



OCTOPUS NATIONAL MANAGEMENT FRAMEWORK PLAN

October 2021



Octopus National Management Framework Plan

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Messages



EXECUTIVE SUMMARY

The Octopus National Management Framework Plan is a framework for the management of Philippine octopus resources that provide livelihood and revenues for various stakeholders of the industry: artisanal fishers, local traders or consolidators, processing and export companies and government. The OCT-NMFP provides a strategic plan for the conservation, proper utilization, fisheries development, and protection of critical life stages of octopus, while maximizing the socio-economic benefits from this valuable marine commodity. The OCT-NMFP was crafted through a widely participatory process that optimizes the involvement of multiple sectors in various stages of the planning process. The Plan integrates the principles of an Ecosystem Approach to Fisheries Management (EAFM) that seeks to balance environmental and socioeconomic concerns through improved governance.

The OCT-NMFP is organized into four main sections or chapters. **Chapter I – Introduction** highlights the importance of octopus in Philippine fisheries & trade and the urgency of management to sustain this export commodity. It also briefly describes the Global Sustainable Supply Chains for Marine Commodities – Philippines (GMC-PHI) Project jointly implemented by the UNDP and DA-BFAR with funding from the Global Environment Facility (GEF) and its role in fisheries management of the octopus and blue-swimming crab commodities. Lastly, the chapter discussed the current policy and institutional framework and the policy gaps in management of octopus resources.

Chapter 2 - Preparing the National Framework Plan for the Octopus Commodity presents the rationale and purpose of the OCT-NMFP, and the methodology and timeline followed in crafting the plan. This chapter also describes the adoption of the EAFM principles in the planning process.

The Philippine octopus fisheries is considered a data-deficient system and available data are mostly nationally aggregated and not presented by region. **Chapter 3 - State of the Philippine Octopus Fisheries and Trade** presents the available data and information on the biology, fisheries, and trade of this important export commodity. An overview of octopus biology, ecology, and diversity is presented. A map showing the location of octopus fishing grounds across the regions and Fisheries Management Areas (FMAs) in the Philippine is included, which is overlaid on a map of NIPAS sites or key marine biodiversity areas. Data obtained from various databases, reports, NSAP, industry data, and primary data gathered through key informant interviews are presented to describe the state of octopus fisheries and trade. Chapter 3 also discusses some of the major management concerns in octopus fisheries and the major findings of the Root Cause Analysis (RCA).



The final section is **Chapter 4 - The Octopus-National Management Framework Plan** which presents the outputs of the cluster Multistakeholder Consultation Workshops (MCW). The chapter presents the Vision, major management issues in the Philippine octopus industry, goals and management objectives. The main parts of the OCT-NMFP are the Objectives-Indicators-Benchmarks matrices and the recommended management action matrices resulting from the rigorous deliberations and consensus at the three cluster MCWs (i.e., Luzon, Visayas, and Mindanao clusters) conducted virtually or online in April 2021 due to restrictions on travel and assemblies ensuing from the COVID-19 pandemic. The last five sections of Chapter 4 of the OCT-NMFP presents the budgetary requirements of implementing the framework plan, and provisional plans for the Implementation, Institutional Arrangements, and Capacity Development, the Sustainable Financing Mechanisms, the Communication Plan, and the Monitoring, Evaluation and Feedbacking Plan.



ACRONYMS AND ABBREVIATIONS

| | |
|--------------|---|
| BAC | Bureau Administrative Circular |
| BFAR | Bureau of Fisheries and Aquatic Resources |
| BFAR-FIQS | BFAR-Fisheries Inspection and Quarantine Section |
| BSC | Blue Swimming Crab |
| BSCMP | Blue Swimming Crab Management Plan |
| CNFIDP | Comprehensive National Fisheries Industry Development Plan |
| CPUE | Catch Per Unit Effort |
| DA | Department of Agriculture |
| DENR | Department of Environment and Natural Resources |
| DOST | Department of Science and Technology |
| DTI | Department of Trade and Industry |
| EAFM | Ecosystem Approach to Fisheries Management |
| EO | Executive Order |
| EU | European Union |
| FAO | Food and Agriculture Organization (also Fisheries Administrative Order) |
| FARMC | Fisheries and Aquatic Resources Management Council |
| FMA | Fisheries Management Area |
| GEF | Global Environment Facility |
| GMC | Global Sustainable Supply Chains for Marine Commodities |
| IEC | Information, Education and Communication |
| IUU | Illegal, Unreported and Unregulated (fishing) |
| JAO | Joint Administrative Order |
| KII | Key Informant Interview |
| LGU | Local Government Unit |
| M&E | Monitoring & Evaluation |
| MPA | Marine Protected Area |
| MCW | Multi-stakeholder Consultation Workshop |
| NFRDI | National Fisheries Research and Development Institute |
| NGA | National Government Agency |
| NGO | Non-Governmental Organization |
| NMP | National Management Plan |
| NPOA | National Plan of Action |
| NSAP | National Stock Assessment Project |
| OCT-NAP | Octopus National Action Plan |
| OCT-NMFP | Octopus National Management Framework Plan |
| PSA | Philippine Statistics Authority |
| RA | Republic Act |
| RCA | Root Cause Analysis |
| SDGs | Sustainable Development Goals |
| SFP | Sustainable Fisheries Partnership |
| TWG | Technical Working Group |
| UNDP | United Nations Development Program |
| USAID-Oceans | United States Agency for International Development – Oceans and Fisheries Partnership |

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Chapter 1

INTRODUCTION

1.1 The Philippine Octopus Resources

Octopus is only a minor fishery resource of the Philippines, representing about 2.5% of the country's total fishery exports in 2019 (BFAR 2019). However, octopus is considered a highly valuable resource, contributing to the country's seafood production and export mainly to the United States, Korea, Vietnam, Japan, Canada and the European Union. The Philippines is a major producer of octopus, generating livelihoods for thousands of rural small-scale or artisanal fishermen and consolidators, and a viable business enterprise for octopus processors and export companies. In 2019 Philippine octopus exports of 6,573 metric tons were valued at PHP1.6 Billion or USD 30.3 Million (BFAR 2019). Octopus mainly occur in shallow to deep coral reef ecosystems where numerous crevices and caverns provide habitats for these highly cryptic predators and their young. As an archipelagic state, the Philippines has vast coral reef areas (i.e., 27,000 km²) to support wide occurrence of octopus resources for both domestic and export markets.

The last two decades have seen a growing demand for octopus in the international market. The relatively small contribution of this marine commodity to the overall marine capture fisheries production may explain why octopus fisheries in the country has not been a priority for comprehensive monitoring programs such as implemented by the Philippines' Department of Agriculture-Bureau of Fisheries and Aquatic Resources (BFAR) through the National Stock Assessment Program (NSAP), nor is it a priority program for fisheries management. Long-term trends in octopus exports from the Food and Agriculture Organization (FAO) show that since the mid-1990s production had progressively declined (FAO FishStatJ 2021) but showed recovery beginning 2015. Data from the annual Philippine Fisheries Profiles published by BFAR (2001-2019) show a similar trend of decline until 2010 then fluctuated sharply between 2011 and 2019.

1.2 Urgent Need for Fisheries Management

The Philippine octopus is an important but data-deficient commodity that faces several problems or management issues that are tell-tale signs of overfishing: unregulated fishing effort, declining catch rates, juvenile catches, and potentially destructive methods practiced by octopus gatherers in certain areas. On top of these are fluctuating market prices at both local and international markets, and negative perceptions about the lack of management of octopus fisheries, which industry leaders believe explains the poor competitiveness of Philippine exports at the global trade arena. Above all, the absence of local and national management programs threatens the long-term sustainability of octopus fisheries and trade in the country. What is urgently needed is a national plan of action and accompanying policy



to address the overfishing issue with the holistic purpose of protecting ecological well-being and improving human welfare through good governance. It is equally important that the plan is crafted through multistakeholder participation to ensure that the various sectors are not only represented in the planning process but shall also enjoy the full benefits from well-managed, sustainable octopus fisheries and trade. The formulation of the OCT-National Management Framework Plan (OCT-NMFP) is a long-delayed response by government and industry to address management issues at the production, trade and export levels. The overarching purpose of this management framework is to ensure the sustainability of octopus resources to support livelihood and revenue production at local and global markets, and to ensure the promotion of ecological and human well-being and good governance at the local production and national trade systems.

1.3 The Global Sustainable Supply Chains for Marine Commodities – Philippines (GMC-PHI) Project

The growing global demand for seafood and a variety of interacting factors have provided a major push toward excessive fishing, pushing vulnerable resources toward the brink of collapse. Improving fisheries governance of fisheries commodities is crucial to achieving sustainable fisheries management. Toward this end the Philippine government, through the BFAR, has entered into partnership with various international aid organizations and programs. The Philippines' partnership with the United Nations Development Program (UNDP) and the Sustainable Fisheries Partnership (SFP) supports the development of the Root Cause Analysis (RCA) report and packaging of a National Action Plan (NAP) for the octopus commodity under the Global Sustainable Supply Chains for Marine Commodities – Philippines (GMC-PHI) Project funded by the Global Environment Facility (GEF). The project launches from the need to address overexploitation of marine fisheries as a major global issue and key driver of changes in the marine environment. In the Philippines, the project aims to mainstream the sustainability of octopus and blue swimming crab resources, including maintaining the good quality raw materials in the supply chain and other support to improve the management of these important fisheries.

Recognizing that octopus is an important export marine commodity which is possibly overfished brings to the forefront the need for a national plan of action that will adopt measures to improve management toward sustainable octopus fisheries and trade. Management of octopus and other important export commodities is consistent with one of the United Nations 17 Sustainable Development Goals, specifically, SDG 14 - Life Below Water which is to “conserve and sustainably use the oceans, seas, and marine resources for sustainable development”. Sustainable management of the seafood industry is consistent with the many provisions of the Philippine Fisheries Code of 1998 or Republic Act (RA) 8550, as amended in RA 10654, mainly toward achieving food security, optimizing utilization, management, development, conservation, and protection of the country's fishery resources.



In its pursuit of a sustainable fishing industry, the Philippine government is dedicated to the formulation of national management plans (NMP) for important marine commodities such as tuna (National Tuna Management Plan, 2018), blue-swimming crab (Blue Swimming Crab Management Plan or BSCMP, 2014) and sardine (National Sardine Management Plan, 2020). These initiatives fall within the broader context of the Philippines' 20-year Comprehensive National Fisheries Industry Development Plan for 2005-2025 (CNFIDP 2005-2025) and the Comprehensive Post-Harvest, Marketing, and Ancillary Industry Plan (CPHMAIP 2018-2022).

The UNDP GMC-PHI project contributes to address key aspects of the market forces that drive overfishing. The project will add to the transformation of the seafood market by mainstreaming sustainability in the value chain of important commodities platforms, fisheries improvement projects (FIP), developing national capacities, and generating learning to be shared worldwide. The project allocates GEF resources strategically under the following four project components:

- Component 1: Promotion of global demand for sustainable marine commodities
- Component 2: Enabling environment for sustainable marine commodities supply chains
- Component 3: Demonstration of Fisheries Improvement Projects (FIPs)
- Component 4: Sustainable marine commodities information and knowledge management systems

The project is an inter-regional intervention. Market engagement and knowledge management are global components. The sustainable marine commodities platforms and FIPs is implemented using a participatory approach in Costa Rica, Ecuador, Indonesia and Philippines, as covered under Component 2 which directs the conduct of an in-depth sector analysis for the country; and the preparation of a five-year strategic National Action Plan (NAP) anchored on an inclusive, multi-stakeholder platform towards the sustainable fisheries management of the Octopus (OCT) commodity. The formulation of the OCT-NAP is a two-part process involving the following:

- 1) Root Cause Analysis
- 2) Formulation of the OCT National Management Plan

The GMC-Philippines project is implemented in partnership with the DA-BFAR, other government line agencies (e.g. DENR and DILG) and the industry (**Fig. 1**). A technical working group (TWG) was formed for each of the blue swimming crab and octopus commodities to guide the project implementation.

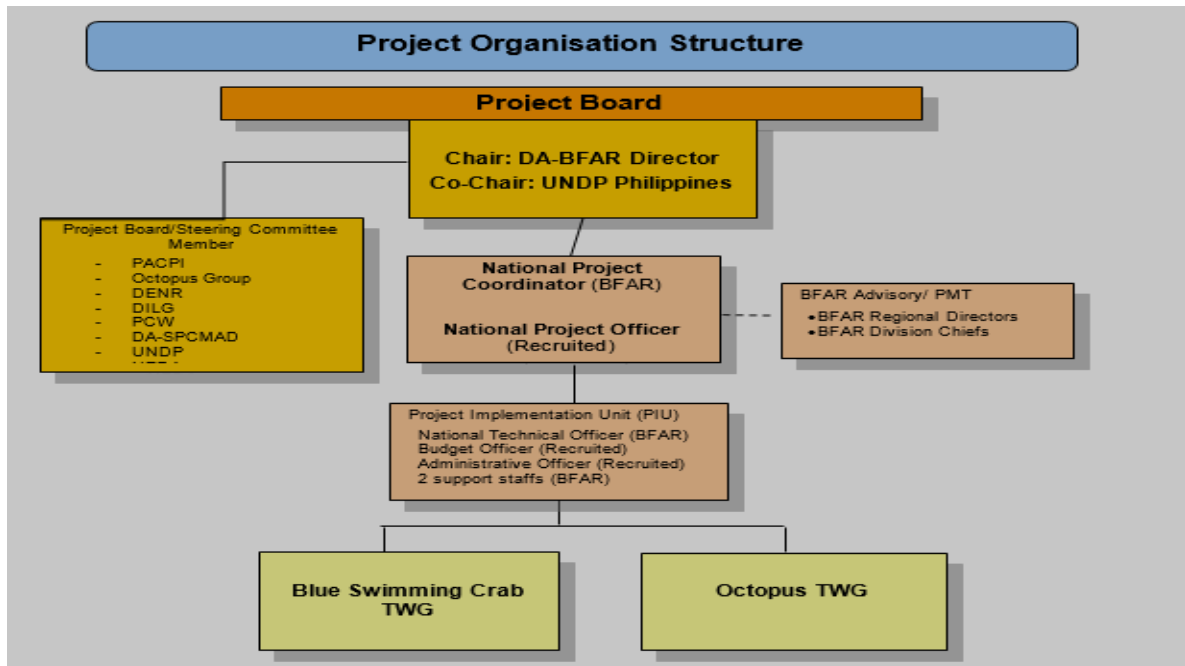


Figure 1. Project Management Structure for the UNDP-GMC project. (Source: Project Brief - Powerpoint presentation at the Octopus Review and Management Planning Workshop held on 20-23 November 2018 in Zamboanga City).

1.4 Policy and Institutional Framework

Governing the environment and natural resources (such as fisheries) is a not an easy task but involves a long, complex process that entails the cooperation of various government institutions, civil society and non-government organizations, local stakeholders, and the science community in achieving the same management goals. Fisheries governance primarily aims to ensure the sustainability of valuable fish stocks, maximize economic benefits from these while protecting the ecosystems that support these resources. The current management paradigm is to treat fisheries as social-ecological systems (SES), a concept that emphasize humans as part of, and not separate from, nature (Berkes et al., 2003). As with other natural resource systems, octopus fisheries management must be founded on an ecosystem-based governance approach to ensure resilience of the production systems, sustain livelihoods and revenues of all industry players.

Integral to governance of octopus fisheries and sustainable export industry is a sound policy and institutional framework. However, the lack of detailed information on life history, stock abundance, and comprehensive production statistics limits the formulation of science-based and adaptive management actions for this commodity. To date, no specific policy at the national or local level has been formulated that is focused on octopus fisheries management. In contrast, a joint DA-DILG Administrative Order (JAO No. 1, series of 2014) and local ordinances govern the conservation and regulation of the blue swimming crab (BSC) fishery (BSC-NMP, 2020). On the other hand, in the last decade the Philippines had made inroads



into improving the country's fisheries policy (see Annex 1 and Annex 2) that can be adopted to manage octopus stocks toward sustainable fisheries production.

Among the landmark national statutes governing fisheries is the amendment of the 1998 Philippine Fisheries Code (Republic Act 8550) by RA 10654, an *Act to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing*, which lapsed into law on February 27, 2015. Among the salient provisions of RA 10654 is its declaration as state policy the adoption of the precautionary principle and an ecosystem approach to fisheries management in the management of the country's fishery and aquatic resources (Section 2f). Illegal, unreported, and unregulated (IUU) fishing has long been recognized as one of the major global challenges of fisheries management (USAID-Oceans, 2017) and inhibits progress towards achieving the goals of long-term sustainability and responsibility (FAO 2021b). Moreover, IUU fishing threatens marine biodiversity, food security, and the livelihoods of coastal communities, especially when it targets vulnerable stocks that are placed under strict management controls or moratoria, thus wasting efforts to rebuild those stocks to healthy levels (FAO 2021a). Another undesirable consequence of IUU fishing is that it greatly disadvantages fishers who act responsibly by complying with their respective country's fisheries policies. On 6 December 2013 the Philippine government issued Executive Order 154 adopting a *National Plan of Action* to address IUU fishing in the country. A precursor of RA 10654, E.O. 154 recognizes that IUU fishing "undermines national and regional efforts to manage fisheries in a sustainable manner" and "threatens the food and livelihood security of coastal communities".

As one of the country's major fishery exports, processed octopus should meet international standards on product quality and food safety. Two important policies (i.e., FAO 210 series of 2001 and FAO 227 series of 2008) provide the rules and regulations on export of fish and aquatic products for human consumption of any form (i.e., fresh, chilled, frozen, or cooked) to any country in the world in order to comply with international standards on . The member countries of the European Union (EU) have particularly stringent requirements for their imports and food safety, thus FAO 227 was formulated especially for the EU (see Annex 2).

A more recent and significant policy is DA-BFAR's (2019) Fisheries Administrative Order (FAO) 263) on the *Establishment of Fisheries Management Areas for the Conservation and Management of Fisheries in Philippine Waters*. This policy establishes 12 Fisheries Management Areas (FMAs) covering all Philippine waters based on considerations of stocks boundary, range, administrative subdivisions, and distribution of fisheries (Oceana-Philippines, 2021). Subdivisions of Philippine waters into FMAs is a mechanism toward science-based, participatory, and transparent governance framework with the goal of restoring the ocean's abundance, managing the resources, while making sure that coastal communities will equitably benefit from these efforts. Each FMA is mandated to organize a Management Body that will serve as a management board and a multidisciplinary Scientific Advisory Group (SAG) to provide advice on fisheries management, resource assessments and monitoring, and management plan formulation to address overfishing and other concerns (DA-BFAR, 2019).



The FMA approach is envisioned to be a holistic and sustainable management strategy for Philippine fisheries as it maximizes multistakeholder participation, integration of various fisheries production sectors (i.e., commercial, municipal, and aquaculture), and provides for an ecosystem- and science-based planning and decision-making process. Under the FMA scheme, the formulation of the national framework plan for octopus is expected to result in appropriate policy development to conserve and sustain this important fishery across the Philippine archipelago.

The DA-BFAR is the Philippines's primary agency for the management and development of the country's fisheries, including octopus resources. However, sustainable octopus fisheries management should be carried out in partnership with other national government agencies (NGAs), local government units (LGUs), fishing communities, the octopus export industry, non-government organizations (NGOs), and academic or research institutions which can provide the scientific data for an ecosystem-based and adaptive management.



Chapter 2

PREPARING THE NATIONAL FRAMEWORK PLAN FOR THE OCTOPUS COMMODITY: AN EAFM PROCESS

2.1 Rationale and Purpose

Presently, the octopus fishery in the country is not managed and there is very scarce information on production, catch and effort statistics, and stock dynamics. The Philippines fisheries bureau classifies the octopus as a municipal fishery involving fishing activities carried out in coastal or nearshore waters. The absence of statutes to regulate octopus fishing and trade and many instances of unsustainable practices and poor product handling have hurt the industry and integrity of octopus export products, resulting in reduced buying price at the international markets. In fact, the Monterey Bay Aquarium Seafood Watch, an important certifying body for sustainable fisheries, had recommended to avoid consumption of octopus from the Philippines mainly because there is no fisheries management (Monterey Bay Aquarium 2017). Clearly the Philippine government needs to improve governance to sustain the octopus industry, improve product quality, and regain the trust of the global market in order to be competitive once again with other exporting countries.

The formulation of a national management plan for octopus will rely on the active support of multiple stakeholders, including government and the business sector, by virtue of mutual benefits anchored upon an agreed unified set of goals, and in line with the objectives of the Fisheries Code, and supported by the goal of the GMC to mainstream sustainable fisheries management for the octopus commodity in the Philippines.

2.2 Methodology

The crafting of the Octopus National Management Framework Plan (OCT-NMFP) is a participatory process that optimizes the involvement of multiple sectors in various stages of the planning process. Its initial stages started in 2018 through Octopus Review and Management Planning Workshop organized by the UNDP-GMC Project and BFAR and held in Zamboanga City on November 20-23, 2018. The purpose of this workshop was to review the state of octopus fisheries based on available data and to draft a management framework for this important but unmanaged export commodity in the context of EAFM approach to sustainable fisheries management. The workshop was widely participated in by various industry stakeholders: octopus gatherers, consolidators, and processors/exporters; BFAR and other government agencies, the academe and non-government organizations. A long list of management issues was generated from this workshop, where the majority comprises governance issues.



The OCT-NMFP integrates the principles of an Ecosystem Approach to Fisheries Management (EAFM) that seeks to balance environmental and socioeconomic concerns through improved governance. Every step in the formulation of the OCT-NMFP is being supported by the GEF-UNDP under the Global Sustainable Supply Chains for Marine Commodities (GMC) Project.

The outputs of the initial octopus management planning conducted in 2018 were used as a reference in the 2021 Multistakeholder Consultation Workshop (MCW). It was agreed among the participants of the first planning workshop to use the outputs as the baseline upon which OCT-NMFP will be built and to adopt the EAFM planning approach employed in the initial framework plan.

The methodological approach to the formulation of the OCT-NMFP departs from that adopted by other important fishery commodities where consultation and planning workshops were conducted in one venue where participants physically interacted. Other fishery resources (such as tuna, sardines, blue swimming crab) are well-studied commodities, replete with comprehensive biological, stock assessment, socio-economic data, and value chain analysis used to present a complete picture of the industry. The OCT-NMFP, on the other hand, is a plan crafted based on limited data on fisheries and trade that are mainly nationally aggregated statistics. Moreover, no detailed information on octopus ecology and reproductive biology are available in the Philippines and this data insufficiency was recognized in the early part of the project. Finally, no value chain analysis exists for octopus that would have augmented the trade database useful in preparing the situational analysis. These deficiencies have steered the methodological approach of this planning process, as follows:

- a) **Data integration workshop** to consolidate all available information on octopus production and trade and to review, harmonize and reconcile data inconsistencies (**Table I**). This workshop was facilitated by the Octopus National Consultant and was attended by members of the PIU, regional NSAP Leaders, technical staff of GMC-PHI, industry leaders, and the Sustainable Fisheries Partnership.
- b) **Gathering of regional and local fisheries and trade statistics** through key informant surveys of octopus fishers, consolidators, and processors/exporters. These surveys also gathered information on local ecological knowledge (LEK) and perceptions on the state of octopus fisheries and trade.

The COVID-19 pandemic and the restrictions that ensued from the national lockdown policy on travel resulted in the cancellation of previous plans to conduct the RCA analysis through multistakeholder workshops in a strategic three-regional clusters, namely, Luzon, Visayas, and Mindanao. Instead a series of virtual, online consultation meetings and workshops attended by UNDP-GMC-PHI program officers, some members of the Project Implementation Unit (PIU) from BFAR and the OCT-TWG, regional NSAP leaders, and the National Consultant were organized to launch a regional rapid data collection program.



Table I. Chronology of events and milestones in crafting the Philippine Octopus NMFP.

| Date | Activities | Milestones |
|--|--|--|
| 20-23 Nov 2018 | Octopus Review and Management Planning Workshop (Zamboanga City) | Draft Octopus Action Plan |
| 12 Nov 2019 | Presentation of Inception Report to Oct TWG | Acceptance of Inception Report |
| 13 Nov 2019 | Data Review and Integration workshop | Identified data gaps |
| 3-23 June 2020 | Virtual planning meetings to obtain regional data on Oct production & other relevant information (UNDP-GMC, BFAR PIU, NSAP Project Leaders, PCPEAI, & Nat'l Consultant) | Designed KII survey instruments for gatherers, consolidators, & processors |
| July-August 2020 | Gathering of regional/ local fisheries and trade statistics; data management (c/o NSAP PLs of Regions 4B, 5, 6, 9/BARMM, Caraga) | Preliminary database on Oct catch, CPUE, revenues, LEK, & perceptions |
| Aug-Sept 2020 | Preparation of Root Cause Analysis (RCA) | Root Cause Analysis report |
| 23 Sept 2020 | Presentation of Draft RCA to the Octopus TWG | Approval of Draft RCA Report |
| 19 Jan 2021 | Presentation of Final RCA Report to TWG | Approval of Final RCA Report |
| Feb-March 2021 | Virtual planning meetings for conduct of national multistakeholder consultation and planning workshops (UNDP-GMC, BFAR PIU, NSAP Project Leaders, PCPEAI, SFP & Nat'l Project Consultant) | Agreement on virtual cluster MCP workshops |
| 13-14 April 2021 15-16 April 2021 20-21 April 2021 | Virtual Multistakeholder Consultation and Planning Workshops in three clusters: <ul style="list-style-type: none"> • Mindanao Cluster • Luzon Cluster • Visayas Cluster | Three-cluster MCP workshop outputs |
| May 2021 | Consolidation of MCP workshop output and Drafting of Octopus National Management Framework Plan (NMFP) | Draft OCT-NMFP |
| 18 August 2021 | Workshop on Presentation & Review of First Draft NMFP (UNDP-GMC, BFAR PIU, NSAP Project Leaders, & Nat'l Project Consultant) | Comments/suggestions on revising Draft OCT-NMFP |

Table 2. Continued.

| Date | Activities | Milestones |
|---------------|---|---|
| 1 Sept 2021 | Presentation of Revised Draft NMFP to the OCT-TWG | Comments/suggestions on revising Draft OCT-NMFP and approval by OCT-TWG |
| 2 Sept 2021 | Revision of Draft NMFP based on comments from TWG | Revised Draft NMFP submitted to BFAR-CO |
| 8-9 Sept 2021 | Revision of Draft NMFP to incorporate comments by the BFAR-Legal Division | Improved Draft NMFP submitted to BFAR-CO |
| 20 Sept 2021 | Presentation of the Draft OCT-NMFP during the Executive Briefing with the Undersecretary for Fisheries/BFAR National Director | Briefing of the draft propose Octopus plan |
| 23 Sept 2021 | Presentation of the draft Oct-NMP to the 2021 3rd Quarter NFARMC meeting | |

Key Informant Interview (KII) schedules were designed to obtain data on fisheries production, trade, local ecological knowledge (LEK) and industry perceptions on the state of Philippine octopus fisheries from the various regions using separate KII instruments for octopus gatherers, consolidators (octopus buyers or middlemen), and processors/exporters. Under a very limited budget the GMC-PHI group implemented this alternative data gathering strategy between July and August 2020 carried out by the NSAP teams in the regions with active octopus fisheries. Electronic files of the KII instrument for the processors/exporters were emailed to the members of PCPEAI and to other processing companies in Region 7.

- c) **Conduct of Root Cause Analysis** which consolidates the management issues in the octopus industry, their root causes, and consequences or impacts. Data from various sources were used to describe the state of the problem in the octopus fishery and trade. The virtual meeting platform was also used in reviewing draft RCA report by the PIU and the Technical Working Group on the OCT commodity.
- d) **Virtual Multistakeholder Planning Workshops** conducted in three clusters covering Luzon, Visayas, and Mindanao and which brought together stakeholders from active octopus-producing regions. This activity provided the platform for obtaining inputs to the crafting of the OCT-NMFP.

The formulation of the OCT-NMFP likewise adopted the virtual platform as an alternative strategy to optimize participation of various sectors. Through a series of online meetings the GMC-PHI team, BFAR-PIU, and NSAP Project Leaders jointly organized the virtual Multistakeholder Consultation Workshop (MCW) to bring together representatives from the three sectors: gatherers, consolidators, and

processors/exporters, key regional and provincial BFAR staff, NFRDI-NSAP staff, LGU staff, and representatives from academic institutions and non-government organizations (NGOs). The MCW was conducted in three clusters (namely, Luzon, Visayas, and Mindanao) in a series of two-day planning workshops in April 2021 which were widely participated in by the target sectors. Each cluster covered the following main activities:

- a) Overview of the GMC-PHI program
- b) Presentation of the Root Cause Analysis Report
- c) Presentation of output of the initial OCT Planning Workshop in 2018
- d) Two sets of break-out workshops, namely:
 - 1) Management Issues across the Ecological Well-being, Human Well-being and Governance contexts
 - 2) Formulation of Management Goals, Objectives, and Recommended Actions

The three cluster consultations had been well-participated by various sectors along the octopus fishery supply chain, representing octopus gatherers, consolidators, and processors/exporters and key LGU staff from areas with an active octopus fishery. The cluster consultations were also attended by representatives from the academe, NGOs, BFAR technical staff, provincial fisheries officers (PFOs), NFRDI, and NSAP project staff. The virtual workshops and break-out sessions were ably facilitated by NSAP project leaders and their staff, BFAR-PIU staff, and academe representatives with the national consultant providing overall facilitation.

- e) **Octopus National Management Framework Plan** was drafted by consolidating data obtained from various sources, the results of the Root Cause Analysis, and the outputs of the cluster multistakeholder planning workshops.

The EAFM Planning Process

The development of the National Management Framework Plan for the Octopus Commodity adopted the ecosystem approach to fisheries management (EAFM) framework (**Fig. 2**) which also combined the outputs of Root Cause Analysis and the Multistakeholder Consultation Workshops held across the Luzon, Visayas, and Mindanao clusters. Despite the limitations imposed by the COVID-19 pandemic that precluded travel and physical workshops, overall, the planning

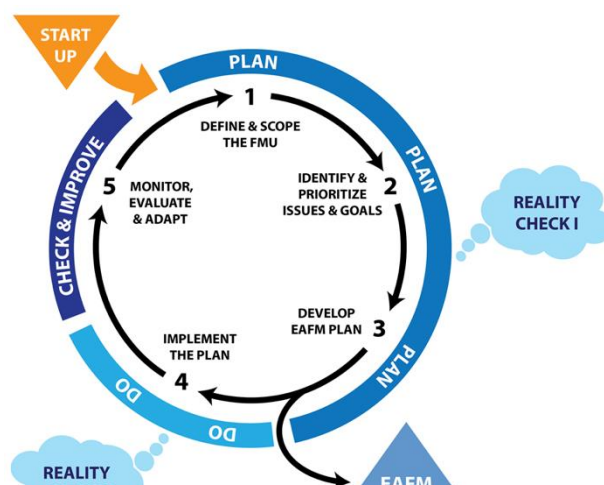


Figure 2. The 5-step EAFM process (Source: Staples et al. 2014).

process had been participatory, transparent, and based on the best available information.

3.3 Octopus National Management Framework

The crafting of the OCT-NMFP was fraught with many challenges, such as data deficiency and the outbreak of a global pandemic that necessitated taking alternative actions (**Table 2**). Formulating a comprehensive NAP or NMP was no longer feasible under the present circumstances and the significant delay in project implementation caused by COVID-19. Discussions with the TWG and BFAR-PIU pointed toward preparing a National Management Framework Plan instead. The OCT-NMFP is an abbreviated version of the NMP but still integrates the elements of EAFM as promoted by FAO (Staples et al., 2014) into the planning process.

Table 2. Challenges in formulating the Octopus NMFP and actions taken to address them.

| Issues and Constraints | Actions Taken |
|--|---|
| Data deficiency and inconsistency in Octopus fisheries and trade | <ul style="list-style-type: none"> • Data Integration Workshop • Obtained trade & export data from national databases and industry players (i.e. PCPEAI) • Designed KII survey schedules • NSAP regional teams administered the KII obtain regional data on Oct production & other relevant data |
| COVID-19-imposed lockdowns constrained the following: <ul style="list-style-type: none"> • Conduct of consultation workshops for Root Cause Analysis • Face-to-face multistakeholder planning workshops • Face-to-face meetings to review workshop outputs and the Draft OCT-NMFP | <ul style="list-style-type: none"> • Consolidated data from KII surveys in 6 regions to describe current scenario of octopus fisheries • Writing of RCA report from KII results, other data sources, and identified issues. • Online meetings to review draft RCA report and approval by TWG • Virtual Multistakeholder Consultation and Planning Workshops in three clusters (Luzon, Visayas & Mindanao) • Online workshop to review the draft Oct-NMFP and recommend revisions • Online OCT-TWG meeting to review and approve Draft NMFP • Online and phone-based coordination with UNDP-GMC and BFAR-PIU and Legal Division • Online Executive Briefing with USEC for Fisheries/BFAR National Director |



Planning along the EAFM context is a desirable approach to crafting the OCT-NMFP for the Philippine octopus commodity as it takes into consideration the three pillars of sustainable development, namely: ecological well-being, human well-being, and good governance. This approach takes off from using the best available scientific information from national databases, scientific literature, and data generated through KII and the detailed stock analysis conducted by Dr. Roa-Ureta. The EAFM approach ensures that the sustainability, conservation, and management of the OCT resources in the country are well-grounded and that all interventions (e.g., policies, regulations, information, education, research, and development initiatives) address what the OCT industry needs to achieve improved performance and sustainable development.

The EAFM approach also places due importance on the impacts of climate-associated factors on octopus biology and ecology, impacting fisheries production and trade sustainability. A large body of literature on climate and environmental impacts on the biology and fisheries of octopus is available worldwide, although specific studies in the Philippines are rare. Despite its limitations, the OCT Framework Plan can set the direction of the more detailed NAP/NMP that will surely be done even beyond the life of the current GMC-PHI OCT Commodity Platform.



Chapter 3

STATE OF THE PHILIPPINE OCTOPUS FISHERIES AND TRADE

3.1 Overview of Octopus Biology and Resource Distribution

Octopus Biology and Diversity

Octopuses are strictly marine, soft-bodied animals belonging to Class Cephalopoda, a group of large, morphologically and behaviorally complex forms of mollusks, together with squid, cuttlefish, and nautilus (Hall 2018). Like other cephalopods, octopuses are characterized by a prominent (often described as bulbous) head fused to a ring of eight arms (called tentacles) surrounding it. The arms have been formed from what is known as foot in the other mollusks. Octopuses are among the most intelligent creatures of the sea, having a large, complex brain evolved to produce sharp minds for problem-solving. An octopus is more dexterous than a squid in trapping prey in a tight grip through powerful suckers on their eight arms, and also uses its arms for a variety of tasks including walking on the reef and handling objects. Octopuses are often called ‘expert escape artists’ due to their uncanny ability to escape various confinements. Like squid and cuttlefish, octopuses have highly developed eyesight which allows them to choose their prey. Octopuses have evolved excellent skills and adaptations to increase their survival in their habitats. They change the color and texture of its skin in an instant to blend into their environment as a disguise (or camouflage) in order to escape predators or stalk prey. Some are also excellent mimics of other animals or even seaweed. Octopuses are cryptic animals, preferring to live in caves and sheltered areas within the coral reefs, and are active predators that feed on crabs, clams, snails, small fishes, and even other octopuses (Gillespie et al. 1998; Mather and Anderson 1998).

Little is known on the reproductive biology of exploited species of Philippine octopus due to scarcity of detailed research work on stock assessment. General information on octopuses describe them as short-lived with a life span of 1-2 years, attaining sexual maturity in less than a year (Herwig et al. 2012). They have separate male and female individuals and reproduce through a single spawning event. Females are highly fecund, producing a range of 27,000–375,000 eggs per cluster (Guard 2003) often in a protracted, batch spawning pattern. Female octopuses are highly protective of their young, releasing eggs that are attached to substrate or on the cave walls and ceilings and guarding them until hatching. As a rule female octopuses do not eat during the guarding period, losing about one-third of its body weight, and die after the eggs are hatched (https://animaldiversity.org/accounts/Octopus_vulgaris/). During the brooding period the octopus mother is severely weakened that it is easy prey to octopus fishers. Hatched larvae have about 30 days of planktonic habit (Van Heukelem 1973). A study on *Octopus cyanea* in Lanuza Bay (Campos 2016b) observed that the recruits start appearing in the catches 4-5 months after the spawning season, which takes place in March-April and October-November. Observed size and weight at maturity for female *O. cyanea* is 9.1 cm



DML (dorsal mantle length) and 450g while for male is 12.5 cm DML at 950g. A few initiatives in aquaculture of octopus had been tried in the last decade (Jereb et al. 2014), such as of *Octopus vulgaris* in Spain, *Enteroctopus megalocyathus* in Chile, *O. maya* in Mexico, and up to eight species in China. However, few have reached commercial operation primarily due to high mortality rates and cannibalism, large investments on high quality feed, and difficulty in raising the earliest life stages. Recent octopus mariculture projects by private companies in Japan had reported optimistic production statistics (CiWF, 2021).

There are roughly 300 species of octopus in the world’s oceans and more species are being discovered (Hall 2018). A list compiled by Campos (2018) shows that at least nine species of octopus reported from various areas in the Philippines (**Table 3**).

Table 3. List of octopus species found in Philippine waters (Source: Campos, 2018).

| Species | Common Name* | Location Found | References |
|---|---|------------------------------------|---|
| <i>Octopus vulgaris</i> <i>Callistoctopus macropus</i> | Common octopus White-spotted octopus# | Batanes islands Cagayan Valley | Morales et al., 2016; Ayson and Encarnacion, 2008 |
| <i>Cistopus sp</i> | (no common name for generic names) | Manila | Naguit et al., 2014 |
| <i>Octopus cyanea</i> | Day octopus | Culasi, Antique Surigao del Sur | Campos et al., 2016a Campos et al., 2016b |
| <i>Cistopus indicus</i> <i>Abdopus aculeatus</i> <i>Callistoctopus nocturnus</i> <i>C. ornatus</i> <i>C. luteus</i> | Old woman octopus Prickly octopus Philippine octopus White-striped octopus Small-spot octopus | No data on location | Yau, 2011 |

*Note: All common names have been verified in SeaLifeBase (www.sealifebase.org)

#Occurrence of this species in the Philippines is not shown on SeaLifeBase Aquamaps and in Jereb et al. 2014.

Labe (2018) and Monterey Bay Aquarium Seafood Watch report (2017) reported only eight species of octopus found in fishery catches, which include *Ampioctopus (Octopus) aegina*, often called “baby octopus” but is listed as Sandbird Octopus in SeaLifeBase (<https://www.sealifebase.ca/>). The updated *FAO Species Catalogue for Fishery Purposes No. 4, Vol. 3* (Jereb et al. 2014) provides additional information on octopus species reported from the Philippines and provides maps showing the geographical distribution of each species. According to Jereb et al. (2014), many octopus species collected by fishers are misidentified as *A. aegina*. The Philippine octopus *Callistoctopus nocturnus* is found in almost the entire archipelago. This species is a possible endemic and to date is known only from the Philippines. *Cistopus indicus*, on the other hand, has a more restricted distribution in southern Mindanao to the Sulu and Tawi-Tawi islands.

Five other species not listed in Table 3 are reported by Jereb et al. (2014) to occur in the Philippines, bringing the number of octopus species to 15. Two of these are important food species, *A. exannulatus* (Plain-spot Octopus) and *A. marginatus* (Veined Octopus). In addition,



certain species with no interest to global fisheries but are collected for export in the aquarium trade are *Wunderpus photogenicus* (Wunderpus), *Hapalochlaena lunulata* (Greater Blue-ring Octopus) and *Thaumoctopus mimicus* (Mimic Octopus). The blue-ring octopuses have a powerful neurotoxin they use for immobilizing prey and as defense against their attackers. The mimic octopus is so named for its extraordinary ability for camouflage or blending with its surroundings by imitating the substratum, other animals, and seaweed in the coral reef ecosystem (Hanlon et al. 2008). The wunderpus is often mistaken for the mimic octopus and is a popular aquarium species. It is possible that more species occur in the Philippines that had not been reported or identified. The limited information of species diversity of Philippine octopus resources and reports of misidentification among collected specimens underscore the need for government and researchers to collaborate in a comprehensive assessment to support fisheries management.

Octopus Fishing Grounds

Despite its small contribution to the Philippine fisheries production, octopus gathering occurs in almost all parts of the archipelago (**Fig. 3**). Available information from NSAP reports, KII survey, and the industry indicate that there are at least five major octopus fishing grounds located in six Fisheries Management Areas (FMAs) whose consolidated harvests support the octopus export trade. These are the Sulu and Tawi-Tawi Islands in the Bangsamoro Autonomous Region for Muslim Mindanao (BARMM), Zamboanga Peninsula, Palawan province, Bicol region and the Siargao-Dinagat Islands and Surigao del Sur (**Table 4**). Octopus fishing is also carried out in other regions but these are considered minor fishing areas and mainly support domestic markets, except for Cebu which is an important trading center and export hub for products from neighboring provinces. The map in Fig. 3 also incorporates fishing areas reported by Campos (2018).

Table 4. Common octopus fishing grounds in the Philippines compiled from KII surveys, input from the NSAP Project, and other sources.

| Provinces | Region | Water Body (Sea, Gulf or Bay) | Fisheries Management Area |
|--|-------------------------|------------------------------------|------------------------------|
| Sulu and Tawi-Tawi* | BARMM | | FMA-4 |
| Zamboanga City and Zamboanga del Sur* | 9 (Zamboanga Peninsula) | Eastern Sulu Sea; Moro Gulf | FMA-4 |
| Palawan* | 4B (MIMAROPA) | West Philippine Sea and Sulu Sea | FMA-5 |
| Siargao-Dinagat* Islands; Surigao del Sur* | 13 (Caraga) | Leyte Gulf Lanuza Bay | FMA-8; FMA-2 |
| Albay, Sorsogon, and Masbate* | 5 (Bicol region) | East Philippine Sea; Lagonoy Gulf, | FMA-1; FMA-7 |
| Batanes and Cagayan provinces | 2 (Cagayan Valley) | North Philippine Sea | FMA-1 |
| Eastern Samar and Southern Leyte | 8 (Eastern Visayas) | East Philippine Sea; Leyte Gulf | FMA-8; FMA-2 |
| Guimaras and Iloilo | 6 (Western Visayas) | Panay Gulf; Visayan Sea | FMA-11 |
| Cebu | 7 (Central Visayas) | Visayan Sea | FMA-10 |

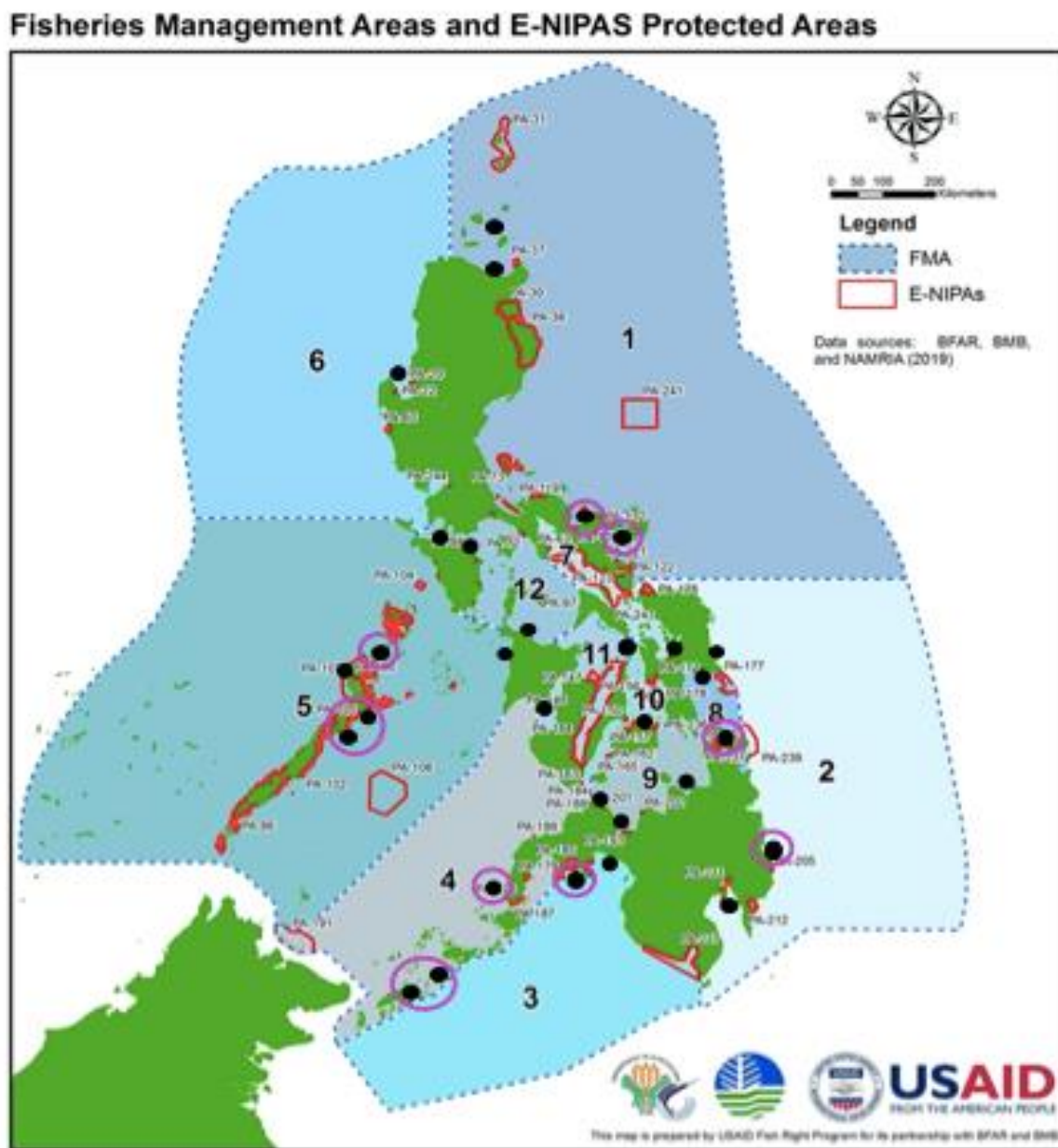


Figure 3. Map of fisheries management areas (FMAs 1-12) overlaid on map of e-NIPAS sites (PAs) in the Philippines. Black dots show the location of octopus fishing grounds: Encircled dots indicate major fishing areas for octopus that supply the export trade (i.e. BARMM, Zamboanga Peninsula, Caraga, MIMAROPA and Bicol region).



3.2 Nature of Exploitation

The exploitation of octopus in the Philippines is carried out through small-scale or artisanal fisheries around coral reefs using a variety of catch methods involving spears, jiggers, vertical lines or traps, and also by handpicking or gleaning (Campos 2018). Spear fishing is carried out using either simple hand spear or with compressor gun and is potentially destructive on the reef. While in many countries octopus are caught by trawlers, in the Philippines this fishing method is banned as it is considered destructive, although there are still sporadic reports on use of small otter trawl to scour the soft bottom for octopus (Jereb et al. 2014). Majority of the gear types used in octopus fisheries are considered sustainable, however, there are observations of unsustainable methods of gathering octopus in certain areas such as the use of chlorine derivatives (e.g. sodium hypochlorite) and mild poisons to weaken the octopus for easy capture.

There is virtually no regulation of fishing effort (= number of fishers), catching methods and sizes, and many octopus fishers collect juveniles that are consumed by the household or sold in rural markets. Most of the fishers' catches are sold to processing companies through small traders or consolidators and which are exported as fresh/chilled, frozen, or cooked octopus. Processing companies and exporters, however, apply some form of size regulation but without detailed knowledge of the reproductive biology of the organisms there is no clear guideline on the appropriate size to gather. Octopus are landed by small-scale fishers that will bring any valuable catch to local middlemen or consolidators in buying stations that trade an assortment of species for export purposes. An undetermined portion of the octopus catch is also sold in the Philippines' domestic markets for local consumption (Monterey Bay Aquarium, 2017). Some consolidators who attended the cluster multistakeholder consultations in April 2021 declared that they transport fresh/chilled octopus to urban centers (e.g., Navotas, Manila, Cavite, and Cebu), while octopus catches in far-flung areas (e.g., Batanes islands) are consumed locally.

3.3 State of Octopus Production and Trade

Octopus Production and International Trade

Data on octopus production in the Philippines are very limited and no detailed information on local and regional catches, gear type, or fishing effort is available in published literature nor in government databases. Octopus production (or landed catch) data are not presented in either the annual BFAR Fishery Profiles or the Philippine Statistics Authority (PSA) online (<https://openstat.psa.gov.ph/>) database, but data on export are available from both BFAR and the PSA's Trade Statistics Division. Long-term production data, however, were obtained from the FAO FishStatJ database (FAO 2021), which show that the Philippines' octopus production since 1970 had undergone large fluctuations with a generally declining trend toward 2019 (**Fig. 4**). Export data from FAO's FishStatJ plotted on the same timeline show an increasing trend in octopus export until 2001 but went on a progressive decline then large fluctuations between 2011 and 2018. An apparent data anomaly between production and export of

octopus is seen on Fig. 4, where exports between 1997-2011 have higher volumes than production, suggesting either data inaccuracies or entry of illegal and undocumented products into processing plants (Monterey Bay Aquarium 2017).

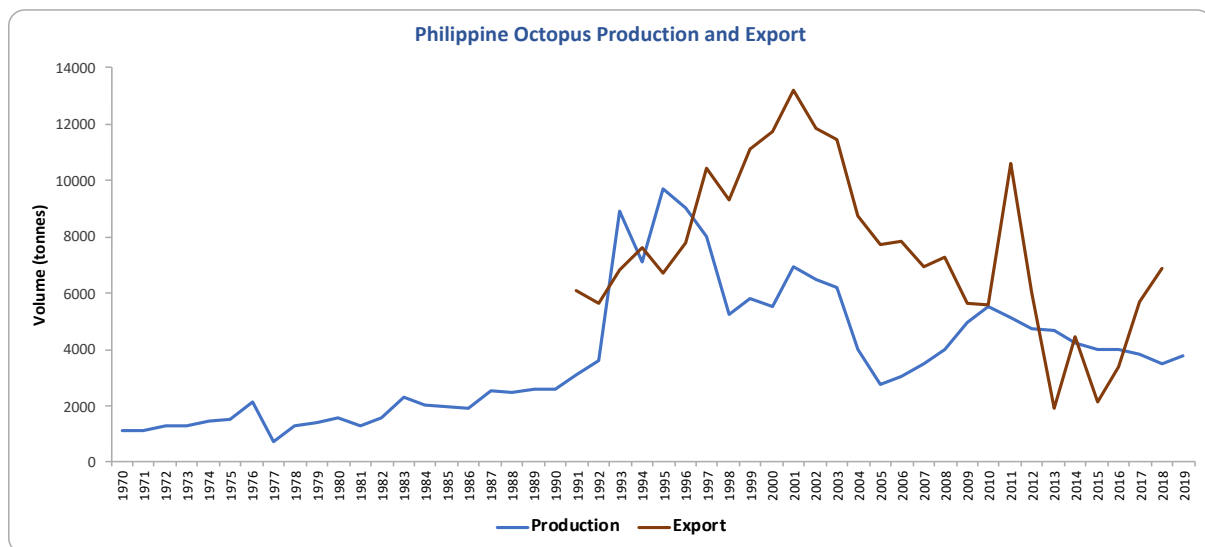


Figure 4. Long-term production and export trends in Philippine octopus (1970-2019). (Source: FAO FishStatJ Release: 4.01.4)

Limited data on octopus production by region were obtained from 2011-2017 records of the Fisheries Statistics Division of the Philippine Statistics Authority (retrieved on June 1, 2018). These data show that the largest catch volume (48%) in 2017 came from the Bangsamoro Autonomous Region for Muslim Mindanao (BARMM), most probably from Tawi-Tawi province where octopus is known to be abundant (Fig. 5a). Octopus products are primarily landed in Zamboanga City, but for some reason no production data were recorded from Region 9 in 2014-2017. Octopus production was also high in Region IV-B or MIMAROPA (35%), mainly contributed by the province of Palawan. Octopus exports (Fig. 5b) also show a declining trend in octopus landings from 2012 (8,843 MT) to 2017 (6,306 MT).

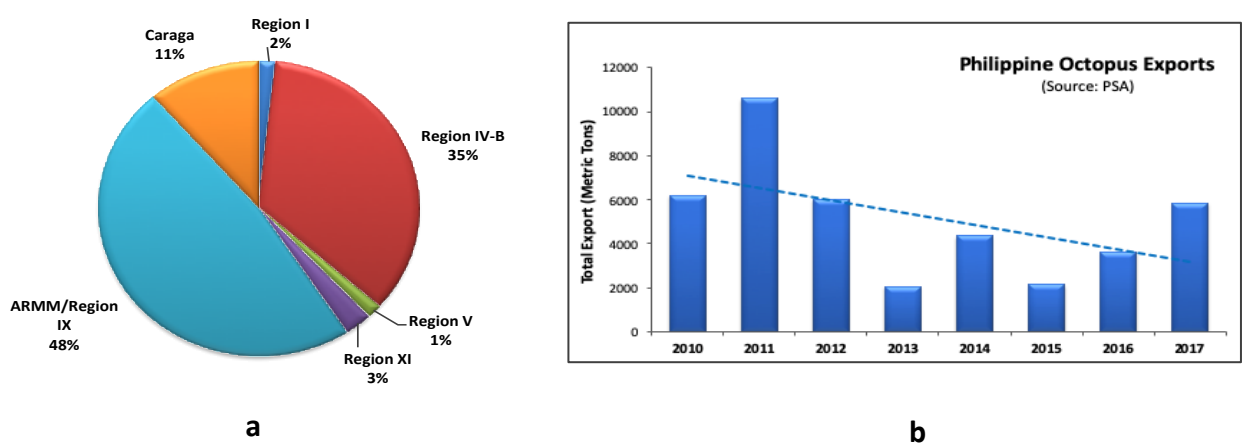


Figure 5. Octopus production by region in 2017 (a) and annual export of Philippine octopus between 2010-2017 (b) showing a generally decreasing trend (Source: Philippine Statistics Authority - Trade Statistics Division; June 1, 2018).

Time-series data from BFAR also show that octopus exports and value (USD) since 2001 had been generally declining, with a few “spikes” in 2011 and in 2017 (**Fig. 6a**). Data from the 2019 Philippine Fishery Profile of (BFAR 2019) show that octopus export represents only about 2.5% of the Philippines’ seafood export (**Fig. 6b**).

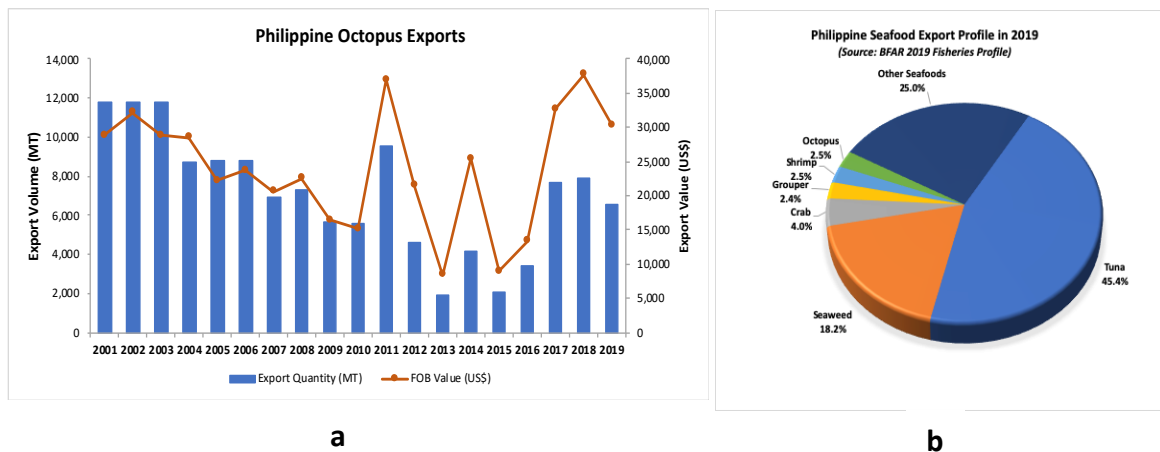


Figure 6. Annual trends in octopus export since 2001 (a) and profile of seafood exports from the Philippines in 2019 (b) (Source: BFAR Philippine Fisheries Profiles 2001-2019).

The top country destinations of Philippine octopus is the USA which exported 59% of this marine product in 2017 (**Fig. 7**), while Asian countries such as South Korea, Vietnam, and Japan received 26% of octopus from the Philippines. Other countries including Canada and the European Union get the remainder of the Philippines’ octopus export (PSA 2018).

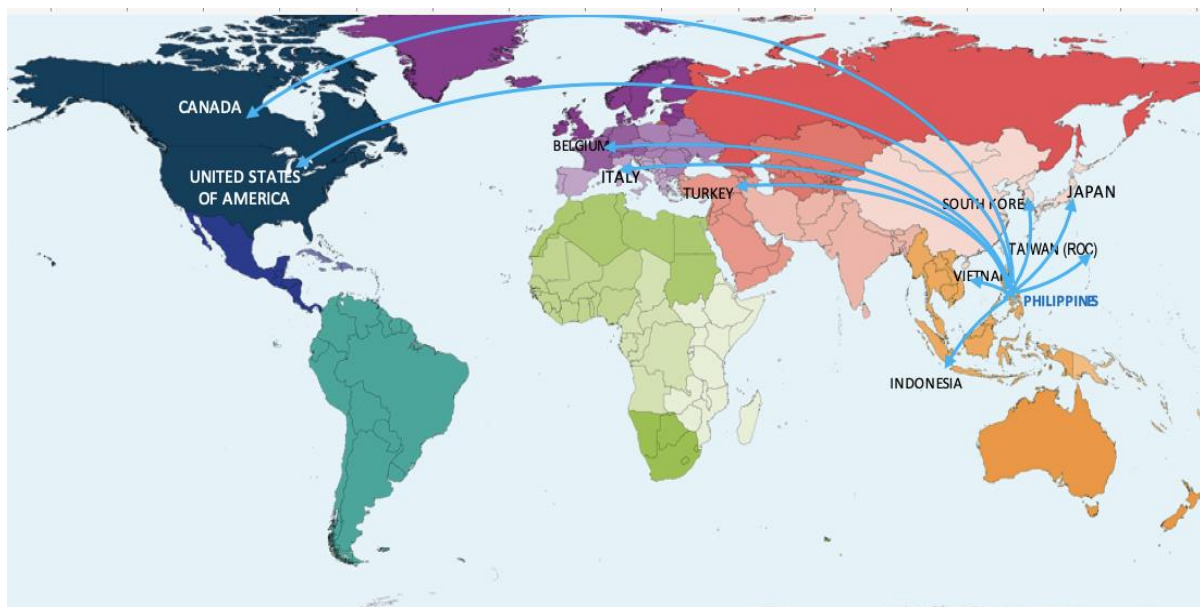


Figure 7. Supply map of octopus from the Philippines to top ten exporting nations drawn based on 2017 octopus export data from the Philippine Statistics Authority-Trade Statistics Division (retrieved June 1, 2018).

Initiatives in obtaining regional and municipal-level fisheries data were undertaken to supplement the limited data on octopus fisheries and trade from existing databases. These include limited landed catch from regional NSAP data, consolidating export data from various regions based on export commodity clearance (ECC) and volume of octopus traded based on local transport permit (LTP) issuances by the Fisheries Inspection and Quarantine Section (FIQS) of BFAR regional offices, and the conduct of key informant interviews (KII) in key regions where active octopus fisheries occur.

Regional NSAP data on octopus fisheries

Data on octopus fisheries from six regional were presented during the Data Integration Workshop held on November 13, 2019 by NSAP project leaders or their representatives covering Region 2 (Cagayan Valley), Region 4B (MIMAROPA), Region 5 (Bicol), Region 6 (Western Visayas), Region 9 (Zamboanga Peninsula), and Region 13 (Caraga). Data on octopus production by region were very limited since this was not a target commodity for fisheries monitoring by the NSAP. Occasionally recorded landed catch between 2014 and 2018 show that the highest catches come from the Zamboanga peninsula and MIMAROPA (**Fig. 8**). Zamboanga City is a major octopus processing and exporting center, thus it is possible that the data from the Zamboanga Peninsula may include landed catches from the BARMM.

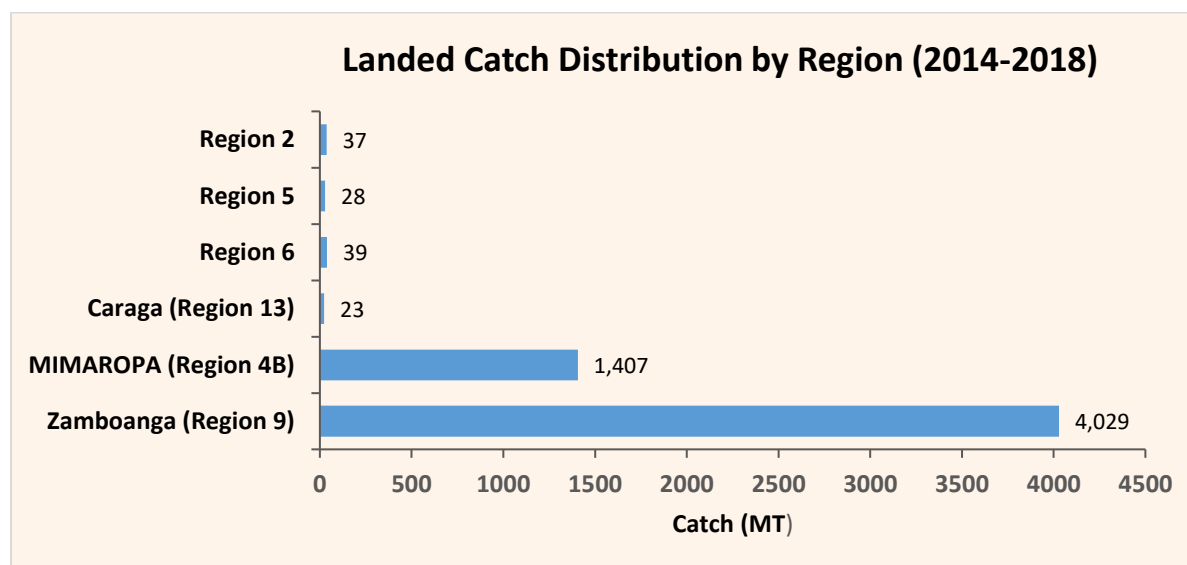


Figure 8. Landed catch data on octopus by region between 2014-2018 (Source: NSAP Regional NSAP data presented during the Data Review and Integration Workshop, November 12, 2019).

Several types of fishing gear or implements are used to catch octopus in the regions, the most dominant of which are octopus jigger (45%) including improvised versions (46%) used in Region 9 (**Fig. 9**). Gillnets dropped over an octopus moving over the reef or sandy bottoms are commonly used while simple handpicking by divers in relatively shallow areas is also an alternative method. At least six octopus species were identified from the landed catches,

however, this identification needs to be validated as some may have been misidentified. The dominant octopus species caught by fishers may be primarily *Octopus cyanea* (Big Blue Octopus), believed to be the dominant species in the Philippines.

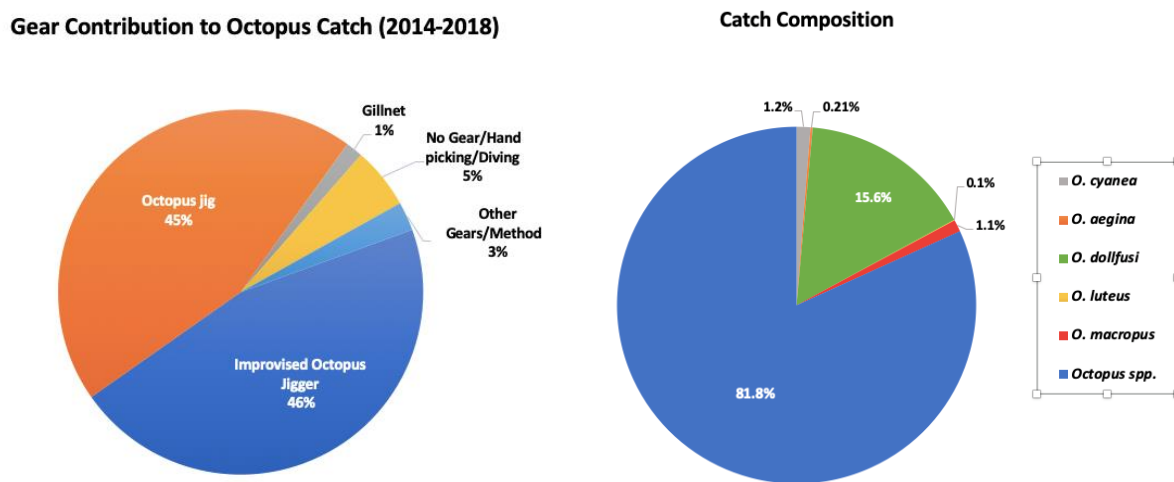


Figure 9. Relative contribution of various gears and methods used in catching octopus (left panel) and proportion of various species (right panel) based on 2014-2018 landed catch data from five regions (Source: Regional NSAP data presented at the Data Review and Integration Workshop).

Regional export data from BFAR-FIQS and BFAR-FIQD

Export commodity clearances (ECC) issued by the Fisheries Inspection and Quarantine Service (FIQS) of regional BFAR offices are another data source for octopus exports at the regional level. The objective of obtaining these data is to augment limited data on octopus production from important gathering grounds of octopus and look at production trends through the years. Unfortunately, only Regions 7 and combined data from 9 and BARMM have time-series ECC data. Other regions (namely, Region 4B, 5, 8 and 13) did not have ECC data but only land transport permit (LTP). An LTP is a document indicating the volume and destination of octopus products and authorizing a trader to transport them by land to airports, shipping ports, or across municipal and provincial boundaries to where the products will be sold to processors and exporters or end up in domestic markets.

Figure 10 shows the volume (MT) and value (in 1000 US\$) of octopus products destined for export from Region 9 which also includes octopus from the BARMM (mainly from Tawi-Tawi) sold to processors in Zamboanga City. Between 2007 and 2019 (over 13 years) various octopus processing and companies in Zamboanga City had exported more than 19,598 mt of fresh, chilled or frozen octopus to various countries, or an average annual export of 1,508 mt. Several processors/exporters are located in Zamboanga City which make Region 9 the top octopus exporter in the Philippines. Much of the octopus brought to Zamboanga City, however, come from Tawi-Tawi islands that are processed there and exported. The export

volume and value of octopus from the Central Visayas (Region 7) from 2010 to 2020 are shown in **Fig. 11**. At an average volume of 471 MT, octopus export from Cebu City is less than a third (31.4%) of the export from Zamboanga. Except for an increase in export in 2011, the trends between the two export hubs vary. Export from Zamboanga dipped in 2016 while peaking in Cebu, and while Zamboanga peaked in 2018, that from Cebu peaked in 2019 mainly due to increased export to the USA and South Korea.

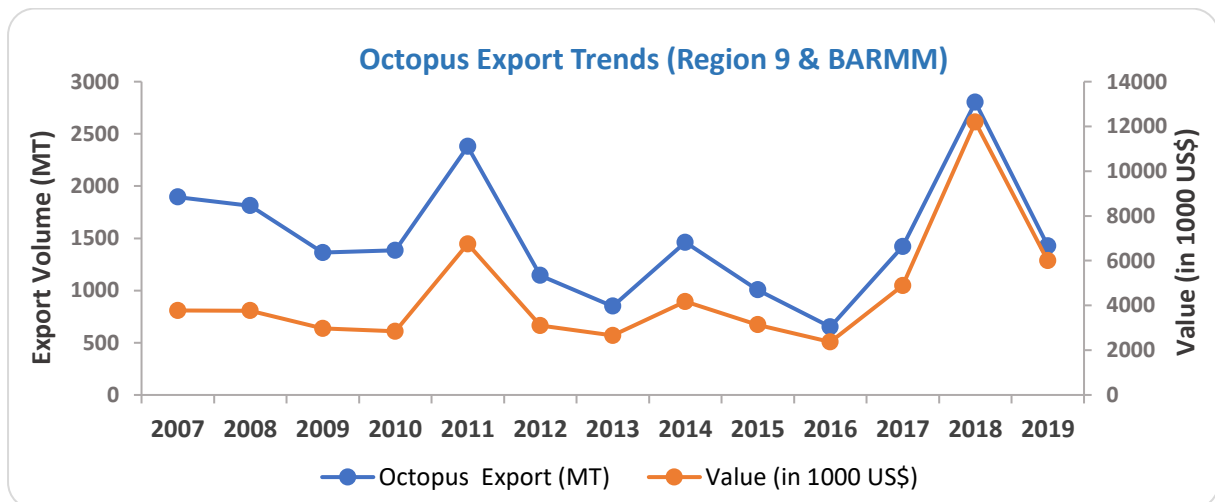


Figure 10. Combined octopus export trends from Region 9 and BARMM for the period 2007-2019. (Source: *Export Commodity Clearance from BFAR 9-FIQS Quarantine Section*).

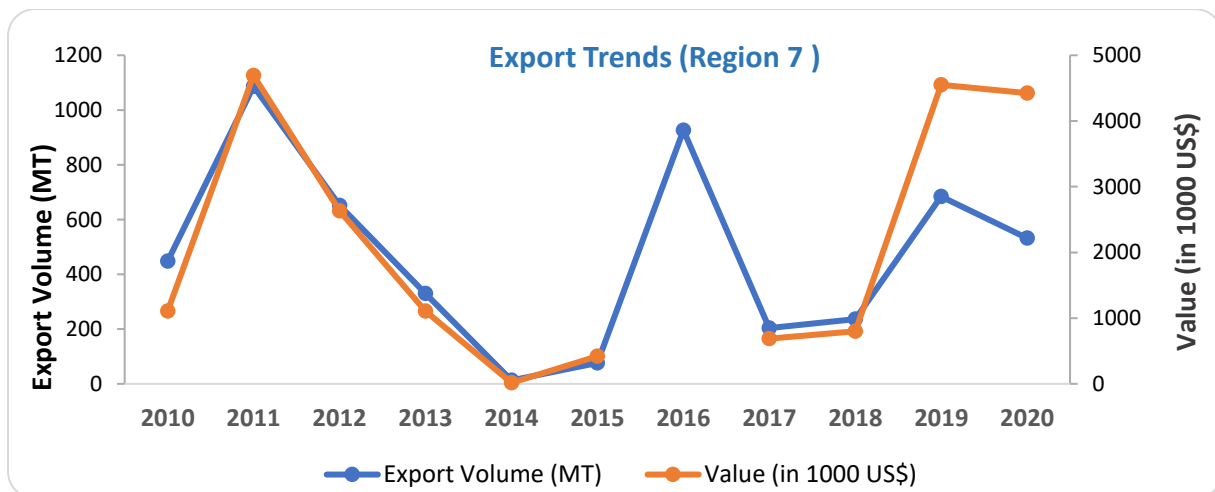


Figure 11. Octopus export trends from Cebu City from 2010-2020. (Source: *Export Commodity Clearance from BFAR 7-FIQS Quarantine Section*).

National export data on octopus obtained from the BFAR-Central Office Fisheries Inspection and Quarantine Division (FIQD) are available only for 2018-2019. In 2018 the country's total octopus export was logged in at 19,070 MT, but this dipped in 2019 at 7,798 MT. In comparison, the aggregate export from Cebu City and Zamboanga City contributed only 15.9% and 27.1% of the national export volume for 2018 and 2019. The value of regional

export, on the other hand, represents higher proportions of the 2018 (32.5%) and 2019 (27.4%) export value (Fig. 12).

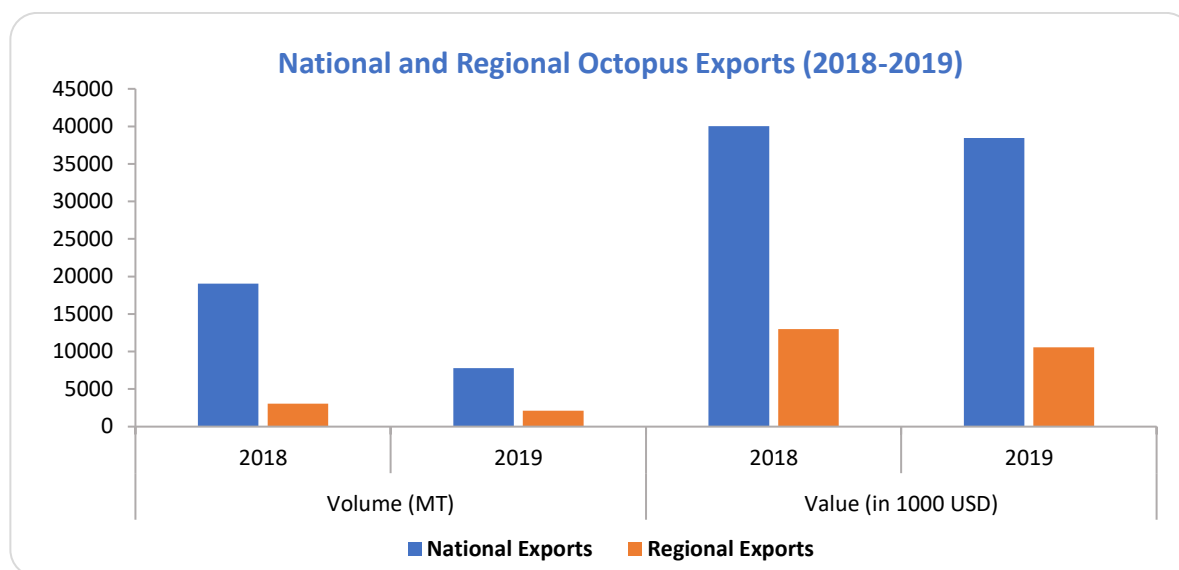


Figure 12. Comparative national and regional octopus exports in 2018 and 2019 (Source: BFAR-FIQD and regional FIQS).

The top country destinations of Philippine octopus for national exports are the USA, South Korea, and Vietnam (Fig. 13). Spain was the second export destination in 2018, but for unknown reasons, no octopus was exported there in 2019 (Fig. 14). The top destinations for regional exports vary slightly from the national export, with Vietnam in the top 2 and China in the top 5 export destinations from Cebu and Zamboanga.

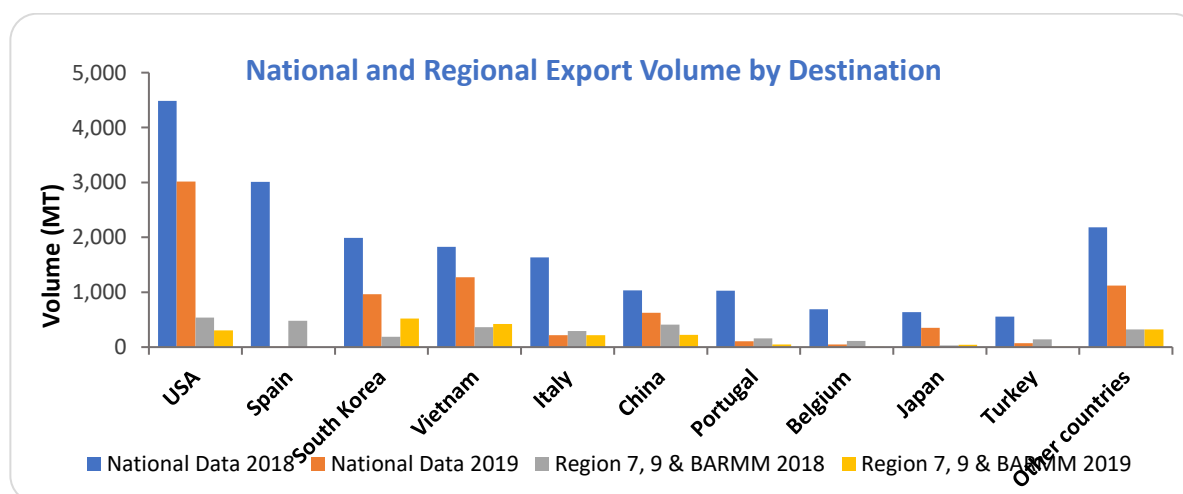


Figure 13. Comparative volume of octopus export from three regions (7, 9 and BARMM) 2010-2020. (Sources: BFAR-FIQD and Region 7, 9 and BARMM-FIQS).

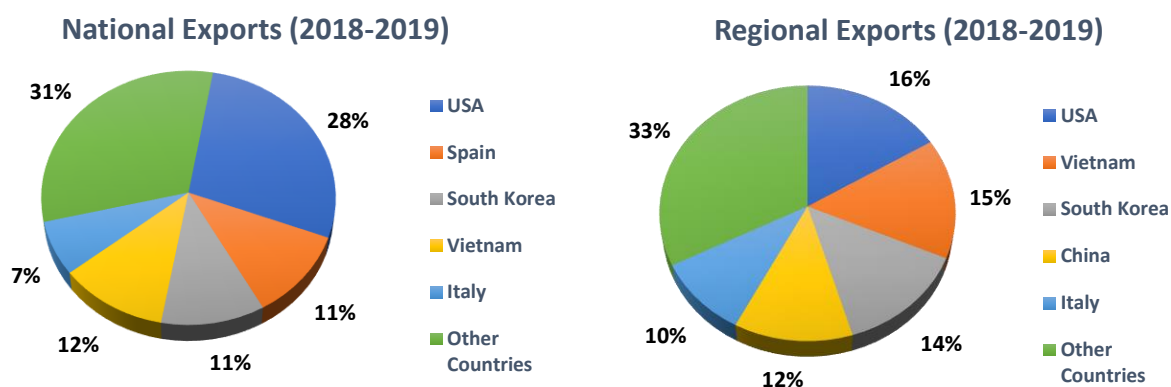


Figure 14. Comparative profile on octopus export destinations in 2018-2019 between national and regional (Region 7, 9 & BARMM) data (Sources: BFAR-FIQD and Region 7 and 9 FIQS).

Regional Data from Land Transport Permits

Data on the volume of octopus transported by land are available only for four major producing regions, namely, Region 4B (MIMAROPA), 5 (Bicol), 8 (Eastern Visayas), and 13 (Caraga) from 2018 to part of 2021 at an annual average of 776 mt/year. The highest volume was transported from MIMAROPA, however, these data are incomplete and cover only the period 2018-2019. Regional BFAR-FIQS issues land transport permits (LTP) to transport octopus and other seafood products from a source to other areas. Some of these products end up as exports, while some are unloaded in domestic markets. There is a need to establish an efficient database system to archive these data to supplement the limited data on octopus production.

Export Data from Industry Partners

Regional data on octopus trade and export from export commodity clearance (ECC) and local transport permits (LTP) sources, however, are also limited and present an incomplete picture of the production and trade of this commodity. Fortunately, time-series data on octopus exports had been shared by 10 processing and exporting companies who are members of *Philippine Cephalopod Processors and Exporters Association, Inc. (PCPEAI)*. These companies have processing plants located in Navotas (Manila), Taguig City, Naga City (Bicol), Puerto Princesa (Palawan), Bago City (Negros Oriental), Mactan Is., Cebu, Surigao City, and Zamboanga City. Ten-year data from PCPEAI members show that octopus exports first peaked in 2011, fluctuated, then increased in 2017 and seemed to stabilize until 2018 (Fig. 15). Low export levels in 2009-2010 are due to limited data from only a few companies located in Zamboanga. Majority of these exports come from Zamboanga City which also consolidates and processes octopus from BARMM, mainly from Tawi-tawi.

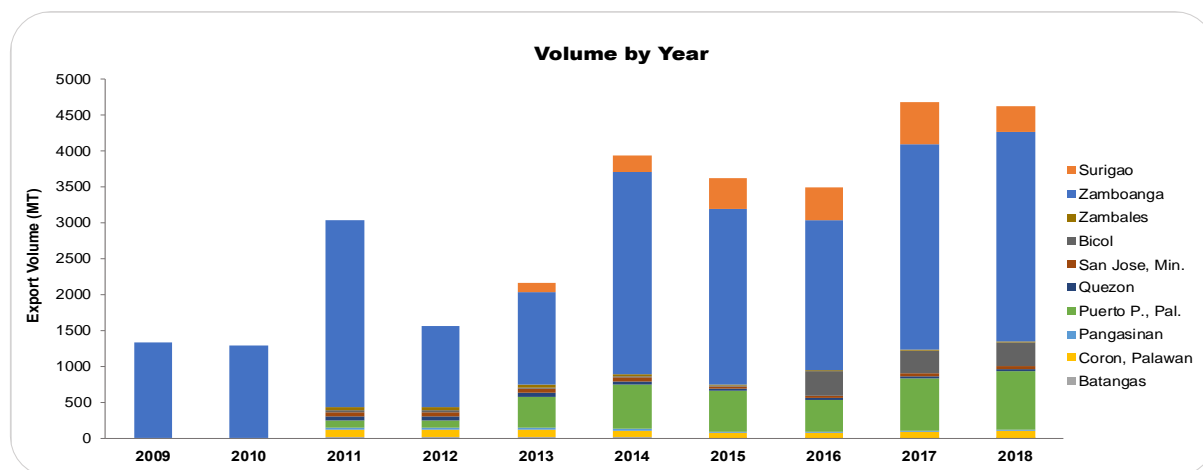


Figure 15. Philippine octopus export volume by year (Source: PCPEAI members).

Local Catch Data and Other Information from Key Informant Surveys

The Key Informant Interviews (KII) conducted simultaneously in six regions across 30 collection sites by the regional BFAR – NSAP teams are the only source of on-the-ground data on the demographics, octopus gathering practices, and estimates of daily catch-per-unit effort (CPUE) of around 218 octopus gatherers and income of 42 consolidators from octopus trading. The activity produced a large set of numeric and qualitative data from six regions, namely, Region 4B (MIMAROPA), Region 5 (Bicol), Region 6 (Visayan Sea), Region 9 (Zamboanga Peninsula), Region 13 (Caraga), and the BARMM covering Tawi-Tawi Islands. Limited data are available from the KII administered to processing and exporting companies.

a. Octopus Gatherers

The following is a summary of data obtained from KII with octopus fishers:

- 1) Some 218 octopus gatherers responded to the KII survey; majority of them are male and only 2 female gatherers were interviewed.
- 2) Age of gatherers range widely from 18-69 years old and spent from 1-52 years in gathering octopus.
- 3) Education of majority of fishers is up to elementary level only, while a few fishers have no formal education at all.
- 4) Fishing is their main livelihood, but dependence on octopus gathering varies across regions: respondents from Region 9, BARMM and Caraga are full-time octopus gatherers while those from Region 4B, 5 and 6 are a mix of part-time and full-time octopus fishers.
- 5) Average daily income from all sources of livelihood range from PHP358-596 but these range widely from low to high, with many earning below PHP200/day.
- 6) Gatherers spend 4-6 days a week in octopus fishing at an average of 5-14 hours/day.



- 7) The main octopus species caught is *Octopus cyanea*, but gatherers from Region 6 catch also *O. aegina* and *O. vulgaris*.
- 8) Octopus gatherers in the six regions recognize peak and lean fishing seasons. CPUE values are rather low, especially during the lean season (1.1-3.2 kg/f/day) but higher during peak seasons (3.3-10.9 kg/f/day). The highest CPUE during the peak season was recorded in Region 9 and 13 and the lowest during the lean months was reported in Region 5. Catch rates of various gears are also variable, from as low as 0.2 kg/f/hr to as high as 3.5 kg/f/hr (**Figure 16**).

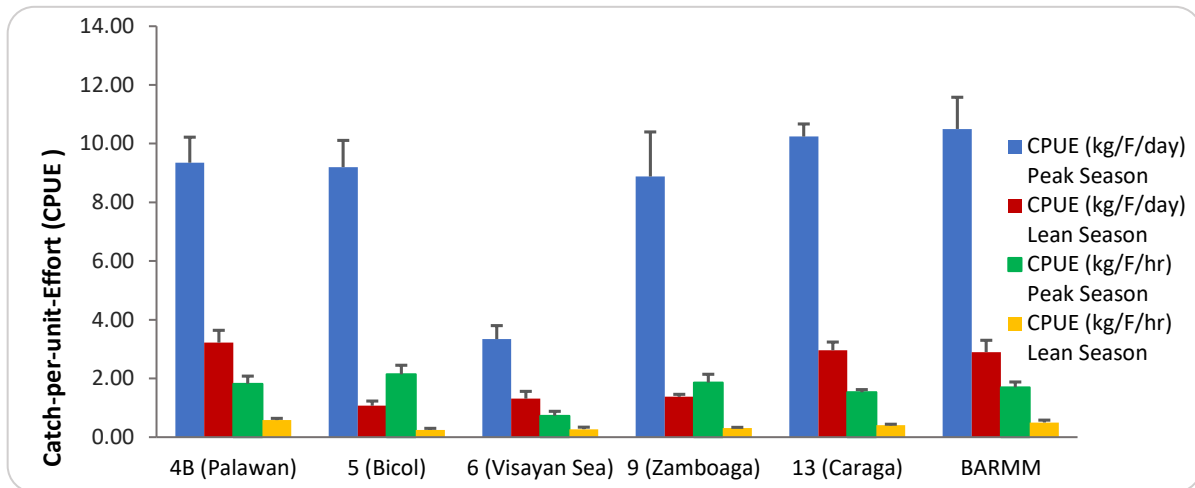


Figure 16. Comparison of average daily and hourly catch rates (CPUE) from octopus gathering across six regions. Vertical bars are standard error of the mean (SE-mean) estimates. On the average octopus fishers earn about PHP244-1,068/day (Peak Season) and PHP112-309/day (Lean Season).

Results show that CPUE (kg/fisher/day) is variable across regions, with the BARMM and Caraga showing the highest average catch rates while Region 6 has the lowest values. Results also showed that octopus fisheries in these reasons exhibit seasonal pulses throughout the year. Estimates of CPUE on an hourly basis are also provided to compare catching efficiency by octopus gatherers in the six regions.

- 9) Most octopus are sold as fresh/chilled and whole to consolidators, very rarely to neighbors and the fish market.
- 10) Estimates of weekly gross income from octopus gathering is between PHPI,172-4,270 during the peak season to as low as PHP561-1,543 during the lean season. These values divided by the median effort of 5 fishing days a week translates to PHP244-1,068/day (Peak Season) and PHPI 12-309/day (Lean Season).

These data demonstrate that while a few gatherers might earn good incomes from this resource, majority of octopus fishers earn below what they need to support their families each day. Estimating the total octopus fisheries production is difficult to do as no data on the total number of octopus gatherers have been compiled for the six regions.



b. *Octopus Consolidators*

The KII survey also provided data from 42 consolidators across six regions (RCA Report 2021). These are the main observations:

- 1) Ages of consolidators range between 20-63 year old and most of them are male (64%)
- 2) Some had been buying and trading octopus for up to 30 years while a few have just entered the business.
- 3) Each region varies in the number of “suki” (or regular gatherers), overall from 3-35 gatherers per consolidator, but certain consolidators buy from several other fishers especially during the peak season.
- 4) Peak months of octopus trade vary across regions; Region 4B – March to October; Region 5 – February to August; Region 6 – March to August; Region 13 – March to June. Other regions did not identify peak or lean seasons.
- 5) Volume bought per week is highly variable across regions:
 - Regions 4B and BARMM consolidate the largest volumes at 200 kg to 20 mt/week
 - Regions 5, 6, 9 and Caraga between 5-1,500 kg/wk. even during the peak season
- 6) Larger volumes of octopus trading occurs in areas where exporters have processing plants (i.e. MIMAROPA and Caraga); the bulk of BARMM’s production is brought to processors in Zamboanga City.
- 7) Likewise the declared gross incomes of consolidators are highest in Caraga, Region 4B, and BARMM.

c. *Processors and Exporters*

Although not listed in the top 30 fishery products in the Philippine Statistics Authority database, octopus is one of top 10 exports of aquatic/marine products of the Philippines (BFAR 2019). The KII questionnaires were sent to all (15) members of the Philippine Cephalopod Processors and Exporters Association, Inc. (PCPEAI), and also to non-member processing and exporting companies based in Cebu City. PCPEAI is a group of companies that had been exporting octopus to the USA, Europe, Canada and other countries in Asia that is now an industry partner of BFAR and the UNDP-GMC Project. Six PCPEAI members and four companies in Cebu City responded to the KII survey.

Data from responses to the KII survey showed that ten processing and exporting companies exported some 5,773 metric tons in 2019 to nine countries and the European Union in 2019, earning gross revenues of PHP1.149 Billion. This amount is, of course, an underestimate as about half of the processors/exporters are not represented in the survey. From the available data, majority of the octopus is exported to the USA, South Korea, Canada, and European Union. A few companies also export to Vietnam, China, Portugal, Croatia, Italy and Spain.

Stock Assessment Using Available Catch Data

Fish stock assessment is a powerful tool in obtaining vital information on the state of a fishery toward developing a science-based management plan for the resource. Along this objective



the UNDP-GMC project through the facilitation of the Sustainable Fisheries Partnership (SPF) engaged Dr. Ruben Roa-Ureta, an expert in statistical modeling, to conduct a fish stock analysis of data-limited Philippine octopus fisheries. Roa-Ureta (2020) used time-series export data from the FAO FishStat, the Philippine Statistics Authority (PSA) and BFAR, supplemented by export data from processing companies (courtesy of PCPEAI). Roa-Ureta conducted an analysis using the CMSY method of Froese et al. (2017), by far the best analytic option to describe the state of certain fisheries when only catch data are available. He found that both data from PCPEAI (which represents over 90% of all octopus landings purchased from fishers) and the BFARs concatenated (or linked) quite well with FAO's time-series data.

Analysis using the available data performed at the regional level indicated that the octopus stocks in four regions analyzed (Region 4B, Region 5, Region 9 + BARMM, and Region 13) have been exploited in biologically sustainable fashion up to 2018 (Roa-Ureta, 2020), but is approaching the upper limit of exploitation (i.e., maximum sustainable yield or MSY) in the next three years (e.g., by 2021). On the other hand, octopus stocks in Region 13 might already be at the alert level as exploitation rates are too close to MSY. Results of Roa-Ureta's analysis of the octopus fishery tends to show that octopus stocks are highly resilient to interannual variations; however, he advised that given so many unknowns about the fisheries, the Philippine government should take a precautionary approach and protect habitat integrity, regulate fishing effort to avoid overfishing, and implement a more comprehensive monitoring program.

Despite the obvious data limitations as discussed by the author, Roa-Ureta's preliminary analysis using the CMSY model provides resource managers an appreciation of what might be the status of octopus stocks in the Philippines. Based on these preliminary analyses, Roa-Ureta (2020) suggests the following management recommendations, drawn exclusively in connection with the biological condition of octopus stocks in the regions and nationally:

1. Initiate a permanent program to collect, validate, and digitally store effort data for the octopus fishery.
2. Improve the collection, validation and digital storage of landings data for the octopus fishery.
3. Considering the rate of increase in recent landings (to 2018) from Regions 4B, 5, 9 + BARMM, 13 and at the national level, and their proximity to the estimated values of maximum sustainable yield (MSY), there is need to establish a programme to slow down the increase in landings and stabilize them pending further management, such as focused research using improved data and more robust stock assessment methods.
4. Given the apparent inconsistencies among the various sources of data that could be used to describe the landings (and thus the catches) of octopus in the Philippines, the various data sources should be re-interrogated and re-analyzed in order to develop one or more catch histories that are likely to be representative of what was actually taken.



3.4 Management Concerns in the Philippine Octopus Fisheries

Potentially Destructive Fishing Methods

Octopus fisheries have been promoted as ecologically sustainable due to the low-impact fishing techniques (e.g. baited or non-baited traps, octopuses historically rated higher on seafood sustainability indices than other marine seafood resources (Jereb et al., 2014). However, more recent concerns about overfishing and the environmental impacts of trawl harvests have lowered the rating of octopuses with some conservation agencies (e.g., Seafood Watch, Monterey Bay Aquarium; Environmental Defence Fund, USA; and SeaChoice, Canada).

In the Philippines trawling had been banned in most places, and octopus gathering mostly involves the use of traps, jiggers, and spears. In 2017 the Monterey Bay Aquarium's Seafood Watch program (Monterey Bay Aquarium, 2017) carried out a sustainability assessment of Philippine octopus fisheries using hand implements and vertical lines specifically on the common octopus (*Octopus vulgaris*) and the big blue octopus (*O. cyanea*) was carried out by based on four criteria, namely:

- Impact on target species
- Impact on other (or non-target) species
- Management effectiveness
- Impact on habitat and ecosystem)

Their findings showed that based on the first three criteria, there is high concern (red) with the octopus fisheries in the Philippines, particularly with possible overfishing due to lack of effort control and the rather indiscriminate practice of fishing on non-target species. There was a low (green) to moderate (yellow) concern as regards the fourth criterion since vertical lines and hand implements cause minimum destruction on the reef and sandy habitats. The overall recommendation of Seafood Watch, however, was to “avoid” buying Philippine octopus until a comprehensive fisheries management program was in place.

Presently, the octopus fishery in the country is not properly managed. Based on perceptions by various stakeholders in the fishery, issues of overfishing, use of destructive fishing gears in some fishing areas, and the lack of focused management interventions are threatening the viability of this important commodity. The recommendation from the SeaFood Watch assessment could diminish the value of Philippine octopus in the export market. These concerns prompt the urgency of implementing management measures in the context of ecosystem approach to fisheries management (EAFM) at both the national and local levels. The lack of reliable production and trade data, however, precludes the formulation of a sound and science-based management plan to sustain the country's octopus fisheries.



Data-deficient Systems

Artisanal octopus fisheries are generally data-deficient systems, lacking the essential elements needed to implement a science- and ecosystem-based approach to resource management. There is no real management of the stock and data on landings are mostly lacking (Monterey Bay Aquarium, 2017). Currently available data on production and export trade are very limited and presented as annual totals from national databases, namely the Philippines' Statistics Authority *Countrystat* and BFAR's Annual Fishery Profiles. These data are not disaggregated by region, province, or municipality nor by species catch, and there is meager local information on production that can be useful for management.

Much regarding the status of octopus stocks in the Philippines is unknown. Meager data on the octopus commodity are available despite its importance in the country's over-all fisheries production and trade. Important stock or biological information such as biomass, fishing mortality, spawning, and size-at-maturity are not known because stock assessments are not conducted, and thus there are no reference points in place for these parameters. Surveys conducted annually at fish landing centers and processing plants would give an idea of landings, and the current size and age distribution of the octopus being caught and exported. Available export statistics are also available but no details on species composition or gear type. There is also a need to improve the ability of researchers and monitors for accurate species identification of Philippine octopuses as many species have been misidentified (Jereb et al., 2014).

Fisheries Management is Urgent

Despite these limitations, it is clear that management of the Philippines' octopus resources is urgent and necessary to sustain the export industry and the various links in the supply chain. The virtual absence of management of octopus resources poses a threat to these essential export resources potentially in the short term. Urgent management measures are needed to conserve octopus stocks and, in the long term, promote sustainable fisheries and livelihoods for artisanal fishers while supporting a steady supply of these valuable products for the global markets. Future monitoring of octopus production in all gathering grounds should obtain data on the total fishing effort, i.e., an inventory of the total number of octopus fishers to obtain reliable estimates of octopus production in the Philippines.

Perceptions on the State of Octopus Fisheries

Part of the KII survey was to gauge the awareness and perceptions of octopus gatherers on the state of the octopus fishery in their localities (**Table 5**). Most gatherers said they observed changes in their fishery: decline in catch volume, decrease in income, decrease in average size of octopus caught, and frequent change in fishing location. They also offered possible reasons or root causes why these changes occurred. Topping the list are overfishing, the destruction of octopus habitats (i.e. coral reefs), and climate-related events such as storms and turbulent wave action that made fishing for octopus even more challenging.

Other management issues related to production and trade emerged from the processors/exporters' responses. Among these are the following:

- Sizes and volume of octopus sold by consolidators is decreasing, resulting in decreasing amount of export
- Sources of octopus (or fishing grounds) are fewer now than before
- Export price fluctuates, based on international market demand and competition
- Philippine export is driven by international prices
- Changing climate and increasing frequency of extreme weather events drive octopus production down as fishing effort also decreases
- Lack of management programs threaten the sustainability of the industry

Table 5 . Perceptions of gatherers and consolidators on changes in the situation of the octopus fisheries and some possible causes of such changes.

| Changes* | Some Possible Root Causes |
|---|---|
| <ul style="list-style-type: none"> • Decrease in volume of catches • Decrease in CPUE or catch rates • Decrease in income from octopus fishing • Decrease in the average size of octopus caught from the reefs • Increase in the number of octopus gatherers • Changes in the location of octopus/shifts in fishing grounds • Increase in the number of buyers/traders | <ul style="list-style-type: none"> ○ Overfishing ○ Total dependence on the fishery for lack of alternative livelihood options ○ Destruction of coral reefs and natural habitat ○ Climate change/extreme weather ○ Seasonality (wind/rainfall patterns) ○ Low buying prices by consolidators ○ Pollution of coastal waters ○ Shifts to other livelihood ○ No fisheries management plan ○ Poor governance |

**Some gatherers and consolidators in the BARMM region noted that octopus are bigger in size, the volume has increased, which is why there are more buyers/middlemen now than before.*

An industry player noted that the quality of Philippine octopus is not of superior quality as those coming from other exporting countries and therefore not competitive in the international marketplace. There were cases when negotiations were either cancelled or did not progress. The lack of strategic fisheries management of this commodity encourages uncontrolled catching resulting in decrease in octopus populations where breeders are also caught and sold. A few respondents, on the other hand, observed that octopus are bigger in size, sold to processors in larger volumes and thus, export is increasing. These apparent differences in experience or perceptions need to be validated in consideration of formulating a national management framework for this commodity.

Across the three sectors, there is a strong agreement on the urgency of fisheries management on octopus resources, citing the following beneficial consequences of effective management:

- Price stability in both local and international markets
- Improved habitat quality results in stock improvement/enhancement



- Increase catch by fishers/gatherers and consequently, their income
- Holistic management leads to fisheries sustainability
- Improved product quality increases competitiveness of Philippine exports

All respondents agreed there is need for standard pricing of octopus according to size among consolidators and processing companies. On the other hand, many gatherers do not believe that changes in international market can affect their decision to stop or continue fishing for octopus – as long as there are octopus and there are buyers they will continue to gather.

SWOT Analysis

A component of the planning process is the identification of the Strengths, Weaknesses, Opportunities and Threats (SWOT) that are present in the local octopus fishery. In the context of an EAFM plan the SWOT is the first “reality check”. The SWOT matrix presented in **Table 6** is a consolidation of responses from gatherers, consolidators, and a few processors. A critical step in crafting a plan that would encompass the various subsectors and stakeholders of the octopus industry and optimizes the benefits from a well-managed fishery is to take stock of what manpower resources, policies, and cooperating institutions are already in place. Also part of the SWOT analysis is identifying the opportunities available that can be harnessed by management bodies. The weaknesses and threats identified in Table 5 serve as reality checks in implementing management options for the octopus fisheries.

3.5 Root Cause Analysis

Another method in generating information to help fisheries management, the Root Cause Analysis (RCA) is a strategic approach to problem solving, particularly in connection with management failures. Root cause analysis is the process of defining and understanding the underlying or fundamental cause of a problem which is crucial to providing the most effective and corrective solution to it. The term “root cause” also refers to the precise point in the causal chain where applying a corrective action or intervention would prevent the non-conformance from occurring again. Very similar to a “problem tree analysis”, in an RCA flow the direct and indirect causes of a problem or an undesirable situation and their consequences are analyzed after which interventions are identified to solve the problem.

Aside from providing much needed data on regional octopus fishing practices, production, marketing and trade practices, information obtained from the KII series were organized into a Problem Tree to determine root causes of the observed decline in production and their consequences, such as their impact on export sustainability and stock levels. An important requirement of the OCT-RCA is that it must be science- and information-based which is why emphasis on presenting realistic data on octopus production and trade is crucial.



Table 6. Integrated SWOT matrix on the Philippine octopus fisheries from Luzon, Visayas and Mindanao clusters and results from KII surveys.

| STRENGTHS | WEAKNESSES | OPPORTUNITIES | THREATS |
|--|--|--|---|
| <ul style="list-style-type: none"> • Viable natural stocks • Skilled fishermen • Active support from fishing industry • Strong collaboration of LGUS, NGAs, & NGOs • MPAs established in some reefs to protect breeding octopus • Organized FARMC's & PO's • General conservation policies on fisheries • Supportive LCEs& LGU officials • Active Bantay Dagat and Law enforcers • Creation of bay-wide management alliances | <ul style="list-style-type: none"> • Weak law enforcement • No specific policy for octopus management • Lack of alternative livelihood • No available data/information on stock status • No e-CDTS • Insufficient local market for disposal • Non-compliance to fisheries policy • Lack of sustained IEC program to educate fishers and traders • Non-functional fisherfolk associations • Octopus fishers not organized • Outdated government facilities & Infrastructure • Lack of support for fisher's welfare • Little logistical support for law enforcement | <ul style="list-style-type: none"> • Availability or existence of • International markets • Implementation of FAO 263 on FMA • Access to community Fish Landing Centers (CFLCs) • Private sector with corporate social responsibility • Experts in fish stock assessment in both government and academe • Credit Lines • High market demand • Wide range of export market • Advanced and sustainable fishing technologies • Aquaculture/ Breeding technology developed by other countries | <ul style="list-style-type: none"> • Degraded habitats for Oct resources • Decreasing octopus catches • Unregulated octopus catches • Increased catches of small sized octopus • More fishermen now • Gasoline is expensive • Tools/gears for octopus fishing are expensive • Modification if fishing gear to increase catch efficiency • Bad weather or frequent extreme weather events • Encroachment of commercial fishing boats in municipal fishing grounds • Use of active gear in municipal waters • Entry of illegal fishers from other areas |

The changes and issues in the octopus fisheries identified by respondents and the possible causes they proposed (Tables 5-6) were arranged in a Problem Tree (**Fig. 17**) to better visualize the core problem of declining productivity of the octopus fisheries. The problem tree is a desirable graphical presentation of a complex of 'cause and effect' relationship among the root causes of the problem and the consequences they engender. This provides a helpful direction and important basis for formulating a National Framework Plan for the Philippine octopus commodity.





In the problem tree the core problem is declining octopus fishery production where the primary root causes of this decline are habitat destruction, overharvesting, very high fishing effort, and seasonal variations in catches. These root causes are, in turn, influenced by the secondary or underlying root causes of poor environmental governance, lack of livelihood options, lack of an efficient licensing or fisher registration system, and climate-related or extreme weather events, respectively. The consequences of these root causes are declining octopus stocks and catches, reduced export volume and market competitiveness, and decrease in revenues and fisher income. The formulation of a national framework plan for octopus is a strategic action to address the root causes of the core management problem, and achieve the goals of an ecologically sound, sustainable octopus industry that will improve human well-being through good governance.



Chapter 4

THE OCTOPUS-NATIONAL MANAGEMENT FRAMEWORK PLAN

4.1 The Vision

The vision sets the overall direction of any management plan and expresses the stakeholders' collective aspiration for the fisheries management unit or commodity (Staples et al., 2014). The National Management Framework Plan for the Philippine octopus commodity has the following Vision Statement:

A well-managed octopus fishery for a sustainable and equitable industry for all stakeholders.

This vision statement was first proposed during the *Octopus Review and Management Planning Workshop* held in Zamboanga City on November 20-23, 2018. The current vision statement is a slight improvement over the original statement with the addition of “sustainable” in the vision.

Market-driven Vision of the OCT-NMFP

The Plan envisions to develop a sustainable octopus industry that is globally competitive and maximizes the socio-economic benefits to multistakeholder beneficiaries. Octopus is an important commodity in the global seafood market, benefiting key industry players along the supply and value chains (*i.e.*, fishers, consolidators, processors/exporters, consumers) and the government through revenue generation. However, lack of a national management program endangers the industry and marine environment due to:

- potential overfishing and unsustainable harvesting methods and their environment;
- undesirable or fraudulent postharvest practices (e.g. water ‘pumping’ or injection; and
- poor product quality, low recovery and distrust of PH octopus in the international market.

The OCT-NMFP is a necessary step toward sustainable fisheries, global competitiveness, and increased revenues through development of a premium quality export product, and its downward benefits to fishers, local traders, and consumers.

4.2 Major Management Issues in the Philippines' Octopus Industry

In addition to the management concerns identified during the regional-level data gathering (mainly through KII), multistakeholder consultation workshops in the Luzon, Visayas, and Mindanao clusters identified a comprehensive list of management issues on the current octopus fisheries and trade (**Table 7**).



Table 7. Integrated management issues and problems in the octopus industry across the Luzon, Visayas and Mindanao cluster consultations held in April 2021.

| Ecological Well-Being Issues | Human Well-Being Issues |
|---|--|
| <ul style="list-style-type: none"> • Overfishing and unregulated effort • Production is highly dependent on wild octopus stocks • Destructive fishing methods practiced by some fishers • Catching of undersized/juvenile octopus (growth overfishing) • Climate Change-driven (warming, acidification of seas and storm surges) impacts to habitats • Limited data and studies on the biology and ecology of octopus species • Habitat degradation/deterioration of some coral reef areas | <ul style="list-style-type: none"> • Negative market perception • Poor product quality sold to processors • Fraudulent/illegal practices in product handling (e.g. water injection to increase body weight) • Poor/improper handling of octopus products • Low buying/market prices drives many fishers to stop octopus fishing • Safety at sea of octopus fishers • Lack of boat ownership • Small-scale local buyers or consolidators often have no regular markets • Limited awareness and inadequate skills of fisherfolk on responsible octopus fishing • Limited capacity on octopus fishery and related livelihood skills • Inadequate income from octopus fishing • Inadequate funds to support appropriate and viable supplemental livelihood programs for octopus fishers • Weak or absent linkages or collaboration among industry partners • Inadequate access to credit institutions • Low opportunity for women engaging in octopus fisheries • Octopus fishers are not organized • No baseline data on octopus fishing effort and socio-economic condition • Lack of technological capacity • Lack of post-harvest facilities • Lack of tenure security (e.g., TURF) • Sudden/unanticipated drops in buying prices • Potential socio-economic impact on the octopus fishery programs of the Mandanas ruling (to take effect in 2022) • Cultural heritage not considered in fisheries management programs |
| <p style="text-align: center;">Governance Issues</p> <ul style="list-style-type: none"> • No octopus management plan • No existing guidelines to regulate octopus fisheries • No budget allocation specific for octopus research and management • Lack of training on proper handling of product • Rampant illegal, unregulated, and unreported (IUU) fishing • Lack of detailed fishery profile on production, effort, and other fishery indicators • Insufficient biological data and information • Lack of manpower for accurate fishery data collection and analysis • Absence of an online information system on octopus fishery production and trade • Lack of alternative livelihood programs • No buying price regulation to maintain revenues from octopus fishing • Absence of Science Advisory Group (SAG) and expertise on octopus taxonomy and biology • Absence of electronic catch documentation system (eCDTS) to reduce IUUF • PSA and BFAR data often inconsistent and need reconciliation • Inadequate information dissemination and communication system on national programs | |

These issues and concerns are classified according to the EAFM components (i.e., ecological well-being, human well-being, and governance) and will guide the formulation of management goals, indicators, benchmarks, and recommended actions in the context of ecosystem-based

fisheries management. The majority (51%) of the management concerns in the octopus fishing industry comprise human well-being (or socio-economic) issues, while governance issues comprise 33%. The OCT-NMFP’s market-driven vision of a sustainable and equitable industry will be the guiding principle in addressing human well-being management concerns that will deliver the optimum benefits to multiple industry players. Ecological well-being issues make up the smallest share (16%), although equally important in the context of EAFM.

4.3 Goals, Objectives, Indicators and Benchmarks

The primary goal of formulating the OCT-NMFP is to mainstream sustainable fisheries management of the OCT commodity in the Philippines. Participants of the MCW clusters formulated the following management goals to guide the crafting of the octopus management framework:

1. **Ecological well-being Goal:** Restored and conserved octopus fishery and its habitat.
2. **Human well-being Goal:** Empowered octopus fishery stakeholders producing globally competitive products.
3. **Governance Goal:** Established a science-based policy for the sustainable octopus fishery.

Table 8 presents the consolidated outputs of the Luzon, Visayas, and Mindanao multistakeholder consultation workshop clusters identifying the goals and objectives of the management framework. Participants of the cluster workshops agreed to retain the three main goals defining the EAFM components identified in the 2018 planning workshop, which are outputs of a rigorous discussion and consensus.

Table 8. Consolidated goals and management objectives identified during the Luzon, Visayas, and Mindanao cluster multistakeholder consultation workshops.

| GOALS | MANAGEMENT OBJECTIVES |
|---|---|
| <p>1. Ecological Well-being Goal: <i>Restored and conserved octopus fishery and its habitats</i></p> | <ol style="list-style-type: none"> 1. Identification and profiling of octopus fishing areas/regions by 2022 2. Conduct resource and habitat vulnerability assessment by 2023 3. Establish reliable science and biological information to determine reference points and harvest control rules by 2024. 4. Establish the size/weight at first maturity to reduce catching of undersized octopus by 2024. 5. Establish/expand marine protected areas (MPAs) or fisheries refugia and capacitate/strengthen management bodies by 2024. 6. Establish database for development of aquaculture R&D for octopus by 2023. |



Table 8. Continued.

| | |
|---|--|
| <p>2. Human Well-being Goal: <i>Empowered octopus fishery stakeholders supportive of fisheries management and producing globally competitive products</i></p> | <ol style="list-style-type: none"> 1. Improve Philippine octopus products’ global competitiveness and market perception/reputation by end of 2023. 2. Improve capacity of fishers and consolidators in postharvest handling by end of 2022. 3. Increase awareness and capacity of fishers on responsible fishing in 10 octopus producing regions by end of 2022. 4. Establish a program to improve welfare of octopus fishers and small-scale traders by 2024. 5. Provide supplemental livelihood to at least 25% of fisherfolk engaged in octopus fishing annually. 6. Increase income of 50% of fishers by at least 10% by 2026. 7. Organize octopus fishers’ association in 10 regions and register them in DOLE or SEC by 2023. 8. Establish small-scale post-harvest facilities in 10 regions by end of 2023. 9. Increase access of octopus fishers to credit facilities by 2023 10. Increase opportunities for women to engage in the octopus fishing industry by 2025 |
| <p>3. Good Governance Goal: <i>Establish science-based and precautionary policies for a sustainable and equitable octopus fishery</i></p> | <ol style="list-style-type: none"> 1. Source out funds from national agencies, international organizations, and private sector between 2022-2023. 2. Establish a National Science Advisory Group (NSAG) with expertise in octopus biology and taxonomy by 2022. 3. Establish a national octopus catch and trade data system by 2022 that reconciles or harmonizes conflicting data from various data collection systems. 4. Establish national industry quality standards throughout the octopus supply chain by end of 2022. 5. Establish a sustainable/annual supplemental livelihood program for octopus fishers in 10 regions. 6. Obtain approval of a national policy or Fisheries Administrative Order (FAO) for sustainable octopus fisheries by 2023. 7. Establish a basic fishery improvement project (FIP) for octopus fishery by 2025. |



For each management objective the participants listed the indicators and benchmarks that will be used in evaluating if the objectives have been met. Indicators refer to parameters or variables that are measurable, and the benchmark establishes the target measure against a baseline or current situation. For some indicators the target beneficiaries are identified (e.g. number of fishers, regions/areas, women, etc.). Overall, the indicators and target benchmarks are intended to benefit multiple stakeholders in the fishery and both local and export trade. Following the EAFM format, preparing the objective-indicator-benchmark matrix (**Table 9**) is iterative; repeating the management goals and objectives in each table is intended to reinforce the salient points of the framework plan. Setting the benchmarks is a tricky process and requires deliberation and consensus among the group members. Many of the benchmarks in Table 8 are conservative estimates in consideration of regional differences in capacity and available resources.

One popular objective under the Ecological Well-being goal is the establishment (or expansion) of marine protected areas (MPAs) which are no-take or non-fishing zones intended to protect and build up biomass of fish and non-fish resources inside (Roberts and Polunin 1993; Russ and Alcala 1996), which will eventually contribute to improving fisheries in surrounding areas through spillover of fish biomass (Alcala 1999). Another option to enhance fisheries is to establish *fisheries refugia*, which are spatially and geographically delineated areas that can be used to protect valuable, target organisms (such as octopus) during critical stages of their life cycles (SEAFDEC-UNEP-GEF Fisheries Refugia Project, 2020). Each FMA or LGU that will implement the OCT-NMFP shall determine the particular type of protected area to established, where appropriate.

Table 9. Integrated objective-indicator-benchmark matrix across the Luzon, Visayas and Mindanao clusters.

| Ecological Well-being Goal: Restored and conserved octopus fishery and its habitats | | |
|---|---|--|
| OBJECTIVE | INDICATORS | BENCHMARK |
| 1. Identification and profiling of octopus fishing areas/regions by 2022 | No. of regions (major octopus producers) | Target: 5 Baseline: 0 |
| | No. of publications | Target: 1 Baseline: 0 |
| 2. Conduct resource and habitat vulnerability assessment by 2023 | No. of octopus fishing areas (major regions) | Target: 5 Baseline: 0 |
| | No. of publications | Target: 1 Baseline: 0 |
| 3. Establish reliable science and biological information to determine reference points and harvest control rules by 2024. | No of reference points | Target: 5 (Lbar/Mean L, Size-at-first maturity (L _m), CPUE, Exp.Rate (E), Length-at-first capture (L _c) Baseline: 0 |
| | No. of harvest control rules (HCRs) recommended | Target: 3 (gear, catch rate, size limit) Baseline: 0 |
| | No. of publications (2024) | Target: 1 Baseline: 0 |
| 4. Establish the size/weight at first maturity to reduce catching of undersized octopus by 2024. | No. of species | Target: 3 (<i>Octopus vulgaris</i> , <i>O. cyanea</i> , <i>A. aegina</i>) Baseline: 0 |
| | No. of HCRs recommended | Target: 3 (minimum size limits, species, spawning period) Baseline: 0 |
| | No. of publications | Target: 1 Baseline: 0 |
| 5. Establish or expand marine protected areas (MPAs) or fisheries refugia per region focused on octopus management by year 2024 and capacitate and strengthen management bodies | No. of MPAs/fisheries refugia (10 regions) | Target: 10 Baseline: 0 |
| | Area of no take zone increased (hectare) | Target: 200 ha/region Baseline: 0 |
| 6. Establish database for development of aquaculture R&D program for octopus by 2023. | No. of aquaculture databases established | Target: 1 Baseline: 0 |
| | No. of aquaculture forums conducted | Target: 1 Baseline: 0 |



| Human Well-Being Goal: Empowered octopus fishery stakeholders producing globally competitive products | | |
|---|---|--|
| OBJECTIVE | INDICATORS | BENCHMARK |
| 1. Improve Philippine octopus product quality, food safety, global competitiveness, and market reputation by end of 2023. | Export market prices level with other exporting countries | Target: USD 3.00-3.70/lb Baseline: USD 2.50-3.20/lb <i>*Values in USD are based on size-grading (2020 market prices)</i> |
| | No. of policies on product quality? | Target: 1 Baseline: 0 |
| 2. Improve capacity of fishers and consolidators in postharvest handling by end of 2022. | No. of post-harvest trainings | Target: 10 regions Baseline: 0 |
| | No. of octopus fishers and consolidators trained | Target: 50% of fishers & consolidators per region Baseline: 0 |
| 3. Increase awareness of fishers on responsible fishing in 10 octopus producing regions by end of 2022. | No. of capacity/awareness building programs conducted | Target: 1 Baseline: 0 |
| | No. of regions | Target: 10 Baseline: 0 |
| | No. of octopus fishers capacitated | Target: 50% of fishers Baseline: 0 |
| 4. Establish a national program to improve welfare of octopus fishers and small-scale traders by 2024. | No. of programs established | Target: 1 Baseline: 0 |
| | No. of octopus fishers assisted | Target: 50% of fishers per region Baseline: 0 |
| 5. Provide supplemental livelihood to at least 25% of fisherfolk engaged in octopus fishing annually. | No. supplemental livelihood enterprises provided | Target: 1 per region Baseline: 0 |
| | No. of beneficiary fishers | Target: 25% of fishers per region Baseline: 0 |
| 6. Increase income of 50% of fishers by 10% by the end of 2026. | No. of fishers with increased income of at least 10% | Target: 50% fishers per region Baseline: 0 |
| | No. of socio-economic profiles of octopus stakeholders | Target: 10 regions Baseline: 0 |



| | No of Value Chain Analysis reports/publications generated | Target: 5 regions Baseline: 0 |
|---|--|---|
| 7. Organize octopus fishers' association in 10 regions and register them in DOLE or SEC by 2023. | No. of registered octopus gatherers' organization | Target: 10 Baseline: 0 |
| 8. Establish small-scale post-harvest facility in 10 regions by end of 2023. | No. of small-scale post-harvest facility | Target: 10 Baseline: 0 |
| 9. Increase access of octopus fishers to credit facilities by 2023 | No. of fishers traders with access to credit facilities | Target: 50% per region Baseline: 0 |
| 10. Increase opportunities for women to engage in the octopus fishing industry by 2025 | No. of women actively engaged or employed in octopus fisheries | Target: 50% per region Baseline: 0 |
| Good Governance Goal: Establish science-based and precautionary management policies for a sustainable and equitable Octopus fishery | | |
| OBJECTIVE | INDICATORS | BENCHMARK |
| 1. Source out funds for improving governance toward a sustainable octopus industry. | No. of financial institutions that will provide the needed fund. | Target: 1 per year Baseline: 0 |
| | Amount of funds raised annually | Target: To be determined Baseline: 0 |
| 2. Establish a National Science Advisory Group (NSAG) with expertise in octopus biology and taxonomy by 1 st Quarter of 2023 | Number of meetings conducted | Target: 3 Baseline: 0 |
| | Number of SAG Groups formed | Target: 1 per FMA Baseline: 0 |
| 3. Establish a national octopus catch and trade data system by 2022 that reconciles or harmonizes conflicting data from various data collection systems | No. of meetings conducted | Target: 1 per year Baseline: 0 |
| | No. of reconciled and regularly updated octopus catch and trade database | Target: 1 Baseline: 0 |
| | No. of updated directory of octopus stakeholders | Target: 1 per region Baseline: 0 |
| 4. Establish national industry quality standards throughout the octopus supply chain by end of 2022 | National Octopus product quality standard established | Target: 1 Baseline: 0 |



| | | |
|---|---|--|
| 5. Improve compliance with fishing and postharvest handling policies and standards by 50% of fishers, consolidators, and processors by end of 2022. | No. of fishers, consolidators and processors compliant with fishing policies, product quality standards | Target: 50% of fishers and 75% of consolidators and processors per region Baseline: 0 |
| 6. Obtain approval of a national policy or Fisheries Administrative Order (FAO) for sustainable octopus fisheries and trade by 2023. | No. of formulated and approved policies | Target: 1 Baseline: 0 |
| | Number of consultations & meetings conducted. | Target: 5 (3 nationwide consultations: 2 NFARMC meetings) Baseline: 0 |
| | No. of stakeholders consulted | Target: 50 pax/consultation (all sectors) Baseline: 0 |
| 7. Establish Fishery Improvement Projects for Octopus Fishery by 2025 | No. of FIPs established (at national) | Target: 3 (1 ECDTS, 1 hatchery, 1 post-harvest facility) Baseline: 0 |
| | No. of capacity building activities conducted (marketing strategy, product handling, etc.) | Target: 1 per region Baseline: 0 |

4.4 Management Actions

The management action matrix in **Table 10** is a detailed list of recommended strategies and activities by participants of the Luzon, Visayas, and Mindanao cluster consultations to undertake under each objective. In each of the management activity the lead or responsible agency and collaborating agencies or organizations are identified. The plan matrix also includes the timeframe, budgetary requirements, and fund sources. The areas where each activity will be carried out are also specified to show the scope or range of the activity and explain the amount of funds requested.

4.4.1 Ecological Well-being

The ecological well-being (EWB) goal of the OCT-NMFP is to conserve and sustain the octopus fishery by protecting and restoring the habitat of these valuable resources. The EWB plan has six objectives (Table 10) with corresponding management actions which mainly focus on ecological profiling of octopus habitats and gathering of comprehensive, relevant data on the status of octopus stocks, fishing effort, catch rates, and production levels. Reliable and science-based fisheries assessment ensures proper catch documentation and traceability of



octopus along the supply chain until they reach the processing plants or exporting companies. Detailed studies on the reproductive biology of octopus species that form the bulk of the fishery are vital to determining size structure, sex ratios, reproductive stages, and spawning periods. Together with fisheries data, information on reproductive biology will be used to determine the biological reference points or indicators for fisheries management.

Most of these assessments will be undertaken by NFRDI through the NSAP projects in collaboration with academic institutions and LGUs in the target regions to funding constraints ecological and fisheries assessments will first be undertaken in major octopus fishing grounds, i.e., Region 4B (MIMAROPA), Region 5 (Bicol), Region 9 (Zamboanga Peninsula), Region 13 (Caraga), and the Bangsamoro Autonomous Region for Muslim Mindanao (BARMM). Assessments in other regions shall be undertaken when additional funding becomes available, preferably with the participation of LGU fisheries staff and local fishers. To do this, simple methods to obtain data, such as determining sex of octopus by ocular inspection rather than dissection, will be developed for the participatory assessments.

An important management objective in the EWB plan is to increase the protection of octopus habitats toward stock and fisheries sustainability. Currently there are no marine protected areas focused on octopus conservation, thus the EWB plan includes management actions to establish MPAs or fisheries refugia where appropriate (see *Section 4.3*) or to expand existing MPAs to accommodate reef areas known to be octopus habitats. Both management strategies are 'no-take zones' and intended to protect a portion of the octopus stocks from harvesting. Integral to the EAFM approach is the capacity building of management bodies in each site.

Another strategy to sustain fisheries production and reduce the industry's dependence on wild stocks of target species is the development of aquaculture technology, such as captive breeding and hatchery for juvenile production. However, caution must be taken before launching an aquaculture project for octopus mainly due to environmental, economic, and welfare concerns reported in aquaculture initiatives in Japan, Spain, USA, and Mexico (CiWF, 2021; The Fish Site, 2021). Participants of the multistakeholder consultation workshops recommend to first establish a database on octopus biology studies and aquaculture initiatives, if any, and conduct a forum on developing an R&D program for octopus.

4.4.2 Human Well-being

The Human Well-Being (HWB) Goal of the octopus framework plan is to have empowered octopus fishery stakeholders who produce high-quality, globally competitive products while adhering to food safety standards to protect the consuming public. The HWB plan is the largest component of the OCT-NMFP covering ten objectives, rightly so since it addresses the majority of management issues surrounding the octopus fishing industry identified in Table 7. Among the most urgent concerns of the octopus fishing industry are poor postharvest handling and the fraudulent practice of injecting water into the octopus tissue in order to increase weight, and thus, revenues. Oftentimes, octopus coming from far-flung places with



long travel time to the processing companies are soaked in water longer as fishers and consolidators have to put more ice to maintain product freshness and avoid spoilage.

According to industry players, these practices earned for the Philippine octopus export products a bad reputation and distrust at the international market, resulting in a lot of rejections and reduced buying prices.

The first three objectives of the HWB plan are focused on improving product quality through better postharvest handling to avoid rejection and increase fishers' awareness of responsible fishing practices (Table 10). Management actions include policy interventions to improve product quality and food safety through the formulation and adoption of clear (i.e., not arbitrary) national standards or guidelines and more stringent policy enforcement. There is also a need to institutionalize product quality grading systems and certification systems (e.g. HACCP, Good Manufacturing Product (GMP) standards, BFAR quarantine requirements, etc.) from source to plant, to ensure that PH octopus are not contaminated by bacteria (e.g., *Salmonella*) and meet all the export requirements both in Philippine ports and at the destination country ports. Eventually, the industry should push for third-party quality assurance certification of PH octopus fisheries by international bodies (e.g., Marine Stewardship Council (MSC), MBAq-Seafood Watch, Responsible Fisheries Management (RFM)), to elevate our status in the international marketplace. Product rejection is costly with large economic losses to the company or supplier; being compliant with quality standards set by government and the importing country will ultimately be more cost-effective.

The ultimate aim of the industry is to improve the perception or reputation of PH octopus in the export market and increase the market price for PH octopus to the level of Indonesia, which is our closest competitor and which is able to get a higher price for their product for the same quality as ours. These interventions would encourage octopus processors to strive for premium quality export to meet the standards of the US, EU, and other importing nations and increase the export revenues for the PH octopus industry. Under the HWB plan it is expected that improving prices at the international market for PH octopus will cascade into increasing buying and trading prices locally, benefiting octopus fishers and small traders or consolidators through higher income. In the absence of fisheries management, the present exploitation level is expected to be close to maximum sustainable yield or MSY (as reported in Roa-Ureta, 2020). Thus, it might be unlikely that octopus production will increase substantially, although under regulation and sustainable fishing catch rates of fishers are expected to increase. The objective of increasing income of fishers from the octopus industry would not come only from increased production or catch volumes, but improving the quality of the commodity will increase the competitiveness and value of export that will lead to improving the income of the octopus fishers through increased local buying prizes.

Other objectives and management actions under the HWB component address socio-economic and welfare concerns such as social protection, sustainable alternative livelihood, improving income, organizing fishers and consolidators, increasing access to credit, and



providing equitable access and opportunities for women and other gender groups. Among the important requirements to meet the above management objectives are to: prepare a comprehensive socio-economic profile of octopus gatherers, fishers, and processors, and conduct an octopus value chain analysis (VCA) in major octopus exporting regions. The establishment of small-scale post-harvest facilities in the 10 octopus-producing regions is an intervention to improve product handling and proper preservation of octopus catch to maintain its freshness. The LGUs in these regions can provide basic infrastructure such as fish landing or storage centers, while proposals for an ice plant near these centers can be submitted to financing institutions such as local banks or seek support from NGOs and foreign-assisted programs in their vicinity.

4.4.3 Good Governance

The primary goal of the Good Governance (CC) component of the OCT-NMFP is to establish a science-based policy and interventions for a sustainable octopus fishery. The plan addresses several governance issues through seven management objectives, covering policy to improve octopus fisheries management, data deficiency and inconsistencies, need to engage scientists and researchers in providing scientific information, and lack of funding to support the implementation of the national framework plan. A national policy (i.e. a Fisheries Administrative Order or FAO) shall be formulated to establish guidelines or rules on effort regulation, harvest control, and reference points for fisheries management based on recommendations from comprehensive stock assessment and biology studies as proposed in the EWB plan. Compiling and harmonizing fisheries and biological information will address the 'data deficiency' as major management issues in octopus fisheries.

Another relevant policy will adopt and institutionalize the national quality standards that will be formulated under the governance plan to ensure quality assurance of octopus products for the export market. The plan also provides for the implementation of these national standards, certification by accredited groups (e.g. HACCP) and assessment of compliance by industry players. The creation of a National Science Advisory Group (NSAG) for octopus adopts the SAG concept integrated into the FMA system (FAO 263, s. 2019) being implemented across the Philippine waters. This group of experts will provide scientific guidance to the Management Board and SAG of the different FMAs for the successful implementation of this framework plan.

The plan also includes a proposed establishment of basic Fishery Improvement Project (FIP) toward improving fisheries governance by instituting an electronic catch documentation and traceability system (eCDTS) for octopus fishing to trace it from the fishing ground to the local markets or to processing plants and onward to the export market. The FIP (Objective 7) also proposes to establish a pilot hatchery for octopus, however, initiatives to culture octopus in

the Philippines must first need to conduct feasibility studies and compare benefits versus costs (i.e., through a BCA analysis) in growing octopus in captivity.

The successful implementation of the good governance plan will ensure effective management and sustainability of the octopus fishing industry and deliver the social and economic benefits equitably among stakeholders. For this plan to work there needs to be closer coordination and cooperation between BFAR, the private sector, and other institutions in providing incentives for players who are compliant with policies and work toward sustaining the industry. Improvement in welfare and provision of alternative, sustainable livelihood options will improve quality of life of fishers. While it is possible that substantial increase in octopus production is no longer possible under the current exploitation level (i.e., nearing MSY; see Roa-Ureta, 2020), improvement in product quality and increase in export prices will have downward benefits to producers or octopus fishers. This would provide incentive to adopt responsible fishing practices and compliance with postharvest and product quality standards and policy.

Table 10. Consolidated matrix of proposed management actions under each EAFM goal.

| Management Action | Lead Agency or Organization | Timeframe | Where | Budgetary Requirement (PHP) | Budget Sources |
|--|---|-----------|---|------------------------------|---|
| Ecological Well-Being Goal | | | | | |
| Objective 1. Identification and profiling of octopus fishing areas/regions by 2022. | | | | | |
| Conduct of biophysical profiling of Octopus fishing areas | BFAR, NSAP, LGUs, Academe | 2022 | 5 major regions (Region 4B, 5, 9, BARM, Caraga) <i>Optional: 5 minor regions (R2, R6, R7, R8, R10)</i> | 2.5 Million (500 k per site) | BFAR, NFRDI, Other NGAs, International Funding Org. (IFOs), Industry/Private Sector, LGUs |
| Objective 2. Conduct resource and habitat vulnerability assessment by 2023. | | | | | |
| Trainer's training on vulnerability assessment | DENR, UPMSI and other academic institutions | 2022 | 5 major regions (Optional - 5 minor regions; same as above) | 2.5 M | BFAR, Other NGAs, IFOs, Private sector |
| Conduct of vulnerability assessment | BFAR, Academe, NGOs, LGUs | 2023 | 5 major regions (Optional - 5 minor regions) (same as above) | 5.0 M | BFAR, Other NGAs, IFOs, Private sector |



| Objective 3. Establish reliable science and biological information to determine reference points and harvest control rules by 2024. | | | | | |
|---|---|---------------------------------|--|-----------------|---|
| Conduct octopus stock assessment to include: <ul style="list-style-type: none"> • Catch & Effort monitoring • Gear selectivity studies • Establish real-time data system • Establish 3-5 reference point indicators | BFAR- RFOs, NFRDI-NSAP LGUs, Academe | 2022- 2024 | 5 major regions and 5 minor regions (R2, R6, R7, R8) | 9.0 M (3 years) | BFAR-Aquatic Wildlife Fund, Other NGAs, Industry/Private Sector, LGUs |
| Objective 4. Establish the size/weight at first maturity of 3 major octopus species as basis of policy to reduce catching of undersized octopus by 2024. | | | | | |
| Conduct of reproductive biology studies, e.g. sex ID, gonadal maturity, spawning period | BFAR- RFOs NFRDI-NSAP Academe | 2022-2024 | 5 major and 4 minor octopus-producing regions | 6.0 M (3 years) | BFAR, NFRDI, Other NGAs, Industry/Private Sector |
| Objective 5. Establish or expand marine protected areas (MPAs) or fisheries refugia focused on octopus management and capacitate and strengthen management bodies by year 2024. | | | | | |
| Establishment of more MPAs or fisheries refugia as needed (with capacity building of management bodies) | DENR, BFAR, LGUs, Academe | 2023-2024 | 5 major regions 5 minor regions (same as above) | 20.0 M | BFAR, Other NGAs, Private sector, LGUs |
| Expand area of no-take zone | DENR, BFAR, LGUs, Academe | 2023-2024 | 5 major regions 5 minor regions (same as above) | 5.0 M | BFAR, Other NGAs, Private sector, LGUs |
| Objective 6: Establish database for development of aquaculture R&D program for octopus by 2023. | | | | | |
| Inventory of local research studies on Octopus culture technology | NFRDI, Academe, Industry/Private Sector | 1 st Quarter of 2022 | Nationwide | 50,000 | NFRDI, Academe |



| | | | | | |
|--|--|----------------------|--|-------------------------------|--|
| Forum on R&D Review for Octopus Aquaculture Technology | NFRDI, SEAFDEC | Last quarter of 2022 | Manila or Cebu City | 1.0 M | BFAR, IFO, Industry, Other NGAs |
| Human Well-being Goal | | | | | |
| Objective 1. Improve Philippine octopus product quality, food safety, global competitiveness and market reputation by end of 2023. | | | | | |
| Policy interventions to: <ul style="list-style-type: none"> improve product handling and quality stop fraudulent and illegal practices | BFAR, DILG | 2022 | Manila | 200,000 | BFAR, IFOs |
| Participation in international seafood shows to showcase improved policy interventions and product quality of PH octopus | BFAR, PCPEAI | 2023 & annually | Abroad | 4.0 M | BFAR, PCPEAI/ Industry, Private sector, NGOs, IFOs |
| Production of IEC materials to highlight reforms | BFAR, PIA | 2022 | Regional centers | 100,000 | BFAR, Other NGAs, NGOs, Private Sector |
| Provide support to exporters through a more facilitative process (i.e. ease in required export paperwork) | BFAR, Bureau of Customs, Food & Drug Admin. | 2023 | Major octopus export hubs (Manila, Palawan, Cebu, Zambo. City) | 100,000 (for admin work only) | BFAR, Other NGAs, Industry |
| Private-public partnerships | BFAR, PCPEAI, DTI, LGU | 2022 | Regional centers | 2.0 M | Private sector, DTI, BFAR |
| PH Octopus industry forums | BFAR, PCPEAI, Private Sector, DTI, NGOs | 2024, 2026 | National | 6.0 M (2 years) | BFAR, IFOs, Private sector, Other NGAs |
| Objective 2. Improve capacity of fishers and consolidators in postharvest handling by end of 2023. | | | | | |
| Development of capacity building program in postharvest and product handling | BFAR, SUCs, DOST, DTI, LGUs, NGOs and other institutions | 2022-2023 | National | 1.0 M | BFAR, private sector, Int'l organizations |



| | | | | | |
|--|-----------------------------------|------------------------------|---|---------|---|
| Fund Sourcing | BFAR, DOST, DTI, LGUs, SUCs, NGOs | 2022 | Per region | 200,000 | BFAR, DOST, DTI, LGUs, NGOs, Int'l institutions |
| Capacity building on product handling practices, to include: <ul style="list-style-type: none"> • Good handling practices (GHP) of raw materials (FAO 211) • Product Quality • Food Safety • Monitoring and evaluation | BFAR, LGU, DTI, PCPEAI | 4 th Quarter 2022 | 10 regions | 10.0 M | BFAR, IFOs, Other NGAs, Private Sector |
| Impact assessment of CB beneficiaries | BFAR, Academe | 2023 | 5 major and 5 minor regions | 500,000 | BFAR, private sector, IFOs |
| Objective 3. Increase awareness of fishers on responsible fishing in 10 octopus producing regions by end of 2023. | | | | | |
| Training needs assessment (TNA) | BFAR, LGUs, SUCs | 2023 | 5 major and 5 minor octopus producing regions | 1.0 M | BFAR, Private sector, IFOs |
| Fund sourcing | BFAR, LGUs PCPEAI | 2023 | 5 major and 5 minor regions | 200,000 | BFAR, Private sector, IFOs |
| Activities include: <ul style="list-style-type: none"> • Prepare a project proposal and invite financial institutions • Organize a “Funder’s Forum” • Collaborate with SUCs, LGUs, NGOs and private sector in implementing these activities | | | | | |
| Conduct awareness seminars for octopus fishers | BFAR, SUCs, NGOs | 2022-2023 | 5 major and 5 minor regions | 1.5 M | BFAR, Private sector, NGOs |
| Objective 4. Establishment of a comprehensive program to improve welfare of octopus fishers by 2023. | | | | | |



| | | | | | |
|---|---|-----------|-------------------------------|--------|--|
| Establish a welfare assistance program, to include the following activities: | BFAR, Octopus fishing Industry, LGUs, NGOs, FMA mgt. bodies | 2023 | By Region | 5.0 M | BFAR, Other NGAs, Private sector, NGOs, IFOs |
| <ul style="list-style-type: none"> Obtain input data for developing a welfare program for octopus fishers Formation of local & national octopus fishers' associations Identify welfare interventions and social protection mechanisms (e.g., fisherfolk Insurance, other incentives) | | | | | |
| Objective 5: Provide supplemental livelihood to at least 25% of fisherfolk engaged in octopus fishing annually. | | | | | |
| Establish a sustainable livelihood program, to include the following activities: | BFAR, DOLE, DTI, DSWD, Industry/ Private Sector, NGOs, LGUs | 2022-2025 | 10 regions | 20.0 M | BFAR, IFOs, Private Sector, Other NGAs, Local Financing Institutions (FIs) |
| <ul style="list-style-type: none"> Identification and validation of fisherfolk engaged in octopus fishing Assessment of fisherfolks to identify the specific needs of fisherfolks Procurement (gears, fishing boats and other materials) materials for fisherfolks Provision of materials (Supplemental Livelihood) to the fisherfolks Cash for work in fisheries industry | | | | | |
| Objective 6. Increase income of 50% of octopus fishers by at least 10% by 2025. | | | | | |
| Improve economic status of octopus fishers | BFAR; LGUs; DSWD | 2023-2025 | 5 major octopus prod. regions | 5.0 M | BFAR, DTI, IFOs, local FIs |
| <p>Activities include:</p> <ul style="list-style-type: none"> Baseline socio-economic survey Value chain analysis (VCA) on octopus Sustainable Livelihood assistance (SLA) programs Training in food safety & GHP (good handling practices) M&E & post-intervention assessment | | | | | |



| Objective 7. Organize octopus fishers' and consolidators' association in 10 regions and register them in DOLE or SEC by 2023. | | | | | |
|--|--------------------------------|-----------|------------|---------|--|
| Establishment of at least 1 octopus fishers and 1 consolidators' association per region | BFAR, LGUs, NGOs | 2023-2024 | 10 regions | 500,000 | BFAR, LGUs, Private Sector |
| Registration with DOLE, CDA or SEC | BFAR, DOLE, DTI | 2023-2024 | 10 regions | 200,000 | BFAR, LGUs |
| Objective 8. Establish small-scale post-harvest facility in 10 regions by end of 2023. | | | | | |
| Inventory of existing PH facilities in target sites (e.g. ice plants, FLC's) | BFAR, LGUs | 2023 | 10 regions | 300,000 | BFAR, LGUs |
| Establishment of pilot small-scale PH facilities | BFAR, LGUs, DTI | 2023-2025 | 10 regions | 50.0 M | BFAR, LGUs, IFOs, Other NGAs, Fis |
| Objective 9. Increase access of octopus fishers to credit facilities by 2023 | | | | | |
| Establish linkage between fisherfolk with financing institutions | BFAR, LGUs, DTI | 2023-2025 | 10 regions | 2.0 M | BFAR, LGUs |
| Training in microfinance management | BFAR, LGUs, DOLE, DTI, Academe | 2023-2025 | 10 regions | 2.0 M | Industry partners, Finance Institutions |
| Objective 10. Increase opportunities for women to engage in the octopus fishing industry by 2025 | | | | | |
| TNA on women's capacity building needs | BFAR, Academe, DOLE, NGOs | 2023 | 10 regions | 500,000 | BFAR, DOLE, NGOs, GAD programs |
| Provision of training for women in various parts of the fishery supply chain | BFAR, DOLE, Academe, NGOs | 2023 | 10 regions | 2.5 M | BFAR, Other NGAs, NGOs, GAD programs |
| Livelihood support for women's groups | BFAR, DOLE, Academe, NGOs | 2023-2026 | 10 regions | 5.0 M | BFAR, Other NGAs, IFOs, Local Banks/ Fis |
| Good Governance Goal | | | | | |



| Objective 1: Source out funds for improving governance toward sustainable octopus industry. | | | | | |
|---|------------------------------|------------------------------|----------------|---------|---|
| Fund sourcing | BFAR, LGUs | 2022 | Manila | 200,000 | BFAR, private sector, IFOs, NGOs, local Fls |
| <ul style="list-style-type: none"> Prepare/submit a project proposal for funding | | | | | |
| <ul style="list-style-type: none"> Invite private sector and funders to commit support to the project ("funders' forum) | | | | | |
| Objective 2: Create a National Science Advisory Group (SAG) for Octopus by 2022. | | | | | |
| Establishment of a National Science Advisory Group for octopus commodity | BFAR, NFRDI, DOST, Academe | 2022 | Manila | 500,000 | BFAR, IFOs |
| <ul style="list-style-type: none"> Conduct of 1st meeting of multisectoral, multidisciplinary team of experts from BFAR, NFRDI, academe, private sector, and NGOs (drafting of Guidelines for SAG creation) | | 1 st Quarter 2022 | | | |
| <ul style="list-style-type: none"> Conduct of 2nd Meeting (Selection of members for Octopus SAG) | | 2 nd Quarter 2022 | | | |
| <ul style="list-style-type: none"> Conduct of 3rd and Final Meeting for confirmation and planning of the National Octopus SAG | | 3 rd Quarter 2022 | | | |
| Objective 3: Establish a national octopus catch and trade data system that reconciles or harmonizes conflicting data from various data collection systems by 2023. | | | | | |
| Reconciliation of catch data | BFAR, NFRDI, PSA, NSAG, NGOs | 2022 | Manila or Cebu | 2.0 M | BFAR, IFOs |
| <ul style="list-style-type: none"> Conduct of 3 meetings with participants from BFAR, NFRDI-NSAP, PSA, SUCs, NSAG, Exporters, Quarantine Section (for LTP & ECC) | | | | | |
| <ul style="list-style-type: none"> Consolidation of catch data and other information for the last 5 years or earlier | | | | | |
| Establishment of national information system on octopus production and trade | BFAR, NFRDI, PSA, LGUs | 2023 | Manila or Cebu | 2.0 M | BFAR, Other NGAs, IFOs |



| | | | | | |
|--|---|--------------------|-----------------------------------|---------|----------------------------------|
| Objective 4. Establish national industry quality standards throughout the octopus supply chain by end of 2022. | | | | | |
| Develop or adopt a national product quality standard (PQS) for octopus | BFAR, PCPEAI, Industry, DTI, Academe | 2022 | Manila | 500,000 | BFAR, Other NGAs, IFOs, Industry |
| Policy formulation on adopting PQS and certifications (e.g. HACCP, | BFAR, NFARMC NSAG, Congress | 2022 | Manila | 1.0 M | BFAR, Other NGAs, Industry |
| Objective 5. Improve compliance with postharvest handling policies and standards by 50% of fishers, consolidators, and processors by end of 2023. | | | | | |
| Policy enforcement/ implementation | BFAR, DILG, DTI, PCPEAI, LGUs | 2023 | 10 regions | 2.0 M | BFAR, DILG, IFOs, NGOs |
| Compliance survey in each region | BFAR, NFRDI-NSAP, LGUs, Academe | Last Quarter, 2023 | 10 regions | 1.0 M | BFAR, NFRDI, Other NGAs |
| Objective 6: Obtain approval of a national policy or Fisheries Administrative Order (FAO) for sustainable octopus fisheries by 2025. | | | | | |
| Formulate and secure approval of a national policy on regulating octopus fisheries | BFAR, LGUs, industry stakeholders, NSAG | 2025 | Manila, Cebu, & Zamboanga | 2.0 M | BFAR, Other NGAs, IFOs |
| <ul style="list-style-type: none"> Establish/Adopt reference points (RPs) and harvest control rules (HCR) | | 2024 | | | |
| <ul style="list-style-type: none"> Conduct series of workshop on the formulation of national policy/FAO | | 2024 | | | |
| <ul style="list-style-type: none"> Conduct of Cluster/regional Consultation re: National Policy/FAO (50pax per cluster) | | 2025 | | | |
| <ul style="list-style-type: none"> Conduct of National Consultation re: National Policy/FAO and sanctions on violations | | 2025 | | | |
| Objective 7: Establish a Fishery Improvement Program for Octopus Fisheries by 2025. | | | | | |
| Fishery Improvement Project for Octopus fishery, to include the following activities: | BFAR, NFRDI-NSAP, Industry and Fishers | 2025 | 5 major octopus producing regions | 20 M | BFAR, NFRDI, Other NGAs, IFOs |



| | | | | | |
|---|---------------------------|------|--------------------------|-------|----------------------------------|
| <ul style="list-style-type: none"> Accomplish basic requirements (TNA, environmental/rapid assessment, etc.) | | 2024 | | | |
| <ul style="list-style-type: none"> Establish an electronic catch documentation and traceability system (eCDTS) | | 2024 | | | |
| Pilot, small-scale hatchery (with a Cost-Benefit Analysis or Feasibility Study) | BFAR, SEAFDEC, SUCs, LGUs | 2025 | Zamboanga/ BARMM/ Caraga | 30 M | BFAR, IFOs, Private sector |
| Small-scale post-harvest facilities | BFAR, LGUs, Industry, | 2025 | 5 Major regions | 10 M | BFAR, IFOs, Private sector, LGUs |
| Value chain analysis | BFAR, SUCs, LGUs | 2022 | 5 major regions | 1.5 M | BFAR, Other NGAs, IFOs, NGOs |

4.5 Cost of Implementing the OCT-NMFP

The budgetary requirements indicated against each objective and management action are ballpark figures covering the recommended period of implementation that serve to guide planners and implementing institutions. An implementation plan will later be prepared with more detailed budgetary estimates. **Table 11** presents the consolidated annual cost of implementing each EAFM component or goal of the five-year OCT-NMFP amounting to a total of PHP238.95 Million. The largest chunk (48%) of this cost will go into accomplishing the human well-being goal which addresses the largest proportion of management issues on the Philippine octopus fisheries presented in Table 8.

Table 11. Total budgetary requirement for implementing the five-year OCT-NMFP.

| Management Goal | 2022 | 2023 | 2024 | 2025 | 2026 | Total |
|--------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| Ecological Well-Being | 10,000,000 | 23,550,000 | 17,500,000 | - | - | 51,050,000 |
| Human Well-Being | 7,700,000 | 33,483,333 | 40,783,333 | 31,183,333 | 11,850,000 | 125,000,000 |
| Good Governance | 6,900,000 | 4,000,000 | 11,000,000 | 36,000,000 | 25,000,000 | 82,900,000 |
| Total Annual Allocation | 24,600,000 | 61,033,333 | 69,283,333 | 67,183,333 | 37,850,000 | 258,950,000 |
| BFAR share | 12,560,000 | 32,660,000 | 37,410,000 | 39,950,000 | 19,650,000 | 142,230,000 |



Funding for implementing the OCT-NMFP will be a cost-sharing arrangement between BFAR, other NGAs, the octopus industry and private sector through public-private partnerships, and LGUs. Fund sourcing from local financing institutions or banks and international funding organizations will be carried out through organizing Funders' Forum and preparation of project proposals. The BFAR is expected to foot more than half (55%) of this cost, amounting to PHP142.23 Million. As the main beneficiaries of the national framework plan, concerned LGUs with active octopus fisheries will likewise share the cost of implementing some programs, such as stock assessment, socio-economic profiling, establishment of MPAs/fisheries refugia for octopus, policy enforcement, and support for small-scale postharvest facilities.

4.6 Implementation Plan, Institutional Arrangements, and Capacity Development

Following the approval of the Oct-NMFP an Action Planning Workshop will be organized to prepare a detailed Implementation or Operation Plan based on the list of management actions listed in Table 9. The actions listed and/or described in Table 9 are more of general strategies and concepts that need to be transformed into specific action plans or readily executable format that will guide the plan implementors. The OCT-NMFP is a management plan that will benefit all stakeholders and must involve various government and non-government institutions local communities, academe, and civil society.

Part of the implementation plan is to identify an appropriate Organization and Management Structure or Institutional Arrangements to implement the Oct-NMFP, composed of relevant institutions and people whose specific responsibilities and functions are clearly defined within a workable hierarchy. As the primary agency for management and development of the country's fisheries, the DA-BFAR is expected to lead the implementation of the OCT-NMFP. Sustainable octopus fisheries management in the context of ecosystem-based approach, however, has to be carried out through BFAR's partnership with other institutions, namely, NGAs (e.g. Department of Environment and Natural Resources (DENR), Department of Trade and Industry (DTI), and the Department of Science and Technology (DOST), Fisheries and Aquatic Resources Management Councils (FARMCs), local government units (LGUs), the fishing industry, academic/research institutions, and non-government organizations (NGOs). Inherent in the implementation process is the creation (or continuation) of an Octopus TWG to serve as technical support team at the national or local levels. The academe and research institutions (e.g. NFRDI) have a crucial role to play in obtaining and providing scientific data needed in implementing the EAFM plan framework.

Another important component is preparing a strategic Capacity Development program for various stakeholders in the Octopus fishing industry. A workshop to bring together capacity development experts shall be organized by BFAR with the help of the Octopus TWG.



4.7 Sustainable Financing Mechanisms

Sustainable funding mechanisms are crucial to the successful implementation of the OCT-NMFP and fund sourcing should be a shared responsibility among members of the management body and its partner agencies and institutions. While government (thru DA-BFAR) is expected to provide funds for this, there are a number of funding sources, such as other NGAs, the private sector, and financing institutions. The provincial and municipal LGUs may finance certain management actions. These funds may come from the LGUs' internal revenue allotment (IRA) and local revenues from auxiliary invoices, business permits, docking fees, fines, licensing fees, penalties, taxes and user fees from fisheries-related activities. Under the *Mandanas* ruling (i.e., Executive Order 138, series of 2021), the LGUs' IRA is expected to significantly increase in FY 2022, and an appropriate portion of this fund should go into environmental and natural resource (including fisheries) management. The higher education or academic institutions (HEIs), both state universities/colleges and privately owned institutions, have internal funds for research and development (R&D) projects or can access R&D funds from DOST and other NGAs to assist in implementing the OCT-NMFP, and provide high-caliber researchers and resource persons.

Government financing institutions (such as DBP and Land Bank) can provide funding support, particularly for livelihood-related activities. Other possible funding sources are donor agencies or international funding organizations (IFOs). These may include the Asian Development Bank (ADB), US Agency for International Development (USAID), Australian Agency for International Development (AusAID), World Bank and GIZ. The USAID-assisted programs in the Philippines can provide technical assistance particularly with regard to fisheries governance. Project proposals for funding of different management actions in the OCT-NMFP can be submitted to international NGOs and the private sector with interests in fisheries and coastal resource management. A funder's forum will be organized to invite and commit support to the program. An EAFM Business or Investment Plan will be developed to establish a sustainable funding mechanism for the activities under the OCT-NMFP which shall contain the details of management actions, schedule, scope, and detailed funding requirement. As appropriate, the OCT-Management Business Plan will be incorporated into the respective annual investment and/or business plans of the regions and LGUs. This annual investment plan should harness funding opportunities through the Public - Private Partnership (PPP) scheme.

4.8 Communication Plan

Upon adoption of the OCT-NMFP by DA-BFAR a Communication Plan or strategy shall be formulated to broadly communicate the plan and its programs to all stakeholders. A committee of science communication and advocacy experts from BFAR and other agencies shall be convened to formulate the strategy of information sharing with target audiences. A communication, education, and public awareness (CEPA) program shall be designed based on the EAFM components of ecological well-being, human well-being, and good governance. The



communication or CEPA plan shall identify the target audiences (e.g. mayors, fishers, business sector, processing/exporting industry, policy makers, etc.), communication methods, key messages, schedule, and funding requirement.

4.9 Plan Monitoring, Evaluation and Feedbacking

Every management plan should have a built-in Monitoring and Evaluation (M&E) system - a mechanism for review and evaluation of the success and challenges of project implementation, anchored on the principle of multistakeholder participation. In the EAFM planning process, the Project M&E is the second 'reality check' - intended to gauge if the management actions we implement are getting us closer to achieving our goals and objectives. Monitoring refers to the collection of data that are focused on the indicators that, in turn, are linked to the plan's objectives. It is a continuous process that provides information enabling the management bodies to track changes. Monitoring data could either be qualitative or quantitative. Evaluation, on the other hand, is more concerned with collating the results of monitoring and assessing the management performance against benchmarks, and reporting the results through feedbacking to appropriate to management bodies or agencies. The M&E shall be done at regular intervals to obtain the critical information for adaptive management.

This plan's M&E system should include a reporting system, documentation processes, evaluation of performance indicators, implementation mechanisms, and baseline data/information. This M&E scheme/system shall track progress in achieving the goals, objectives, and targets of the OCT-NMFP through time. In this way, accurate and timely feedback will be provided to the implementing units or organizations. The monitoring indicators, frequency and method, targets and evaluation parameters are expected to vary across the three EAF clusters and thus, should be specific to each. A detailed M&E Plan shall be formulated, led by BFAR, after the approval and adoption of the OCT-NMF plan.



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ANNEXES



Annex I

List of Republic Acts (RA) and Presidential Decrees (PD), related to the governance of Philippine Fisheries (*Source: BSC-NMP 2020, with modifications*).

| RA /PD /AC | Year | Title | Description |
|--------------|------|---|---|
| RA No. 10654 | 2015 | An Act to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing | An act to prevent, deter, and eliminate Illegal, Unreported and Unregulated Fishing (IUUF), amending RA 8550, and for other purposes. |
| RA No. 10611 | 2013 | Food Safety Act of 2013 | An act to strengthen the food safety regulatory system in the country to protect consumer health and facilitate market access of local foods and food products, and for other purposes |
| RA No. 8550 | 1998 | Philippine Fisheries Code of 1998 | An act providing for the development, management, and conservation of the fisheries and aquatic resources, integrating all laws pertinent thereto, and for other purposes |
| RA No. 8435 | 1997 | Agriculture and Fisheries Modernization Act of 1997 | An act prescribing urgent related measures to modernize the agriculture and fisheries sectors of the country in order to enhance their profitability, and prepare said sectors for the challenges of the globalization through an adequate, focused, and rational delivery of necessary support services, appropriating funds therefore and for other purposes. |
| RA No. 7394 | 1991 | The Consumers Act of the Philippines of 1991 | An act to protect the interests of the consumer, promote his general welfare and to establish standards of conduct for business and industry. |
| PD No. 1599 | 1978 | Establishment of the 200-mile Exclusive Economic Zone of the Philippines | A decree extending 200 miles beyond and from the baselines from which the territorial sea is measured |
| PD No. 1151 | 1977 | Philippine Environmental Policy of 1977 | A decree formulating a Philippine environmental policy holding each individual responsible for the preservation and enhancement of the Philippine environment and submission of individual environmental statements of all agencies of the government in every action, project, or undertaking significantly affecting the quality of the environment |
| PD No. 704 | 1975 | Fishery Decree of 1975 | A decree revising and consolidating all laws and decrees affecting fishing and fisheries |

Annex 2

List of Fisheries Administrative Orders (FAO) issued by the Bureau of Fisheries and Aquatic Resources (BFAR), pursuant to the provisions of the Republic Act No. 8550 that are related to governance of Philippine Fisheries

(Source: BSC-NMP 2020, with modifications).

| FAO/AC No. | Year of Implementation | Title |
|-----------------|------------------------|--|
| FAO No. 263 | 2019 | Establishment of Fisheries Management Areas (FMA) for the Conservation and Management of Fisheries in Philippine Waters |
| BFAR AC No. 251 | 2014 | Traceability System for Fish and Fishery Products |
| FAO No. 246 | 2013 | Banning the Operation of Danish Seine and modified Danish Seine in Philippine Waters |
| FAO No. 227 | 2008 | Rules and Regulations Governing the Export of Fish and Aquatic Products to European Union Member Countries |
| FAO No. 212 | 2001 | Guidelines on the Implementation of HACCP System |
| FAO No. 211 | 2001 | Requirements for Pre-Processing and Processing Plants the SSOP thereof and the Processing and Quality Requirements for Shellfish |
| FAO No. 210 | 2001 | Rules and Regulations on the Exportation of Fresh, Chilled, or Frozen Fish and Fishery/ Aquatic Products |
| FAO No. 201 | 2000 | Ban on fishing with active gears |
| FAO No. 196 | 2000 | Guidelines on the Creation and Implementation of Fisheries and Aquatic Resources management Council (FARMCs) |
| FAO No. 195 | 1999 | Rules and Regulations Governing Importation of Fresh Chilled / Frozen Fish and Fishery Aquatic Products |



Photo-Documentation