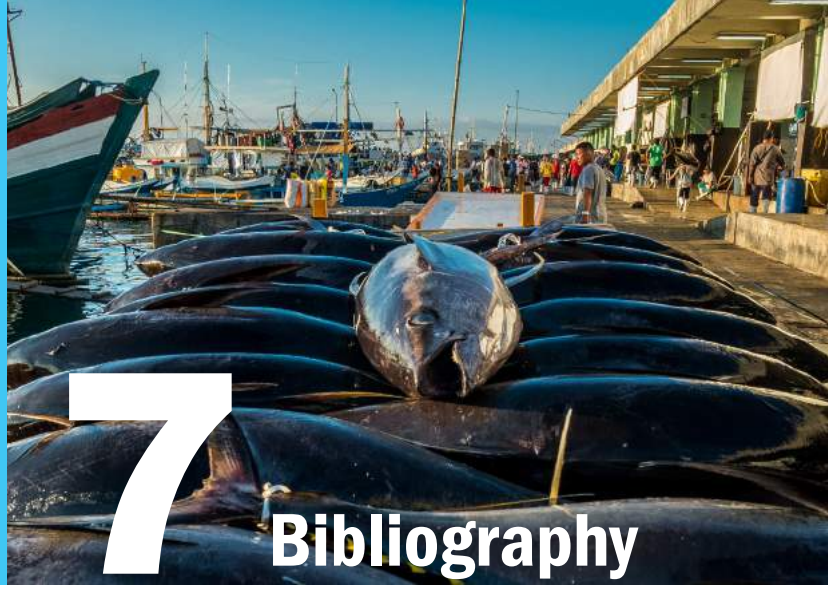
Provide recommendations for scaling up and replicating best practices.

Recommendation No. 6: Identify and operationalize strategic partnerships with complementary projects and programs, including but not limited to (1) FAO-GEF Programme on Global Sustainable Fisheries Management

and Biodiversity Conservation in the Areas beyond National Jurisdiction (ABNJ), (2) the World Bank-GEF Ocean Partnerships for Sustainable Fisheries and Biodiversity Conservation, (3) the EAFM Working Group of the Coral Triangle Initiative, and (4) USAID Oceans and Fisheries Partnership on the Catch Documentation and Traceability (CDT) system and EAFM. Partnering with complementary projects, possibly providing incremental funding for specific activities might be a more sustainable implementation strategy than implementing relatively small actions, such as funding prior studies and limited scope field trials.

Recommendation No. 7: Establish collaborative partnerships with the private sector on application of market-based approaches. There are private sector initiatives in each of the three beneficiary countries, including involvement in projects, such as catch documentation and traceability system, performance monitoring and ensuring sustainably sourced tuna, certification and labeling. It would be advisable to establish collaborative partnerships prior to project closure, increasing the likelihood that progress will be maintained towards achievement of the conditions for a blue economy.

Recommendation No. 8: Assess sustainable financing alternatives for maintaining adequate levels of data collection. Government funding streams for data collection structures, including enumerators, samplers, etc., remain tenuous and/or uncommitted in the 3 beneficiary countries. It would be advisable to assess sustainable financing alternatives.



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Annex 1: Ocean Economic Activities

	CAMBODIA	INDONESIA	PR CHINA	MALAYSIA	PHILIPPINES
1. OCEAN ECONOMIC ACTIVITIES (Gross Value Added, Year 2015, in billion US$, in constant prices)					
• Fisheries and Aquaculture		14.70	64.4	12.83	2.59
• Offshore Oil and Gas		22.05	14.7	2.18	0.80
• Mining (Minerals)					
• Energy/electric supply (ocean energy; offshore wind, renewables)					1.22
• Water (seawater utilization; desalination)					
• Manufacturing		38.80	1260.9[b]	0.88	1.99[d]
• Seafood processing					
• Ship building and repair					
• Marine transport equipment					
• Marine biotechnology, pharmaceuticals, chemicals					
• Marine Construction		63.25	311.7	0.08	0.12
• Shipping and Ports		2.16	84.2	23.73	1.38
• Marine transportation (shipping)					
• Ports, storage and warehouses					
• Marine tourism and recreation		19.30	162.4	16.25	3.06
• Government (navy, coast guard, etc.)		22.27			0.41
• Marine research and education				5.43	0.04
• Marine services (mapping, monitoring, consulting, maritime insurance, etc.)			1911.6		0.2[e]
TOTAL (billion USD)		**182.54**	**3809.9**	**61.35**	**11.81**
2. CONTRIBUTION TO GDP (percent)		28.34%	9.51%[c]	23%	7.07%
3. EMPLOYMENT IN OCEAN ECONOMY (million)		5.11[a]	35.5		2.15

Source: Indonesia: Fahrudin 2017; PR China: China Marine Statistical Yearbook 2016; Zhu 2017; Malaysia: Kaur 2017; Philippines: Philippine Statistics Authority 2017; Recide and Baling 2017

Notes:
a/ for year 2013
b/ s
c/ share of gross ocean product (core ocean product plus marine education, research and support services, and ocean-related industries) to GDP
d/ includes fish and seafood processing; ship and boat building; manufacture of engines and turbines for marine propulsion, pulleys, etc.
e/ includes related maritime business activities and maritime insurance

	RO KOREA	SINGAPORE	THAILAND	TIMOR LESTE	VIET NAM
1. OCEAN ECONOMIC ACTIVITIES (Gross Value Added)	Year 2013 (in billion USD, In constant prices)		Year 2015, (in billion US$, in constant prices)	Year 2015, (in billion US$, in constant prices)	Year 2015k (in billion USD, in constant prices)
• Fisheries and Aquaculture	6.76		2.50	0.01	12.11
• Offshore Oil and Gas		22.05	10.08	1.5	13.68
• Mining (Minerals)					
• Energy/electric supply (ocean energy; offshore wind, renewables)			5.50		1.22
• Water (seawater utilization; desalination)					
• Manufacturing	16.23[f]		49.45		
• Seafood processing					3.16
• Ship building and repair					2.01
• Marine transport equipment					
• Marine biotechnology, pharmaceuticals, chemicals					
• Marine Construction	2.60		3.07		
• Shipping and Ports	5.33		10.42	0.07	1.80
• Marine transportation (shipping)					
• Ports, storage and warehouses					
• Marine tourism and recreation	2.9		5.83[h]	0.02	5.39
• Government (navy, coast guard, etc.)	4.46		3.92	0.38	0.18
• Marine research and education			3.39		
• Marine services (mapping, monitoring, consulting, maritime insurance, etc.)	3.80		24.03		
Others	1.43[g]				
TOTAL (billion USD)	**43.53**		**118.19**	**1.97**	**38.32**
2. CONTRIBUTION TO GDP (percent)	3.3%		30%	87%	20.8%
3. EMPLOYMENT IN OCEAN ECONOMY (million)	0.656		10[j]	0.41	3.0

Source: RO Korea: J. Chang 2017; Thailand: Office of the National Economic and Social Development Board 2017; National Statistics Office of Thailand 2017; Timor Leste: Dessy 2017; Viet Nam: VASI 2017

Notes:
f/ includes manufacturing of machine and equipment, and ship-building
g/ includes marine resource development and marine environment
h/ hotels and restaurants
i/ includes wholesale and retail trade; repair of motor vehicles and household goods ($13.89B); financial intermediation (US$4.16B); real estate, renting and business activities (US$5.13B), other community, social and personal services (US$0.74B), and private households with employed persons (US$0.11B)
j/ employment in 23 coastal provinces
k/ preliminary estimates