



# COMPREHENSIVE NATIONAL FISHERIES INDUSTRY DEVELOPMENT PLAN

## MEDIUM-TERM 2016-2020

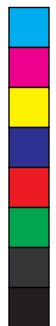
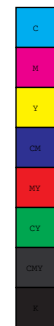
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COMPREHENSIVE NATIONAL FISHERIES INDUSTRY DEVELOPMENT PLAN MEDIUM-TERM UPDATE 2016-2020





COVER PHOTO BELONGS TO  
**PHILIP DAFFON, JR.**  
MAG-AGRI TAYO PRODUCER



# Message

Secretary of the Department of Agriculture



The review and updating of the Comprehensive National Fisheries Industry Development Plan (CNFIDP) 2016-2020 reaffirms our commitment to the Filipino fisherfolk and other fisheries stakeholders.

A roadmap for the fisheries industry, the CNFIDP reinforces crucial reforms we have implemented as we recognize fisheries as the next important source of livelihood in agriculture. We have the National Program for Municipal Fisherfolk Registration or FishR launched in 2013 which has now registered over 1.6 million municipal fisherfolk. An offshoot of the FishR program is the ongoing National Program for Municipal Fishing Vessels and Gears Registration or BoatR, which already registered over 147,000 municipal fishing vessels. To prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing, we have deployed 240 fisheries law enforcers in the country's major fishing grounds. The establishment of Community Fish Landing Centers (CFLCs) were established in strategic coastal communities to lessen fisheries post-harvest losses and reduce poverty.

The CNFIDP 2016-2020 is a product of consensus building among fisheries stakeholders composed of capture fisheries, aquaculture, post-harvest and marketing sub-sectors. Through these consultations, the government and the industry were able to identify appropriate solutions to address the challenges in the fisheries industry. It also enabled industry players to see how they can assist each other in order to ensure that our fishery resources are protected and managed for future generations.

I am confident that through the strength of our partnership, we can achieve the government's aspiration for a better quality of life for fishing communities and its people while we strictly enforce the conservation and management of the country's fisheries and aquatic resources. With CNFIDP, we look forward to the growth of the fisheries sector.

Mabuhay ang Industriya ng Pangisdaan!



PROCESO J. ALCALA  
Secretary

# Message

Undersecretary for Fisheries, Department of Agriculture

National Director of the Bureau of Fisheries and Aquatic Resources



Congratulations to all those who have actively participated and contributed in developing the Medium-term Comprehensive National Fisheries Industry Development Plan for 2016-2020.

The series of workshops we had gone through served as the platform for the industry to collaborate with one another and come up with ways to have an industry that is viable and supportive of inclusive and sustainable growth.

I am excited for the future of the industry, having seen how the stakeholders have shown serious intent in taking part in their own development. It is also worth noting that outside of the industry, we have a robust team of supporters, from the academe and research institutions, NGOs, CSOs, NGAs, and local government partners.

On our part, the BFAR will endeavor to respond to the strategies and actions formulated by the industry and to align the agency's programs in support of the industry's articulated targets for the next five years. I am optimistic that through the CNFIDP 2016-2020, our trajectory will lead to a globally competitive Philippine fisheries.

A stylized, cursive signature in black ink, appearing to read 'Asis G. Perez'.

ATTY. ASIS G. PEREZ  
Lead Convenor  
CNFIDP 2016-2020



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# Acronyms and Abbreviations

ASEAN	Association of Southeast Asian Nations
BFAR	Bureau of Fisheries and Aquatic Resources
BoatR	Municipal Fishing Vessels and Gears Registration System
CAR	Cordillera Administrative Region
CCC	Climate Change Commission
CFLC	Community Fish Landing Center
CHED	Commission on Higher Education
CNFIDP	Comprehensive National Fisheries Industry Development Plan
CSO	Civil Society Organization
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOH-BFAD	Department of Health-Bureau of Food and Drugs
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
EAFM	Ecosystems Approach to Fisheries Management
EU	European Union
EU TRTA	European Union Trade Related Technical Assistance
FeLiS	Fisheries e-Licensing System
FishR	Municipal Fisherfolk Registration System
FLEMIS	Fishery Law Enforcement Management Information System
GAqP	Good Aquaculture Practices
GDP	Gross Domestic Product
GOCC	Government-Owned and Controlled Corporation
GVA	Gross Value Added
HACCP	Hazard Analysis and Critical Control Point
IAS	Invasive/Alien Species
ICCAT	International Commission for the Conservation of Atlantic Tuna
ICRM	Integrated Coastal Resource Management
ICT	Information and Communication Technology
IEC	Information, Education and Communication
IMTA	Integrated Multi-trophic Aquaculture
IOTC	Indian Ocean Tuna Commission
ISO	International Organization for Standardization
IUUF	Illegal Unreported and Unregulated Fishing
JMRL	Joint Mobile Registration and Licensing
LCP	League of Cities of the Philippines
LGU	Local Government Unit
LMP	League of Municipalities of the Philippines
LPP	League of Provinces of the Philippines
MARINA	Maritime Industry Authority
MFDPs	Municipal Fisheries Development Plans
MFOs	Major Final Outputs



## Acronyms and Abbreviations

MSMEs	Micro Small Medium Enterprises
MT	Metric Ton
MTP	Medium-term Plan
MTPDP	Medium-term Philippine Development Plan
NAPC	National Anti-Poverty Commission
NCWC	National Coast Watch Council
NEDA	National Economics and Development Authority
NFRDI	National Fisheries Research and Development Institute
NGA	National Government Agency
NGO	Non-Government Organization
NHTS-PR	National Household Targeting System for Poverty Reduction
NSO	National Statistics Office
OPAPP	Office of the Presidential Adviser on the Peace Process
PCG	Philippine Coast Guard
PCRA	Participatory Community Resource Assessment
PFDA	Philippine Fisheries Development Authority
PNP-MG	Philippine National Police-Maritime Group
PNS	Philippine National Standard
PPPs	Public Private Partnership
R&D	Research and Development
RA	Republic Act
RFMO	Regional Fisheries Management Organization
RSBSA	Registry System on Basic Sectors in Agriculture
SOP	Standard Operating Procedure
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TARGET	Targeted Action to Reduce Poverty and Generate Economic Transformation
TESDA	Technical Education and Skills Development Authority
TWG	Technical Working Group
UP	University of the Philippines
US	United States
VAT	Value Added Tax
VMS	Vessel Monitoring System
WPS	West Philippine Sea

# Executive Summary

## Background

The Fisheries Code, or Republic Act 8850, as amended by RA 10654, mandates that the Bureau of Fisheries and Aquatic Resources develop and implement a Comprehensive National Fisheries Industry Development Plan (CNFIDP).

The CNFIDP's first iteration was in 2006, where a 20-year framework for the improvement of the fisheries industry was developed. Given the socioeconomic and natural resource status at the time of its development, it summarized the problems of the fisheries industry into one: unsustainable fisheries management.

Ten years hence, developments such as new opportunities and challenges in fishing grounds and markets, the ASEAN integration, short return rates of climate change events and other hazards coupled with low coping capacity of the industry; and, pervasive issues such as high poverty incidence rate, depletion of fish stocks, and degradation of fishery habitats, call for an updated medium-term plan for 2016 to 2020.

Meanwhile, the recent paradigm shift from exploitative, demand-driven, production-based fisheries, to a scientific, sustainable, ecosystems-based fisheries management, as well as the 2015 amendments to the Fisheries Code of 1998 will form an enabling environment for the implementation of the medium-term plan.

## Process

The planning and development of the CNFIDP Medium-term Plan was spearheaded by the BFAR, pursuant to the Fisheries Code. The development framework called for a participative, transparent, science-based process, enabling participants to produce targets, strategies, and actions that are specific, measurable, achievable, realistic, and time-bound.

The consultations spanned three, two-day workshops, and involved extensive and consistent attendance from all sectors: capture, aquaculture, post-harvest, and trade and marketing, each forming a technical working group. Participants were from diverse socioeconomic backgrounds and regions.

On the first workshop, presentations were made by representatives of the academe and research institutions on the state of Philippine fisheries for each sector. Baselines were agreed on and targets were developed. The second workshop consisted of breakout sessions where subsectors each performed a SWOT analysis and developed actions. On the third workshop, the sectors integrated actions and identified overarching strategies.

The representatives of the technical working groups attended further meetings to identify crosscutting themes and further polish the action plans.

## The CNFIDP Medium-term Plan 2016-2020

The resulting targets, strategies, and actions developed during the consultative process focuses on the following objectives: 1) sufficient contribution to national food security, 2) inclusive growth within the industry, 3) sustainable, science-based fisheries and aquatic resource management practices, 4) compliance to international laws, policies, and standards,



and enforcement of local laws and regulations, 5) strengthened capacities in infrastructure, technologies, human resource, and information sharing, and 6) resilience to environmental hazards.

Given that the Fisheries Code rules that food security must be the paramount goal for the industry, all targets are identified as increases in production, or actions leading to such (as in decrease in post-harvest losses). However, these increases are gained through the efficiency resulting from a science-based and sustainable fisheries management instead of by exploitative measures.

Overall sectoral targets:

1% annual growth in municipal capture fisheries with considerations of proper management interventions

5% annual growth in commercial capture fisheries in new fishing grounds, or conditioned on positive results on management interventions

Increase in aquaculture production for key species below as well as other high-value species depending on market demand

- 4% annual increase for milkfish
- 6% annual increase for tilapia
- 10% annual increase for shrimp
- 25% increase over 5 years for seaweed
- 10% increase over 5 years for shellfish
- 5.4% increase over 5 years for mud crab

Reduction of post-harvest losses from 25% to 15% in 5 years and 100% compliance of facilities to hygiene and sanitation standards

Increase in value and volume of traded fish and fishery products for domestic and export

Implementation and monitoring

The BFAR has designated a team within the Bureau to oversee the implementation and monitoring of the CNFIDP Medium-term Plan. Partnership will be maintained as is during the planning and development stage to ensure continuity and ownership. The design of the implementation and monitoring and evaluation plans for each strategy or for each sector will necessitate further collaborations from the sectors.

Institutional strengthening

Recommendations were made in the course of the consultations by the industry to upgrade the status of the Bureau as a Department. Several Bills have been drafted and filed. The industry informed the body of its continuing efforts to reach out to Legislators to achieve this goal.



# PART I: INTRODUCTION

COMPREHENSIVE  
NATIONAL FISHERIES INDUSTRY  
DEVELOPMENT PLAN  
**MEDIUM-TERM UPDATE**  
2016-2020

# A. The CNFIDP

## 1. Overview

The Fisheries Code, or Republic Act 8550, as amended by RA 10654, provides the comprehensive legal framework that governs the development, management, and conservation of the country's fisheries and aquatic resources.

Sec. 65(a) of the Fisheries Code mandates that a Comprehensive National Fisheries Industry Development Plan must be developed and implemented by the Bureau of Fisheries and Aquatic Resources (BFAR) through a participative and open process involving the different sectors within the fisheries industry, non-government organizations, and relevant BFAR offices.

The CNFIDP, the Municipal Fisheries Development Plans (MFDPs) and the Comprehensive Post-harvest and Ancillary Business Plan comprise the primary planning systems as indicated in the Fisheries Code.

Developed in the years following 2006, the first CNFIDP aimed to provide a comprehensive framework for promoting the optimal development and long-term sustainability of the benefits derived by the nation from its fisheries.

The CNFIDP provided strategic directions for the Philippine fisheries from 2006 to 2025. Given the state of Philippine fisheries from 2006 and earlier, the CNFIDP identified key problems pervading the industry at the time of its development. The nine (9) key problems and issues and corresponding objectives identified and developed in the CNFIDP 2006-2025 may be referred to in Table 1.

### *Vision:*

*A sustainable and competitive fisheries industry that contributes to food security and provides optimum socio-economic benefits to Filipinos*

### *Mission:*

*To build effective multi-sectoral collaboration and partnership arrangements that empower communities and other stakeholders for responsible stewardship of Philippine fisheries resources and ecosystems*

## 2. Recent developments and pervading issues necessitating an updated CNFIDP Medium-term Plan 2016-2020

The Philippine population has consistently increased over the decades, putting a corresponding, progressive increase in the demand to the country's limited natural resources. The fisheries industry provides both food security and livelihood to millions of Filipinos. Declining fish catch from degraded fishery resources significantly contributed to the high incidence of poverty in the sector, which to date is 39.2% (PSA-NSCB, 2014). Most at risk are the 1.6 million municipal fishers residing in coastal communities. Increasing resource use conflict among fishers has been noted due



TABLE 1. Problems and corresponding objectives identified in the CNFIDP

PROBLEMS	OBJECTIVES
Depleted fishery resources largely brought about by excessive fishing effort and open access regimes	Rationalize utilization of fishery resources
Degraded fishery habitats due to destructive fishing methods, conversion of fishery habitats into economic uses and negative impacts from land-based activities	Protect fishery habitats
Intensified resource use competition and conflict among fisher groups and other economic sectors	Reduce resource use and competition and conflict
Unrealized full potential of aquaculture and commercial fisheries, as there are still underutilized areas for industry developments	Develop full potential of aquaculture and commercial fishing
Uncompetitive products due to inferior quality and safety standards	Promote competitiveness of fishery products
Post-harvest losses in terms of physical, nutritional, and value losses	Minimize post-harvest losses
Limited institutional capabilities, from the local up to the national levels of governance	Enhance institutional capabilities
Inadequate/inconsistent fisheries policies that promote conducive environment for sustainable development	Promote appropriate fisheries policies
Weak institutional partnership among government agencies, civil society organizations and private sector	Strengthen institutional partnerships

to the decreasing fish catch and increasing competition for food. To reduce poverty, the government in its "inclusive growth" strategy has prioritized the fisherfolk among the marginalized sectors to benefit from the recent economic growth. To restore degraded fishery resources, the shift from production-driven to resource-based management has been promoted by the BFAR in the last four (4) years. Apart from restoring habitats and fish supply, a key issue in the fisheries industry is poverty, which is a problem that must be addressed in partnership with LGUs, DSWD, and other development agencies through livelihood and capacity building programs.

In 2011, the Western and Central Pacific Fisheries Commission opened the Pacific High Seas Pocket 1 for the Philippine-flagged vessels. New fishing grounds lead to increased catch enabling us to serve global market demands such as the EU. These global markets require compliance to set rules and standards prior to access. New world trading regime demand that IUU fishing be regulated, to which the Philippines has been successful in addressing. Amendment of the 1998 Fisheries Code by the Republic Act 10654, entitled "An Act to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing," formed the highlight of initiatives on policy reforms. Due to said reforms, the country was able to maintain its access to international markets, in particular the European Union, which imports 39% of our tuna products.

The fisheries industry is also affected by the ASEAN integration, among others, as the ASEAN has identified fisheries as one of its priority integration sectors. In its Fisheries Integration Roadmap, it highlighted a focus on food safety issues, research and development, human resources development, and information sharing with considerations not only on production and trade but also on sustainability of fish stock. Compliance will allow us easier transport across borders and access other previously untapped markets.

In recent years, and in rapid succession, the country has been ravaged by severe weather conditions. Volcanic and tectonic activities have also been observed although not as damaging. In Typhoon Haiyan, municipal fishers were affected greatly, having very low resilience and coping capacity. The BFAR has responded with the AHON project, providing boats and other fishing implements to affected fishers. However, the industry will have to be resilient to increasing environmental hazards through risk reduction measures, insurance access, and response procedures among others.

These developments, opportunities, and challenges described briefly above, call for an updated CNFIDP, which will allow the industry to respond and take advantage of the current situation.

The next section further discusses these developments.

## B. STATE OF THE FISHERIES AND FISHERIES INDUSTRY IN THE PHILIPPINES

### 1. Developments from 2006 to 2015

#### 2006-2010

During these years, as stated by the CNFIDP 2006 analysis, the

#### ***Recent challenges and opportunities:***

*Food security a priority*

*Pervasive poverty in the industry*

*New fishing grounds and global market demands*

industry suffered from unsustainable fisheries management. As a consequence, the ecosystem can no longer produce to increasing demands. Before any development projects can be successfully implemented without putting the fishery habitats through further irreversible damage, the ecosystem that sustained fisheries must be rescued, resuscitated, and rehabilitated.

In these years, the BFAR took to an emergency management approach in order to allow the fishing grounds to recover to productive capacity. The interventions included were Coastal Resource Management and Inland Fisheries Management; the Fish Health Management with laboratories ensuring fish and water quality; Quality Assurance Laboratories; National Stock Assessment Program; Monitoring, Control, and Surveillance and the Bantay Dagat Program for law enforcement, among others.

### 2011-2015

During this period, fisheries management shifted its focus from increasing production, which led to overexploited resources, to protection and conservation through the EAFM or the Ecosystems Approach to Fisheries Management. Habitat restoration, e.g. mangrove planting to rehabilitate abandoned, underdeveloped and unproductive fishponds and other suitable areas was actively pursued.

The first five years of the Aquino government (FY 2011-2016) sowed meaningful and significant developments in the fisheries sector. These developments include compliance to international standards thereby opening access to the international market; management interventions that maintained the balance between sustainable natural resource management and production targets; enhanced law enforcement capacity, and monitoring and regulatory mechanisms; national registration of fishers, vessels and gears with an active online database; and BFAR institutional capacity building.

#### 1.1

##### Gained recognition as a responsible flag/coastal/port/market/state against IUU fishing from the European Commission

Legal and institutional reforms enabled the country to sustain its recognition by the EU as a responsible fishing nation, and thus secure its multi-billion dollar tuna and other seafood export in the international market.

In April 2015, the European Commission lifted the yellow card issued to the Philippines in June 2014 as a result of the country's collective and serious efforts to comply with international regulations and provide the necessary measures to deter, eliminate, and prevent illegal, unreported, and unregulated fishing. Three main issues were addressed in order to attain compliance, these include the need to

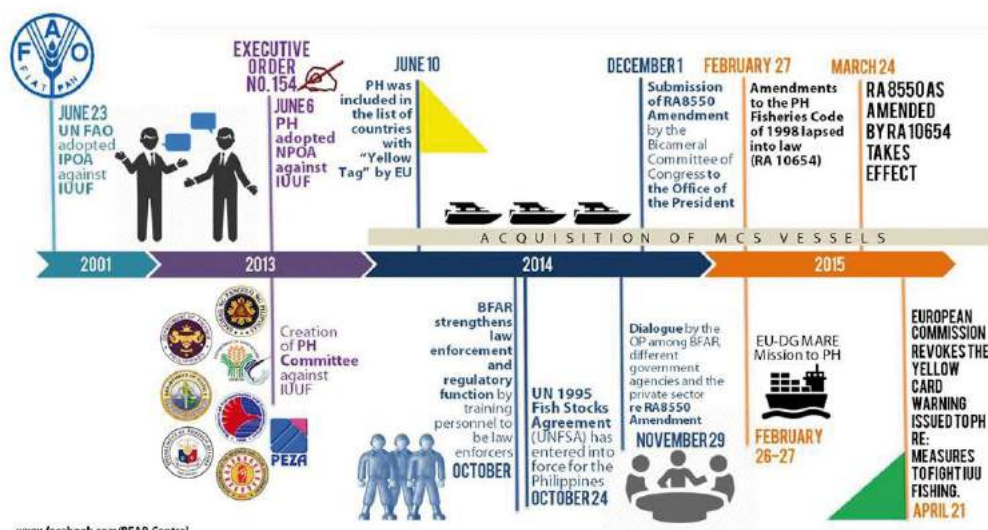


amend RA 8550, the Fisheries Code of 1998; the need to manage long distance vessels; and the need for structural and capability reforms.

### Amendment of the Fisheries Code

The latter part of 2015 saw the passing into law of RA 10654, which amends the Fisheries Code of 1998, thereby strengthening the Philippine policy on IUUF as well as mandating BFAR as a law enforcing body. Apart from this, national legal reforms were undertaken to ensure compliance. EO No. 154 series of 2013 and RA 10654 series of 2015 significantly helped the Philippines to earn said recognition. This, including the GSP+, would further bolster export of PH seafood products to EU countries. For tuna and tuna-like products alone, Philippine export to Europe constitutes 39 percent of total production.

FIGURE 3. Anti-IUU Fishing efforts in the Philippines



### Management of long-distance fishing vessels

BFAR is also fully implementing BFAR Administrative Circular No. 252 s. 2014 on the Rules and Regulations Governing Distant Water Fishing by Philippine-flagged Fishing Vessels. This requires VMS (Vessel Monitoring System) enrollment, observer coverage, landing declaration of catch of all Philippine-flagged fishing vessels fishing in RFMO areas. Vessels carrying the Philippine flag are now being monitored through a fully functional VMS particularly for those fishing in HSP-1, ICCAT, and IOTC areas, including Philippine flag bearing fishing vessels authorized to fish in waters of third countries (i.e. Papua New Guinea).

To improve traceability, an SOP and Checklist for Catch Certification was formulated with the assistance of EU TRTA. Validation Officers and Catch Certifying Officers have been trained on the use of the Checklist.

### Structural and capability reforms

The BFAR continued to fund the process of ISO accreditation for better compliance to international standards of quality operation and management. Regulatory and enforcement personnels have

been increased and trained. Poverty alleviating projects are being undertaken such as TARGET and the National Program for Community Fish Landing Centers.

## 1.2

Management interventions on important fishing grounds abated resource depletion and reduced habitat destruction including occurrence of fish kills, through LGU- and stakeholders-supported management policies and programs

### Closed Seasons coincide with increase in fish stock in Zamboanga Peninsula, Visayan Sea, and Davao Gulf

Strong LGU and stakeholder partnerships on resource management gained grounds during the Aquino governance resulting to the implementation of long overdue closed seasons or ban on fishing to allow the spawning of major fish species. The annual observance of closed season in the waters off Zamboanga Peninsula beginning 2011 inspired other LGUs, such that the imposition of fishing ban in the Visayan Seas in 2012 finally put to end its more than two (2) decades of non-implementation. The National Stock Assessment Program of the NFRDI preliminary results for Zamboanga Peninsula has reported an increase of landed catch of up to 30% and the eggs of sardines were reportedly getting bigger. Moreover, reports from Zamboanga fisherfolks show that larger fishes such as mackerels (tanigue) and tunas have returned to municipal waters. In the Visayan Sea, enhanced law enforcement of the existing closure (FAO 167) is believed to have resulted in increased landed catch and fish biomass of up to 80%. In 2013, Davao Gulf closure began.

While relatively new, NFRDI data shows that the closing of small pelagic fishing from 2013 coincided with observed increases in sizes of certain landed fishes such as small tunas (tulingan) and moonfishes (chabeta). There were also initial reports from Davao Gulf fisherfolks, similar to the Zamboanga experience that larger fishes are now appearing in the municipal waters of the Gulf. The number of LGUs subscribing to integrated bay-wide management, as well as Ecosystems Approach to Fisheries Management or EAFM in contiguous bodies of waters, is also increasing. These efforts are gradually gaining impact as seen from improvement in catches and/or produced from protected habitats despite climate-related and other natural or manmade disturbances.

### Export ban on protected corals and elvers open the market for other exportation of species resulting to increase export earnings

Export and/or smuggling of precious corals, both the black and red corals had been reduced significantly, including that of elvers and sargassum with the stricter implementation of laws and regulations

and law enforcement visibility in problem areas. Incidentally, the reinstatement of the ban on eel fry and elvers in May 2012 led to the opening of export for live yellow eel or kiwet (*Monopterus albus*), once thought of as a pest in rice paddies and fishpond dikes. The BFAR One-Stop Export Documentation Center reported that from 2012 to 2014, the total export of yellow eel spiraled to 13,376 tons valued at US\$91M or an annual average of 4,458 tons compared to only 534 tons valued at US\$4.3M in 2011. The true eel (*Anguilla spp.*), on the other hand, registered only a total of 296 tons valued at US\$2.5M on the same years. The Philippine exports live eel to Japan, Korea, Taiwan and China and increase in export is seen to grow in the next decades due to market demands.

#### [Dismantling of illegal fish cages in Taal Lake results in a 16-fold decrease in fish kill and increased production from 9.3 MT/cage in 2011 to 11 MT/cage in 2014](#)

Fish kill in Taal Lake shrunk 16-fold from 2,619 MT in 2011 to only 162 MT in 2014 or a decrease in value of losses from P236M to P15M as a result of the dismantling of 1,093 illegally-constructed fish cages by the joint Task Force of the DENR, BFAR, PLGU and other partners. The Taal Lake Unified Rules and Regulations on Fisheries allows only a maximum of 6,000 cages in the entire lake area. Vigilance, coupled with proper resource management measures resulted to better water quality, shortened production cycles from 4-5 months compared to 8-9 months in the past and lower incidence of fish kills. Total fish cage production in 2014 reached 65,913MT or an average annual production of about 11 MT/fish cage compared to only 9.3 MT/fish cage in 2011.

#### [Invasive species, Knifefish, containment in Laguna Lake allowed for a 20T ton increase in endemic species production in 4 years](#)

Multi-agency efforts to contain knife fish infestation in Laguna Lake have paid off considerably. Percentage of knife fish from total fish catch dropped from 41% in 2011 to 27% in 2014. Likewise, Laguna Lake fish production, exhibited increasing trend from 140T tons in 2010 to 160T tons in 2014. Catches of endemic species - dalag, ayungin, hito, biya and other species preyed on by knife fish also showed signs of normalcy. Containment strategies include increasing fishing efforts through cash incentives for knife fish caught, distribution of appropriate fishing gears and provision of livelihood training on value-adding coupled with the establishment of mini-processing plant for knife fish products. Other means to eliminate or kill the eggs are also being perfected by BFAR, DOST and academe partners.

### 1.3

#### [Increased logistics and development of unified and inter-relational monitoring, control, and surveillance \(MCS\) and other information](#)



systems result in intensified law enforcement, fisheries management, and regulatory mandates

BFAR law enforcement and regulatory functions had been strengthened with the increase in manpower and logistics complement. From an initial four (4) permanent staff in 2011, a total of 580 trained personnel were deployed nationwide within the year. In addition, 113 units of patrol boats beefed up the existing 14 units of MCS patrol vessels. Inter-agency relational databases, such as the Fishery Law Enforcement Management Information System (FLEMIS), Fisheries e-Licensing System (FeLiS) for commercial fishing boats, Municipal Fisherfolk Registration System (FishR) and Municipal Fishing Boats and Gears Registration System (BoatR), among others were also established during the period. The BFAR had also improved its Vessel Monitoring System or VMS, which tracks the activities of local and international fishing vessels to prevent poaching and other illegal fishing activities.

#### 1.4

Completed municipal fisherfolk registry ensure provision of preferential rights to artisanal fisherfolk, availment of government benefits, including livelihoods to alleviate poverty and promote inclusive growth

With the nationwide and LGU-supported implementation of the FishR program in 2014, over 1.6 million municipal fisherfolk are now registered with the BFAR national database for Municipal Fisherfolk Registry System: a backlog that should have been accomplished by LGUs 16 years ago. To further complete the registry, the municipal fishing boat registration or BoatR is now on its nationwide rollout with expected completion in 2016. Crossmatching of the FishR database with that of the DSWD's NHTS-PR, PhilHealth and RSBSA are being undertaken to enable qualified registered fisherfolk access to health insurance, boat and crop insurance, and other social benefits. The FishR database also served as basis in identifying priority beneficiaries (individuals and communities) for the BFAR livelihood program dubbed as TARGET or Targeted Actions to Reduce Poverty and Generate Economic Transformation, which began implementation in 2015. Close to 40,000 identified fisherfolk will be trained and provided with livelihood interventions in readiness and anticipation of the completed construction of Community Fish Landing Centers in 504 municipalities nationwide.

#### 1.5

Strengthened Bureau of Fisheries and Aquatic Resources (BFAR) portend to further developments in succeeding years

Under the Aquino Government, the BFAR was strengthened to carry its law-enforcement, regulatory, policy and technical and other mandatory functions. By 2016, plantilla items will increase by more

than two-folds from 1,492 in 2010 to 3,462 with the establishment of Provincial Fishery Offices in 81 provinces nationwide. Further, the construction of the National Fisheries complex which will house the BFAR, PFDA and NFRDI is scheduled to be completed starting FY 2016 onwards, giving the BFAR its own edifice after 87 years of existence. The first major amendment of the 1998 Philippine Fisheries Code took effect in the early part of FY 2015.

## C. PROCESS OF PREPARING THE CNFIDP 2016-2020.

### Planning and development process

As mandated by the Fisheries Code, the BFAR led the planning and development of the Medium-Term CNFIDP 2016-2020.

#### 1.1 Development framework

The framework was established by BFAR, highlighting the need for the process to be participatory: from the industry, by the industry; transparent; science-based; and with SMART or specific, measurable, achievable, realistic, and time-bound targets. This would allow for ownership of the plan from all partners, as they have been deeply involved with the planning and decision making.

#### 1.2 Participatory process

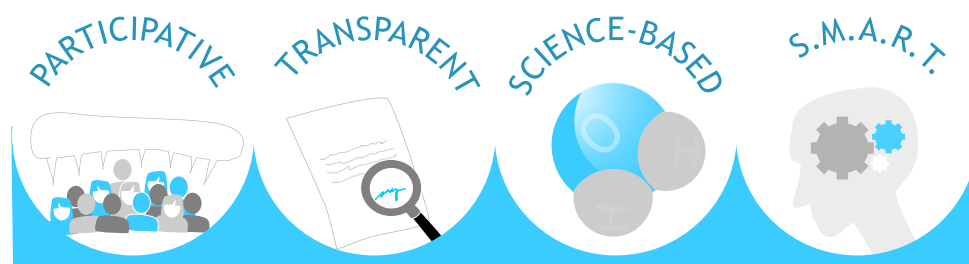
The process builds upon a review and consideration of relevant plans and programs of the BFAR, partner agencies, and the private sector. It draws extensively from the broad participation from all sectors, ensuring that the process is as transparent and participative given constraints of time and place and allowing for a stream of information from the academe and research sectors, businesses, LGUs, other government agencies, and the industry partners themselves, including the forefront and basic unit of fisheries: the fisherfolk. National participation was achieved, most notably with BFAR management interventions such as closed season implementation which was only recently able to gain local support and acceptance after successful implementation and realization of impact by the fishers themselves.

Rule 65.1 of RA 10654 also states that the committee to review and update the CNFIDP shall be comprised of the aquaculture sector, commercial fishing sector, municipal fishing sector, post-harvest sector, civil society organizations, concerned BFAR Offices, and other government agencies among others. Hence, the workshops were participated by the following groups, each forming their own technical working group:

- 1) Capture fisheries - municipal fishersholk; small, medium, and large-

scale fishing companies; suppliers of fishing gears and paraphernalia; NAPC and FARMC representatives

2) Aquaculture sector - major and emerging commodity producers (bangus, tilapia, shrimp, seaweed, crab, eel, shellfish, and other high-



**FIGURE 4** CNFIDP development framework

value products); hatchery/nursery operators; feeds and other input producers/suppliers

3) Post-harvest sector - small, medium, and commercial aquatic products processors; suppliers of packaging materials including spices and ingredients; operators of ice plant and cold storage establishments

4) Marketing sector - exporters and importers of fish and other aquatic products; consolidators; middlemen 5) Other sectors - LGUs (LMP, LCP, LPP), NGOs, CSOs, academe and research institutions, NGA partners (CCC, CHED, DA, DENR, DILG, DOH-BFAD, DOLE, DOST, DTI, MARINA, NAPC, NCWC, NEDA, OPAPP, PCG, PNP-MG, TESDA), and BFAR national and regional key offices

Each of these sectors have internal subsectoral groupings in order to ensure that problems are identified from the smallest unit of organization and no concern is left undiscussed.

### 1.3 Consensus-building

The exhaustive and highly participative planning process is outlined above. Three two-day workshops were held from October to December, one each month to allow for the participants to conduct further consultations with stakeholders, networks, and resource persons outside of the workshops. It also gives them time to take stock of the information they receive during the workshops, and to process them and provide their own inputs.

#### Workshop 1:

- Presentation and analysis of the status of Philippine fisheries
- Identification of baselines
- Agreement on targets





Fisherfolk representatives actively participate in the exchange of ideas during plenary discussions.

In the first workshop, the academe and research units, in particular, UP Visayas, presented the status of Philippine fisheries for each sector. While this allowed the sectors to see their issues framed in a scientific approach, the researchers themselves were able to see how their scientific findings translate into socioeconomic concerns. The sectors validated the presentations of the academe, and provided on-ground experiential data to support the findings. Following the presentations, baselines were identified and agreed upon, followed by identification of targets as informed by the baselines and the sustainable development philosophy. It is important to note that these targets were informed by all inputs from the representatives of the fisheries industry as present in the workshops, as well as by information on the state of fisheries habitats across the country; climate and weather patterns; global economy and international relations; and, concerns and other factors that would not otherwise be discussed and considered should such a diverse and complete group have not been convened.

#### Workshop 2:

- Identification of strengths, weaknesses, opportunities, and threats for each subsector
- Identification of strategies
- Formulation of key activities

Persons present in the first workshop a month previous were also present in the second workshop. This allowed for continuity and the

ability of the group to take discussions further. The goal of the second workshop was to determine how each of the sectors could reach the targets identified in the first workshop. To do this, the sectors have broken down into subsectors: capture fisheries into municipal (coastal and inland), commercial, and distant water fisheries subsectors; and, aquaculture fisheries into brackishwater,



Each workshop group employed SWOT Analysis to help determine strategies that each fisheries subsector must implement to reach its specific targets.

freshwater, and marine subsectors. The trade and marketing and the post-harvest sectors each convened as a group. The eight breakout groups performed a SWOT analysis on their subsectors.

Given the result of the analysis, strategies were identified particularly on how to capitalize on the strengths, maximize opportunities, whether to manage or actively address weaknesses, and how to manage threats especially those the industry has no active control over (climate, for example).



BFAR National Director Atty. Asis Perez leading the consultation during the second workshop.

After the strategies have been identified, the subsectors further worked on how to operationalize these strategies into concrete activities. Through the guidance of the Director of BFAR, the subsectors

ensured that each activity is clear and specific and directly feeds into the overall sectoral targets identified in workshop one; that each activity can be realistically implemented within the five-year term of the CNFIDP MTP 2016-2020; that the actions are set at international industry standards; and that monitoring and evaluation systems are in place in order to report progress and impact.

### Workshop 3:

- Integration of workplans

On the third workshop, on the third month of the participatory planning process, it can be claimed that the commitment from the

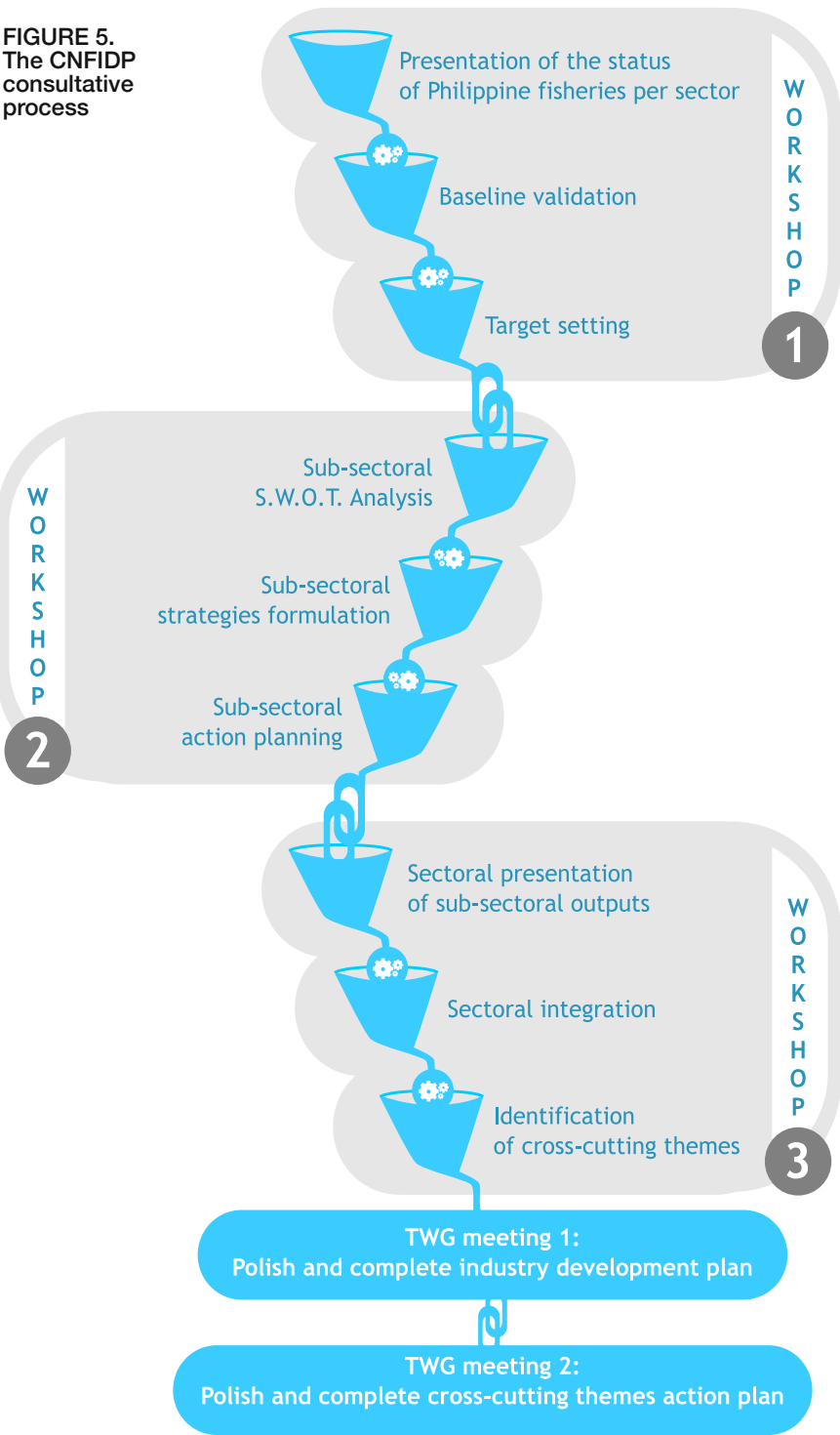
participants have been astounding. At this point, the persons representing their subsectors have become advocates of the process and the MTP 2016-2020 itself, ensuring that when the MTP commences implementation phase, the subsectors will have full understanding and ownership of the project, thereby facilitating acceptance with key communities and actors in the field.

Recalling that on the second workshop, the participants have subdivided into their respective subsectors, the third workshop was structured as a plenary discussion where the subsectors integrate the results from their subsectors to form an action plan with lead and partner agencies/corporations/institutions/organizations, indicative start and end dates, and indicative budgets.

The sectoral action plan presentation allowed the group to identify themes that cut across all sectors. These were clustered into one action plan in order to streamline the plan and to ensure maximization of resources.

After the workshops, the sectors have given approval that a post-workshop TWG composed of representatives from different sectors be allowed to further process and fine-tune the outputs of the workshops for compliance with operational standards without changing what was already discussed and ratified by the industry representatives.

FIGURE 5.  
The CNFIDP  
consultative  
process



### Post-workshop TWG

The group convened two more times, once to verify that the indicative timeframe and budgets for the implementation of MTP is realizable, and second to finalize the crosscutting themes action plan. After the three-month planning process, the completed industry workplan for the Medium-term CNFIDP 2016-2020 was approved by the Director of BFAR following a final presentation.





# PART 2: THE CNFIDP MEDIUM-TERM PLAN 2016-2020

COMPREHENSIVE  
NATIONAL FISHERIES INDUSTRY  
DEVELOPMENT PLAN  
MEDIUM-TERM UPDATE  
2016-2020

## A. Overall targets

To attain the vision of a sustainable and competitive fisheries industry, we must have 1) sufficient contribution to national food security, 2) inclusive growth within the industry, 3) sustainable, science-based fisheries and aquatic resource management practices, 4) compliance to international laws, policies, and standards, and enforcement of local laws and regulations, 5) strengthened capacities in infrastructure, technologies, human resource, and information sharing, and 6) resilience to environmental hazards. To achieve these goals, targets were developed through the combination of science-based information as presented by resource persons from the academe and research institutions, and actual observed situational information from industry frontliners.

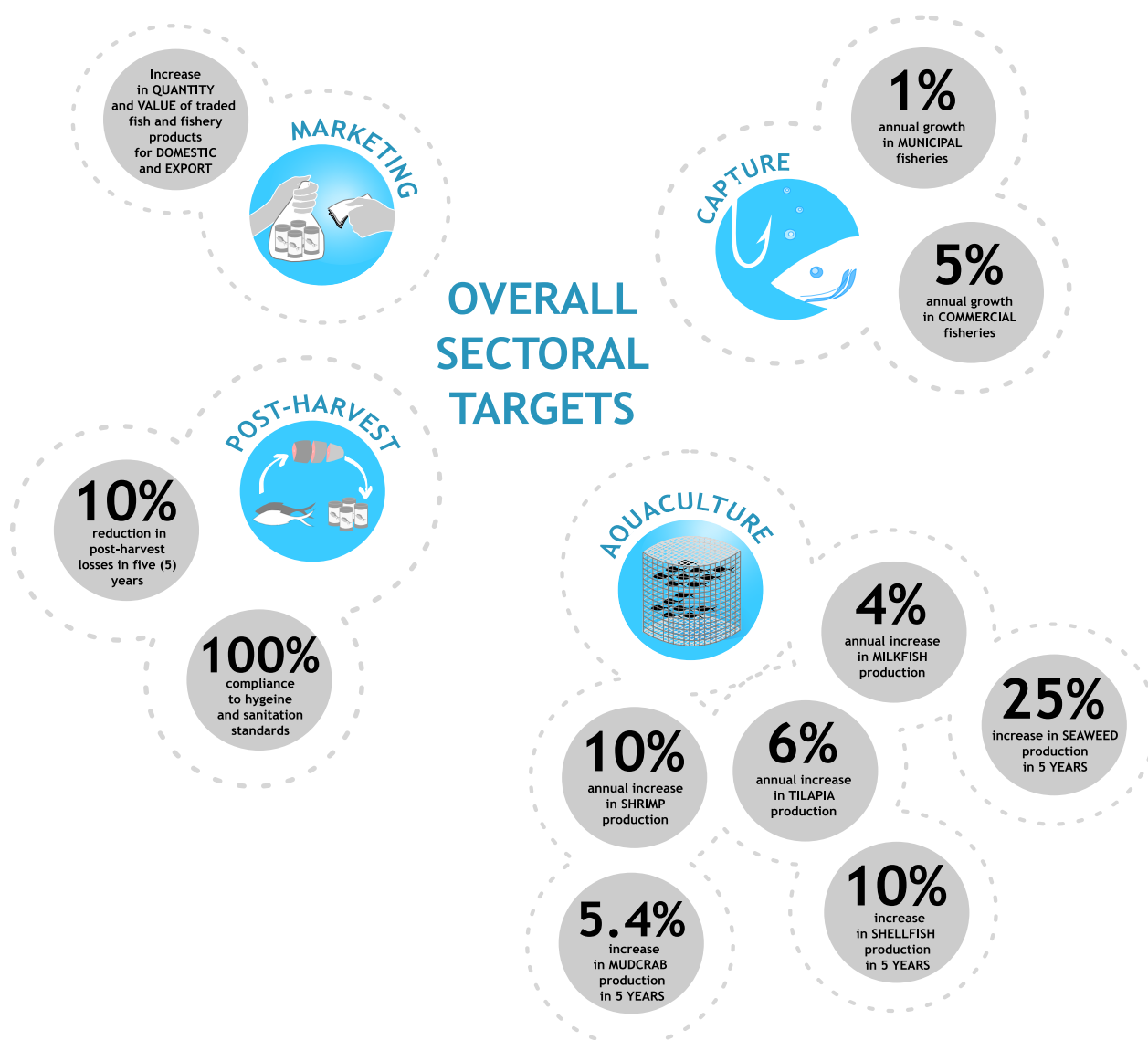


FIGURE 6. Overall sectoral targets

In achieving the primary goal of food security as stated in the amended Fisheries Code, and considering trendlines and demand, it was determined during the planning process that the targets for the CNFIDP Medium-Term Update for 2016-2020 be structured as increase in production. This is not to counter the paradigm shift towards an ecosystem-based management from exploitative production-centric management, but actually, as a result of the shift. One of the features of sustainable and science-based fisheries management is that it actually improves efficiency of fisheries systems, reducing losses, improving catch quality, etc., that an increase in production is achieved without overexploiting fishery habitats and fish stock.

In 2014, municipal capture fisheries produced 1.029 million MT, but it sustained a very high post-harvest loss of a quarter of the total catch, or 25%. Reducing post-harvest losses alone will allow for an increased income for the fishers. There were 252 Community Fish Landing Centers constructed in 2015, and another 252 CFLCs are scheduled to be constructed in 2016. These would allow municipal fishers access to cold storage facilities, improving marketability of products.

Commercial capture and distant water marine fisheries, on the other hand, have produced 1.107 million MT and 106,979 MT respectively in 2014. Dwindling stock has been the challenge for commercial fishers but the establishment of closed seasons has resulted in recovery of stocks as reported by the operators themselves. A sustained increase in the issuance of Catch Certificates, from 4,657 in 2010 to 5,819 in 2011 should also improve marketability of catch and increase revenues for fishers.

Inland capture fisheries have produced 0.2148 million MT in 2014 with the main challenge being the various, and at times clashing, local regulations on access and management of shared fishing grounds. This concern should be addressed by the harmonization of structures and mandates of government units and agencies in the management of wetland, lakes, and reservoirs together with the establishment of inland aquatic habitat quality and capture fisheries.

In aquaculture fisheries, seaweeds, milkfish, tilapia, and shrimps, are the major species farmed, with seaweeds representing 66.29% of total production. Seaweed production is targeted to increase by 25% over the 5-year period with sustained support from the sector.

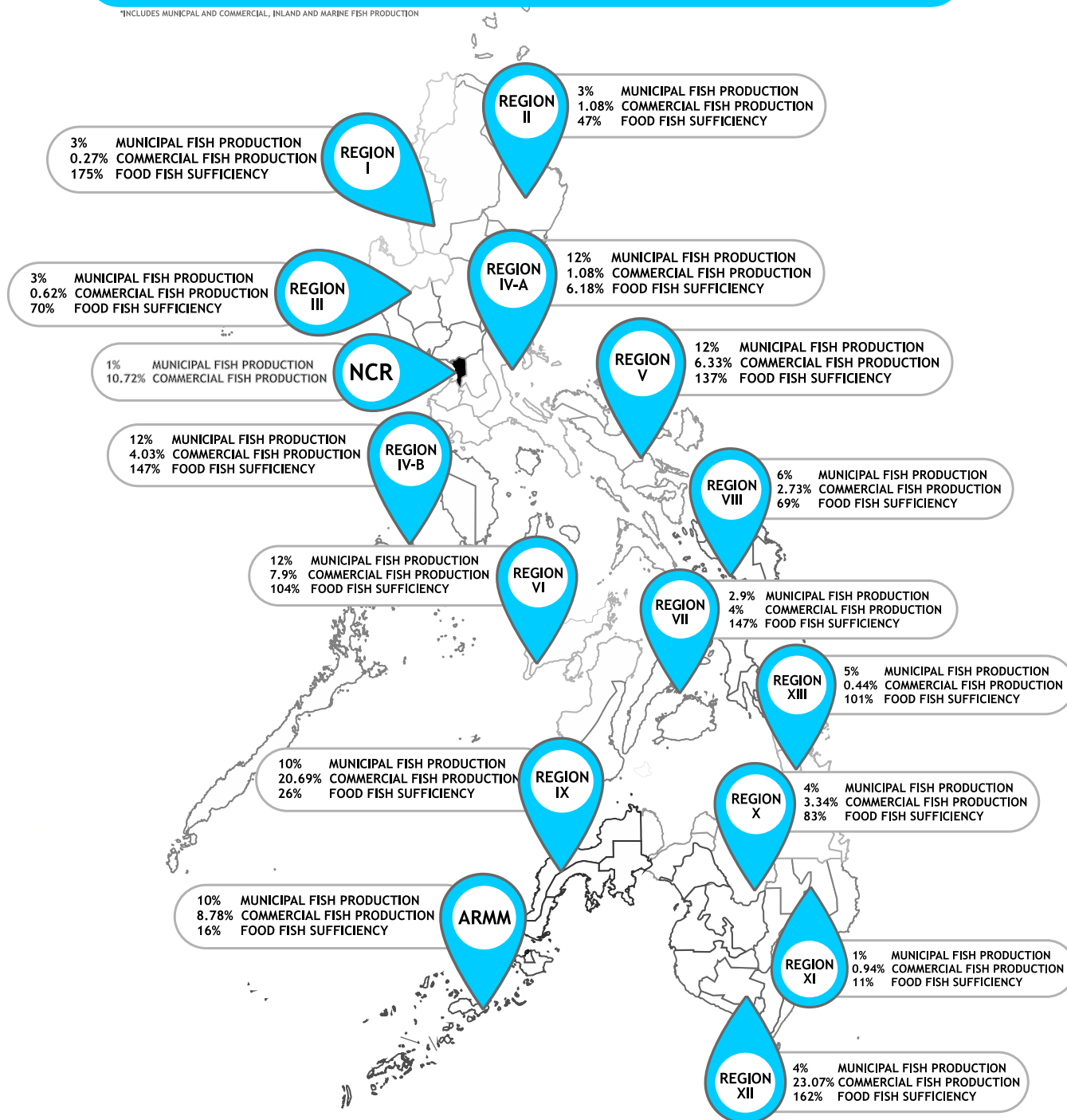
AUU fishponds were reverted to mangrove as part of the restoration of habitats and overall improvement of the ecosystem. Although it would seem that this would cause a decline in production of milkfish, the low utilization of MP areas (459.05 out of 15,5951.77 hectares) would affect production more. Expansion of cage farming and enhancing nursery systems in underutilized fishponds would allow increase in

FIGURE 7

## FISH PRODUCTION\* & FISH FOOD SUFFICIENCY PER REGION

2014

\*INCLUDES MUNICIPAL AND COMMERCIAL, INLAND AND MARINE FISH PRODUCTION





production targeted at an annual 4% for milkfish.

Similarly, shrimp production, which at 2014 was at 59,245 MT, could be increased through the intensification of the Shrimp Health Management Program, currently composed of 14 disease diagnostic laboratories, and 2 recognized laboratories, with a total of 52 trained analysts.

Tilapia production has been reporting deteriorating quality of broodstocks, which could potentially lower production from the 259,198.16 MT produced in 2014 without management interventions. However, the tilapia broodstock development programs were developed to address this concern and a 6% annual increase in production can be expected.

Other species such as shellfish and mudcrab show sustained increases in production, except for mussel, which exhibits highs and lows in a trendline from 2005 to 2014. Hygiene and safety standards are being increased to address this with two pilot sites in Sapijan Bay and Sorsogon Bay identified under the National Shellfish Sanitation Program.

FIGURE 8

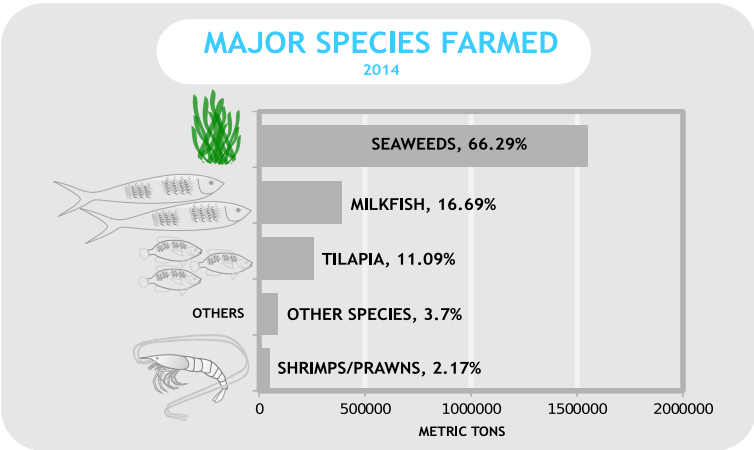


TABLE 2. Compliance and certifications of fishery establishments

GMP recognized fishery establishments	76	EU approved fishing/freezer vessels	78
EU-approved fishery establishments	50	BFAR (HACCP) approved fishery establishments	76
DA accredited cold storage warehouses	239	Halal certified establishments	29
Philippine National Standards at present	18	BFAR testing laboratories	9
BFAR inspection units	17	ISO 17020 certified regional fish inspection units	1

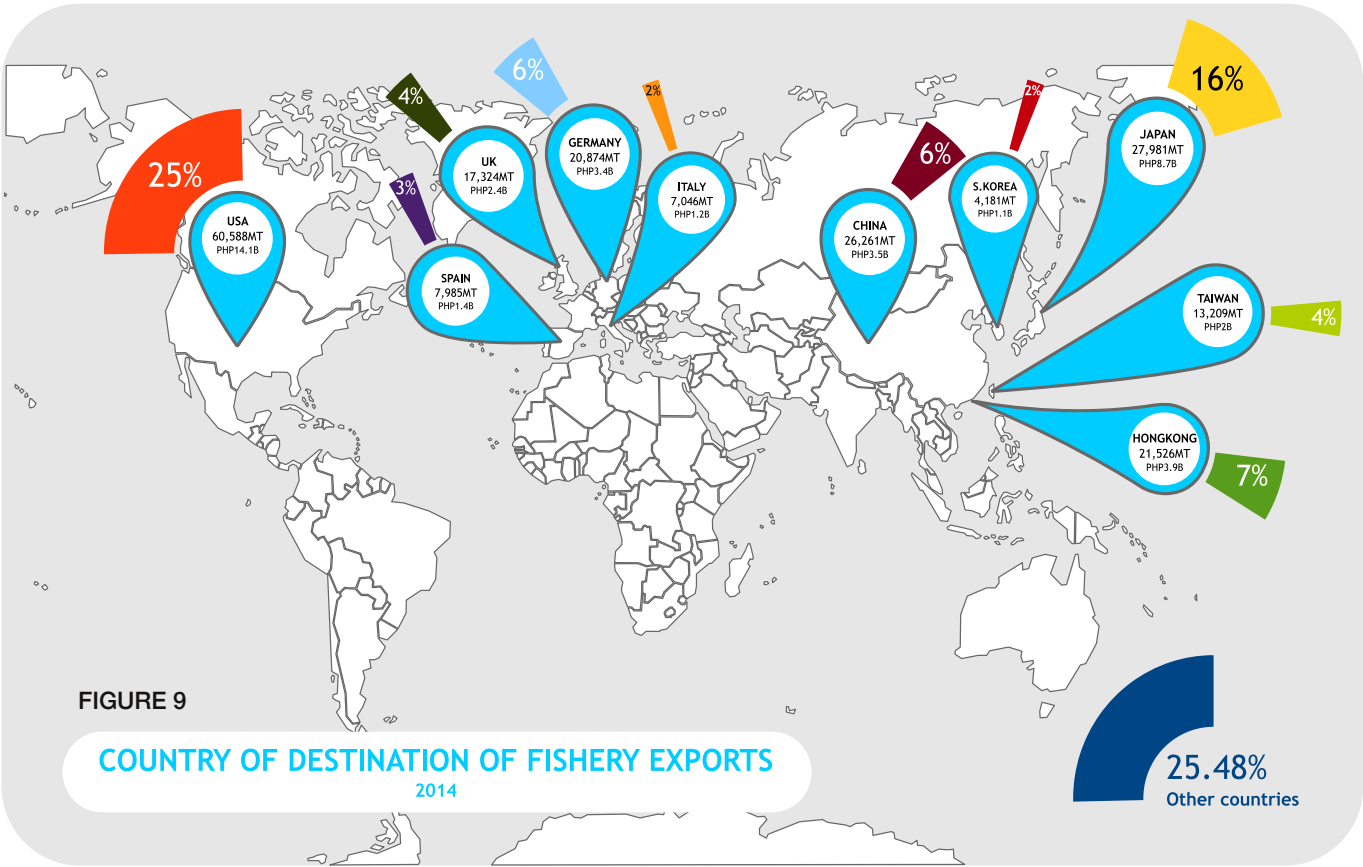
High-value species such as groupers and siganids are also projected to increase depending on market demand. Emerging species in aquaculture and the practice of organic aquaculture are also being developed.

Improved post-harvest processes can greatly maintain the quantity, quality, and marketability of fish produced from capture and aquaculture. Post-harvest losses range from 20-40% of total output with identified causes as improper handling and processing practices and poor and minimal post-harvest facilities.

As of 2004, only 8.7% or 2 out of 23 of the government-owned LGU-managed ice making facilities are operational. Similarly, 11 out of 27 government-owned ice making facilities are

operational and 11 out of 43 government-owned ice storage facilities are operational. Utilizing and developing the non-operational facilities, as well as developing other fishery facilities to be compliant to local and international standards, would greatly reduce post-harvest losses while improving product quality and marketability.

Finally, for trade and marketing, availability of food fish in regions with low fish sufficiency will be enhanced through marketing. The sector will also expand access to both local and international markets. Currently, Philippine fish and fishery products are exported all over the globe, with 124 country destinations in 2014. In terms of value and quantity, US and Japan are the two (2) major destinations of the country's fishery exports (Philippine Fisheries Profile, 2014). Improved quality and compliance to international standards on food safety, traceability, packaging, increased participation in local, locally-held international and international trade fairs and increase in capacitated fishery-based MSMEs would allow for an overall increase in trade over the next five years.



## 1. Capture fisheries

Poverty was identified as the key issue in municipal fisheries, the causes of which were identified as overfishing; habitat degradation; resource use conflict; weak management, monitoring, and enforcement; and slow development of municipal fisheries.

In commercial fisheries, the key issue is non-optimal utilization of marine fishery resources beyond the 15km limit, with the following issues feeding into it: excessive fishing efforts in major traditional fishing grounds, degraded/artificial fishery habitats, intensified resource-use competition, inadequate fishery management systems and structures, limited access to regional/international resources/grounds, and underexploited fishing grounds.

However, with RA 10654, the amendment of the Fisheries Code of 1998, having taken effect March 2015, the BFAR will be able to file criminal and administrative charges to violators, especially in particular to illegal, unreported, unregulated fishing. The Bureau has also already begun to undertake the registration of boats (including municipal fishermen, multiple/shared ownership, etc.) and fishers in the FishR and BoatR projects. As these are recent developments, we have yet to evaluate their impact, but the effects are slowly becoming apparent, especially in the improvement of management, monitoring, and enforcement; conflict resolution and management as well as the protection of fishers when in high seas and contested areas.

While we may expect to see a significant decline in IUUF in the next five years, we have yet to work on a socioeconomic mechanism to get fishers from beyond the poverty line. According to the Philippine Statistical Authority: Fishermen consistently posted the highest poverty incidences among the nine basic sectors in the Philippines in 2012 at 39.2%. Also, 5 of the 9 basic sectors consisting of fishermen, farmers, children, self-employed, unpaid family workers and women, have higher poverty incidence than the general population estimated at 25.2% in 2012 (2014). In the 2002 data from NSO, 86.99% of fishers or 1.781 million fishers are working in the municipal level, most of which are low-income areas.

With such a wide scope, the capture fisheries TWG has developed 20 actions for implementation in the next five years. These are clustered in six (6) thematic areas as seen in the table below.

TABLE 3. Capture fisheries strategies

# CAPTURE FISHERIES STRATEGIES

## Strategy 1:

Determine new fishing grounds and expanding access to fishing grounds

Identify, develop, and/or negotiate potential areas from inland and marine waters through partnership between government and private sector and strengthen security for fishing operations especially in the West Philippine Sea

Work with LGUs to open/re-open fishing grounds for ornamental fishes harvesting using sustainable, equitable, and legal means

Protect Philippine vessels in distant waters through presence of "whiteship" (PCG and BFAR), research vessels, and Navy boats where applicable; and, documentation of Philippine Navy harrassments

## Strategy 2:

Strengthen Anti-IUUF measures

Intensify Information, Education, and Communication (IEC) activities on resource conservation measures and compliance of fishery laws

Delineate and zone coastal land and water uses to resolve conflicting uses with Comprehensive Land Use Plan

## Strategy 3:

Implement science-based conservation and management measures

Implement science-based measures to rehabilitate domestic stocks

Prevent introduction/containment of invasive/alien species (IAS)

Restore fishery habitats (mangroves, sea grasses, coral reefs, wetland, and inland bodies of water) through protection and rehabilitation including pollution control

Set reference points/harvest control rules

Work for the passage of ordinances for the implementation of 10.1 - 15km by small and medium scale commercial access subject to existing laws

Revisit and review the 15km distance to include the study of bathymetry and topography

Protect spawning grounds and spawning cycles based on research and using a participatory process

Develop inter-LGU Integrated Coastal Resource Management (ICRM) plan based on PCRA



# CAPTURE FISHERIES STRATEGIES

## **Strategy 4:**

Promote the use of appropriate and updated technology

Promote the use of fishing gears and boats/vessels

## **Strategy 5:**

Facilitate livelihood opportunities

Strengthen/ Facilitate/ Capacitate organizations of registered fisherfolk multi-purpose cooperatives and associations to enhance access to financial services and livelihood opportunities and other purposes especially for municipal fisherfolks

Identify and establish women-managed areas

## **Strategy 6:**

Improve reporting compliance and maintaining database

Improve boat/vessel and gear licensing including compliance to catch documentation requirement

Sustain political will among implementing agencies through synchronized and coordinated efforts, ex. Joint Mobile Registration and Licensing (JMRL)

## 2. Aquaculture fisheries

Philippine aquaculture production has dramatically increased in the last three decades. However, it declined and registered negative growths, in 2012 (-2.54 %) and in 2013 (-6.63%) and continued until 2014, attributable to the decline in the production of most commodities with significant reduction in the production of seaweeds for the period 2012 and 2013.

Nevertheless, the outlook for foodfish production is bullish especially for major commodities like milkfish and tilapia, which peaked in 2008, then declined in subsequent years. It showed a certain level of recovery starting 2011 but declined slightly in 2014 caused by both natural disasters and possibly, stricter implementation of regulations like the reduction of culture structures (Taal Lake) or complete cessation of culture operations in some areas (e.g. Magat Dam). Shrimps stay at around 50,000 MT while oyster and mussels had not breached half that volume for a long time. High value finfish species did not show any significant contribution either. Production of grouper and siganids have been oscillating below the 30,000 MT mark. These are indicative of the challenges faced in the sustainable production of these species in marine aquaculture.

The shift to the coastal marine environment for aquaculture expansion is the most viable option in the foreseeable future. About 67 mariculture parks (MPs) had been established by BFAR in collaboration with LGUs but only an estimated 43 operational. The increasing contribution of marine cages to the total milkfish supply might drive conversion of grow-out milkfish ponds to nursery systems to support the requirements of the milkfish cage industry. As with all sectors, aquaculture must ensure that it is climate resilient, with mechanisms in place to allow for quick recovery after disasters. For long-term sustainability, aquaculture must aim for precision and reliability. This necessitates complete control of aquaculture production systems and processes through persistent innovations, modernization and reduction of human errors. Empirical evidence points to human engagement as the key factor affecting sustainability and profitability of aquaculture operations. The way forward is automation and mechanization that should diminish uncertainties caused by human frailties.

For these reasons the following strategies and actions have been developed for implementation under the aquaculture sector as part of the CNFIDP MTP 2016-2020.

TABLE 4. Aquaculture fisheries sector strategies

# AQUACULTURE STRATEGIES

<b>Strategy 1:</b> Secure quality fry/seed supply through coordinated investments in propagation facilities (broodstock, hatcheries, nurseries, laboratories)
<b>Strategy 2:</b> Institutionalize Good Aquaculture Practices (GAqP) for key commodities and promote sustainable aquaculture
<b>Strategy 3:</b> Assure quality and treceability of aquaculture inputs and outputs
<b>Strategy 4:</b> Invest on species with high commercial potential
<b>Strategy 5:</b> Optimize operation of mariculture parks
<b>Strategy 6:</b> Ensure climate/disaster resilience of the aquaculture sector

### 3. Post-harvest fisheries

The two core problems stated in the CNFIDP 2006-2025 concerning post-harvest fisheries are post-harvest losses and uncompetitiveness of fish and fishery products. From 2006 until now, there seems to be no significant reduction of post-harvest losses in the country. Almost the same post harvest handling practices exist in different fish landing and trading facilities in the country. Causes of these losses in any supply chain are still prevalent. Approximately 25% of the fish is lost in the entire supply chain of each commodity where existing practices in each of the steps of any fishery supply chain both from capture and aquaculture sub-sectors can potentially contribute to losses. Most recent data from the Philippine Statistics Authority (PSA, 2015) reveal that the fish products with the lowest values for net food disposable are milkfish, roundskad, and tuna at about 60%.

Though Philippines has eight regional fish ports being managed by the Philippine Fisheries Development Authority and 86 municipal fish ports being managed by their respective local government units, majority of the fishers still have limited access even to simple ice making/plant facilities. Some of our fish and fishery products have been experiencing export refusals and detentions (BFAR 2015) despite the presence of rules and regulations related to food safety in the country. Interestingly, cases of refusal and detention of Philippine fishery products in the export market due to varied reasons have been decreasing recently.

In addition to the locally produced fishery products, there has been an influx of imported products in the market, putting significant strain on local manufacturers. Considering the existing strict rules and regulations in other countries for our export products and the limited control of the entry of imported products in the Philippine market, coupled with the incentives being given to these imported goods, the playing field is not at all balanced, for it puts the local players in a very disadvantageous position.

Another way of increasing the competitiveness of Philippine fishery products is via the production of new and varied forms of product through utilization of processing waste. This does not only increase the variety of available products in the market, it is also beneficial to the manufacturers (i.e. increased income via zero waste approach), and to the environment as well (i.e. less solid and water waste disposal to the environment).

Presently, there has been an increasing trend in the utilization of fishery by-products and processing wastes in the Philippines and elsewhere, which would benefit from an increase in production. Apart



from this, we can also improve export marketability by ensuring that our packaging technology is at par with international standards.

Given this scenario, the post-harvest TWG has developed the following strategies and actions in order to improve post-harvest facilities, increase the production of value-added products, comply with international standards to ensure global competitiveness, improve fisher economic standing through livelihood support, and ensure that there is equity on incentives for both domestic and foreign companies.

TABLE 5. Post-harvest fisheries strategies

## POST-HARVEST STRATEGIES

<b>Strategy 1:</b> Improve fisheries post-harvest and cold chain technology and facilities
<b>Strategy 2:</b> Increase production of value-added products from fish and fishery by-products/processing wastes
<b>Strategy 3:</b> Improve compliance of fishing establishments to relevant national and international regulations
<b>Strategy 4:</b> Increase and strengthen fishery-based livelihood and entrepreneurial programs in coastal communities
<b>Strategy 5:</b> Formulate and implement consistent policies on granting of incentive and other support services to all domestic or national companies vis-a-vis grants to foreign companies in relation to post-harvest fisheries

## 4. Trade and marketing

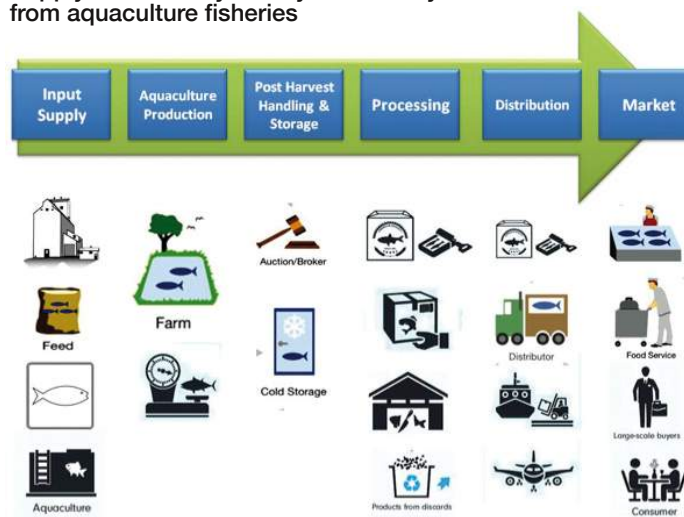
Trade and marketing play a critical role in the entire supply chain of all fishery commodities. These include all activities that lead to the sale of commodities at different stages – from the culture or capture of any commodity up to their sale either as raw material or as semi-processed or processed goods. As shown in the figure below, trading and marketing activities are done in almost all of the stages in any aquaculture supply chain, from the input supply to aquaculture facilities until the end processed products are distributed in the different markets, both domestically and globally. The same observation can be said with the supply chain for fishes captured from the wild (Yap, E. E. S. and Diaz, A. G. 2016. Status of the Philippine Fisheries Trade and Marketing).

The domestic markets for fish and fishery products are facing the perennial problem of limited marketing networks to enable distribution of the products from highly productive areas to food-fish deficient areas.

Inadequate transport service providers resulting to high cost of distribution of fishery raw materials and finished products for domestic movement, smuggling incidence, limited infrastructure and post harvest facilities for proper trade and marketing are quite apparent; and therefore need proper attention. In particular, most of the fish trading facilities in the country, including some of the regional fish ports, the municipal fish ports, and the wet markets need improvement, not only with their infrastructures, but with their facilities for proper post harvest handling and storage, prior to trading of any fishery commodities.

In the export market, problems and constraints are usually related to (1) limited market access; (2) marketability and competitiveness of

**FIGURE 10.**  
Supply chain of any fishery commodity from aquaculture fisheries



**FIGURE 11.**  
Supply chain of any fishery commodity from capture fisheries



Philippine seafood products in terms of product variety, packaging, labeling, etc.; (3) unstable market prices; (4) the existence of trade measures (SPS and conservation measures); (5) stringent and tedious export-import procedures; and (6) export rejection at the border of the importing countries. Reported reasons for export rejection at the borders of importing countries include, but not limited to, the following: (a) food quality issue, such as presence of filth and substandard end products; (b) food safety issues such as the presence of microbial, chemical and physical contaminants; and (c) non-compliance to regulatory requirements (e.g. EU approval, US Seafood HACCP, HALAL certification, etc.).

Apart from the challenges faced by the domestic, import and export markets, as well as the Micro, Small, Medium Enterprises (MSMEs), there are also challenges related to basic needs such as food security, livelihood, and employment opportunities, evident of the 39.2% poverty incidence rate in those employed in the fisheries sector.

For the Medium-term 2016-2020, the trade and marketing sub-sector has set the overall goal as increase in quantity and value of traded fish and fishery product for domestic and export. To achieve this goal and to address the aforementioned challenges, the sub-sector has identified six (6) main strategies such as (1) Expand the market for sustainable fish and fishery products (domestic and export); (2) Ensure the availability of sufficient supply in foodfish-deficient areas; (3) Increase the number of capacitated and competitive fishery-based MSMEs that can enter the market (domestic and export); (4) Establish a comprehensive market information system; (5) Strengthen enforcement of laws, policies and regulations related to trade and marketing; and (6) Enhance capacity and competency of fishery institutions, manpower and professionals (LGUs, NGAs and other industry players), specific to marketing. Furthermore, the specific activities corresponding to the identified strategies are cited in the Annex .

TABLE 6. Trade and marketing sector strategies

# TRADE AND MARKETING STRATEGIES

<b>Strategy 1:</b> Expand the market for sustainable fish and fishery products for both domestic and export trade
<b>Strategy 2:</b> Ensure the availability of sufficient supply in foodfish-deficient areas
<b>Strategy 3:</b> Increase the number of capacitated/competitive fishery-based MSMEs that can enter the market
<b>Strategy 4:</b> Establish a comprehensive market information system
<b>Strategy 5:</b> Strengthen the enforcement of laws, policies, and regulations related to trade and marketing
<b>Strategy 6:</b> Enhance capacity/competency of fishery institutions, manpower, and professionals (LGUs, NGAs, academe, and other industry players) specific to marketing



## 5. Crosscutting themes

Several crosscutting themes emerged during the workshops and indeed necessitated a separate consultation meeting in order to flesh out and finalize.

The underlying and unifying concept behind these crosscutting themes is equity. Fisheries is an industry that not only contributes Php197 billion to the country's Gross Domestic Product, it also is one of the main food sources from most of the low-income coastal barangays. The BFAR understands that as much as it deals with fishing conglomerates, it also deals with households sharing ownership of a one-man boat, the fish vendors, the fisheries students in rural universities and technical schools. Hence, the CNFIDP MTP 2016-2020 has projects that will be implemented across all fisheries subsectors in order to promote a more equitable socioeconomic environment.

With easy access to credit and livelihood programs in place, municipal fishers will be able to scale up in production, for example, in being able to afford post-harvest technology. However, being able to afford technology is one thing, being able to use them, is another. There are a lot of islands and islets that do not have access to electricity and they will greatly benefit from alternative, affordable, and accessible sources of energy. Apart from electrification, it is also proposed to improve infrastructure that would benefit all sectors.

Larger businesses will appreciate that BFAR not only imposes sanctions but also provides monetary incentives to encourage positive response and support to regulations and management strategies. Having a Fisheries attaché will facilitate faster trade agreements as well as discuss fishing boundaries and territorial claims; this should increase safety of fishers as well as proper custodianship of our offshore natural resources.

In line with breaking the cycle of poverty as well as ensuring that our aquatic resources will have future custodians, and given that we have more water resources than we do land, it is only fitting to have more persons formally trained in fisheries. In 1989, 78% of coastal household heads have not completed elementary education. Only 30% of students who enrolled in first grade went to high school because of pressing economic demands: they had to leave school and earn for their families; leaving school also removes the need for the family to allot money for school-related expenses. These coastal households were also found to have poor access to basic necessities such as potable water source, sanitation facilities, and electricity. A scholarship program for fisheries education and strong and extensive linkages with agencies and learning institutions across the Philippines

will provide a mechanism for a future fisher population that is well trained and able to employ a scientific approach to their fishing activities.

Finally, as the fisheries sector gains more positive media, the industry must have communication resources, materials, and technology that are at par with the media industry standards. This should facilitate faster communications throughout the fisheries sector and between all other industries.

## 6. Moving forward

The CNFIDP Medium-term Plan 2016-2020 is just the beginning of more collaboration and partnerships. It is meant to be a living document that responds to development trends; to external, uncontrollable factors affecting the industry; and, to internal, pervasive issues plaguing the industry. Bearing that in mind, the BFAR will continue to take the lead in working towards the objectives of the CNFIDP while maintaining linkages to academic and research institutions, partners in the industry, development agencies, government institutions, LGUs, CSOs, NGOs etc. who from planning partners have now become implementing partners. As a next step, detailed implementation plans will be designed per sector, and as needed, per action. Following that is the design of monitoring and evaluation plans to track progress. Impacts may be assessed at least one to two years after full implementation of the plan.

TABLE 7. Crosscutting themes strategies

## CROSSCUTTING THEMES STRATEGIES

<b>Strategy 1:</b> Facilitate access to credit
<b>Strategy 2:</b> Develop insurance programs for fisheries involving fishery products, fisherfolk, and facilities
<b>Strategy 3:</b> Provide tax and other incentives
<b>Strategy 4:</b> Enhance convergence of livelihood/ entrepreneurial programs
<b>Strategy 5:</b> Develop/strengthen/harmonize information and communication technologies (ICT) in fisheries
<b>Strategy 6:</b> Provide infrastructure and mechanization support for all fisheries sectors
<b>Strategy 7:</b> Provide alternative/affordable source of energy for fisheries applications, including electrification for areas without
<b>Strategy 8:</b> Collaborate with concerned agencies to enhance fisheries education
<b>Strategy 9:</b> Expand fisheries scholarship program
<b>Strategy 10:</b> Establish Fisheries Trade Attaché



## ANNEXES:

CAPTURE FISHERIES WORKPLAN

AQUACULTURE FISHERIES WORKPLAN

POST-HARVEST FISHERIES WORKPLAN

TRADE AND MARKETING WORKPLAN

THE STATE OF CAPTURE FISHERIES IN THE PHILIPPINES

THE STATE OF AQUACULTURE FISHERIES IN THE PHILIPPINES

THE STATE OF POST-HARVEST FISHERIES IN THE PHILIPPINES

THE STATE OF FISHERIES TRADE AND MARKETING  
IN THE PHILIPPINES

COMPREHENSIVE  
NATIONAL FISHERIES INDUSTRY  
DEVELOPMENT PLAN  
**MEDIUM-TERM UPDATE**  
**2016-2020**



## Capture Fisheries Sectoral Workplan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization/ Entities	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
1. Identify, develop and/or negotiate potential areas from inland and marine waters through partnership between government and private sector and strengthen security for fishing operations especially in the West Philippine Sea.	(1a) Inventory and mapping of fishing grounds							20,000	30,000	30,000			80,000					BFAR/ NFRDI	NAMRIA, DENR-BMB, LGUs, FARMCs, POs, Fishing Companies/ Associations, Research Institutions, NGOs, DFA, DND, PCG
	(1b) Identify potential fishing grounds including women- managed areas							5,000	5,000	5,000			15,000					BFAR/ NFRDI	NAMRIA, LGUs, FARMCs, POs, Fishing Companies/ Associations, Research Institutions, NGOs, NAPC-AFSC
	By BFAR												-						
	In collaboration with the private sectors												-						
	(1c) Review status of stocks and habitat							2,000	5,000	5,000			12,000					BFAR/ NFRDI	academe and research institutions, NGOs, fishing companies
	By BFAR												-						
	In collaboration with the private sectors and other partners												-						
	(1d) Develop and introduce management plan for fishing grounds								3,000	3,000			6,000					BFAR	LGUs, FARMCs, POs, Fishing Companies/ Associations, Research Institutions, NGOs
	(1e) Set harvest control rules												-						
	(1f) Identify appropriate gears and boats/vessels												-						
	(1g) Introduce and implement programs												-					BFAR and LGUs	FARMCs, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	CBRCM												-						
	IRM									1,500	1,000	1,000	3,500						
	EEZ									20,000	20,000	20,000	60,000						
	DISTANT WATERS									20,000	20,000	20,000	60,000						
	EAFM									5,000	5,000	5,000	15,000						
	(1h) Identify potential fishers												-					BFAR and LGUs	FARMCs, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(1i) Negotiate agreements where applicable							2,000	3,000	2,000	1,000	1,000	9,000					BFAR	DFA, Fishing Companies/ Associations
	(1j) Formulate regulations/ ordinances where applicable								5,000	5,000	5,000	5,000	20,000					BFAR and LGUs	FARMCs, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(1k) Issue License/ Permits including orientation of fishers									1,200	1,200	1,200	3,600					BFAR and LGUs	
	(1l) Fishing operations									30,000	30,000	30,000	90,000					Fishers	
	(1m) Report fish catch and fishing efforts									1,000	1,000	1,000	3,000					Fishers	BFAR, LGUs
	(1n) Monitor catch and fishing effort									10,000	10,000	10,000	30,000					BFAR and LGUs	FARMCs, POs, Fishing Companies/ Associations, NGOs, Women's Organizations/ groups
	(1o) Procurement of patrol boats and aircrafts/ drones								500,000	500,000			1,000,000					BFAR, PCG, PN, LGUs, PAF, PNP MARITIME Group **by agency	
	(1p) Conduct visibility patrol							75,000	125,000	175,000	175,000	175,000	725,000					BFAR	PCG, PN, LGUs, PAF, PNP MARITIME Group
	(1q) Provide security escorts for fishing vessels								100,000	100,000	100,000	100,000	400,000					PCG	BFAR, PN, National Coast Watch Council (NCWC)
	Sub-total							104,000	776,000	913,700	369,200	369,200	2,532,100						

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		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
2. Work with LGUs to open/re-open fishing grounds for ornamental fishes harvesting using sustainable equitable and legal means	(2a) Coordinate with LGUs and FARMCs and conduct proper consultations							500					500					Phil. Tropical fish Exporters/ Ornamental Fishers	FARMCs, POS, women's groups, LGUs,
	(2b) Identify potential fishing grounds including women- managed areas							500					500					LGUs	FARMCs, POS, women's groups, Phil. Tropical fish Exporters/ Ornamental Fishers
	(2c) Review status of stocks and habitat							1,000					1,000					BFAR/ NFRDI	LGUs, Academe, FARMCs, Private Sector
	(2d) Develop and introduce management plan for fishing grounds							1,000					1,000					LGUs	BFAR, Academe, FARMCs, Private Sector
	(2e) Conduct training on sustainable means of harvesting to include proper transport methods							3,000					3,000					Private Sector	LGUs, Academe, FARMCs, Private Sector, Pos, Women's Group, BFAR
	(2f) Formulate regulations/ ordinances where applicable							1,000					1,000					LGUs	BFAR, Academe, FARMCs, Private Sector
	(2g) Issue Permits including orientation of fishers							200	250	250	250	250	1,200					LGUs	Private Sector
	(2h) Fishing operations							500	500	500	500	500	2,500					Fishers	Private Sector
	(2i) Report fish catch and fishing efforts							250	250	250	250	250	1,250					Fishers	LGUs, Private Sector
	(2j) Monitor catch and fishing effort							1,000	2,000	2,000	2,000	2,000	9,000					LGUs	Fishers, Private sector, BFAR, FARMCs
	Sub-total							8,950	3,000	3,000	3,000	3,000	20,950						
3. Implement science-based measures to rehabilitate domestic stocks	(3a) Identify stocks that needs rehabilitation							1,000	2,000				3,000					BFAR/ NFRDI	FARMCs, POS, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(3b) Identify potential measures and available technology							2,000	3,000				5,000						
	(3c) Conduct studies on natural productivity							4,000	4,000	4,000	4,000	4,000	20,000						
	(3d) Conduct studies including food-based approach to open water species							7,000	10,000	10,000	10,000	10,000	47,000						
	(3e) Draft FAO								2,000	3,000	3,000	3,000	11,000					BFAR and NFARMC	
	(3f) Implement rule 65.2 of RA 10654 (Consultation Process)								3,000	3,000	3,000	3,000	12,000					BFAR	
	(3g) Promulgate and implement FAO								5,000	5,000	5,000	5,000	20,000						
	(3h) Monitor for compliance									720	720	720	2,160						
	(3i) Conduct stock enhancement and/or implement measures							3,000	5,000	5,000	5,000	5,000	23,000					BFAR and LGUs	
		Sub-total							17,000	34,000	30,720	30,720	30,720	143,160					
	(4a) Conduct orientation on the new provisions of RA 10654							4,000	4,000	600	600	600	9,800					DILG/BFAR	LGU, FARMCs, POS, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4b) Harmonize MFO with RA 10654							8,000	8,000	3,000	3,000	3,000	25,000					LGU/BFAR	FARMCs, POS, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4c) Conduct inventory of licensed fishing boats/ vessels and gears							5,000	5,000	1,000	1,000	1,000	13,000					BFAR and LGU	MARINA, FARMCs, POS, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4d) Sustain BoatR/ FishR Programs							9,000	9,000	9,000	9,000	9,000	45,000					LGU	BFAR, FARMCs, POS, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4e) identify and map areas with rampant illegal fishing activities/ hotspots							100					100					LGU	

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		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
<b>4. Strengthen Anti-Illegal Unreported and Unregulated Fishing (IUUF) Measures</b>	(4f) Organize enforcement teams Bantay Dagat, Bantay Lawa, QRT, etc.							15,000					15,000					LGU and BFAR	FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4g) Train and deputize enforcement teams including FLEMOP							15,000	15,000	15,000	15,000	15,000	75,000					LGU and BFAR	DOJ, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4h) Identify/ provide legal support teams/ services							1,440	1,440	1,440	1,440	1,440	7,200					LGU and BFAR	LGUS, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, Environment Legal NGOs, Women's Organizations/ groups
	(4i) Identify/ provide fish examiners and laboratory services per province including cyanide detection								200,000	200,000	200,000	100,000	700,000					BFAR	PCG, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4j) Conduct patrol							75,000	125,000	175,000	175,000	175,000	725,000					BFAR and LGU	PCG, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4k) Conduct specialized trainings for Law enforcement teams, prosecutors and judges							10,000	10,000	10,000	10,000	10,000	50,000					BFAR and LGU	DILG, NBI, PNP, PCG, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4l) Apprehend, prosecute and penalize violators							1,000	1,000	1,000	1,000	1,000	5,000					Enforcement Teams	PCG, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4m) Maintain database on law enforcement							500	500	500	500	500	2,500					BFAR and LGU	PCG, PNP, MARITIME Group, NALECC/ RLECC, FARMCS, POs, Fishing Companies/ Associations, Research Institutions, Academe, NGOs, Women's Organizations/ groups
	(4n) Implement Fishery Law Enforcement Management Information System (FLEMIS)							1,200	1,200	1,200	1,200	1,200	6,000					BFAR	LGUs
	(4o) Implement Vessel Monitoring Measures (VMM)							2,000	2,000	2,000	2,000	2,000	10,000					BFAR and LGU	
	(4p) Procure bigger, multi- long range vessels for enforcement								350,000	350,000	350,000		1,050,000					BFAR	DBM
	(4q) Procure appropriate and low- maintenance enforcement vessels and gears for LGU								150,000	150,000	150,000	150,000	600,000					LGUs	FARMCS
	(4r) Coordinate with LGUs regarding provisions of RA 10654 and impose sanctions for negligence of LGUs and other concerned agencies							3,000	3,000	3,000	3,000	3,000	15,000					DILG	FARMCS, BFAR, POs, DILG,
	(4s) Collect evidence and file case to the ombudsman												-					FARMCS	Enforcement Teams, POs, Ombudsman
	(4t) Provide insurance, incentives and recognition for law enforcement teams							13,500	27,000	27,000	27,000	27,000	121,500					LGU	PCIC, Philhealth, DSWD SSS
	(4u) Convene adjudication committee/ board							500					500					DA	BFAR, NFARMCS
	(4v) Formulate FAO and/or LGU Ordinance banning the use of compressor and trammel net in fishing								3,000	3,000			6,000					DA and LGUs	BFAR, FARMCS
	(4w) Continue linkages with RFMOs, neighboring countries, interpol for global/ regional cooperations to address IUUF							3,000	3,000	3,000	3,000	3,000	15,000					BFAR	DFA, NCWC
	(4x) Implement catch documentation							1,000	1,000	1,000	1,000	1,000	5,000					BFAR and LGU	FARMCS, Fishers
	(4y) Conduct mandatory training on detection of fish caught with explosives for fish dealers, exporters							2,250	2,250	2,250	2,250	2,250	11,250					BFAR	FARMCS, LGUs, PNP, Exporter's association, DOST

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		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	(4z) Publish semi- annually enforcement efforts and accomplishments per region							200	200	200	200	200	1,000					BFAR	LGUs, FARMCs, RLECC
	(4za) Issue ID cards for registered fisherrolks and fishworkers							320	320	320	320	320	1,600					LGU and BFAR Regional Offices	FARMCs
	(4zb) Implement Programs/ Policies/ Regulations to ensure continuous compliance with all the Conservation and Management Measures (CMMs)							100,000	150,000	150,000	150,000	150,000	700,000					BFAR	Fishing Companies/ Associations, LGUs, Fishers, FARMCs, NCWC, DENR
	Sub-total							271,010	1,071,910	1,109,510	1,106,510	656,510	4,215,450						
5. Intensify Information, Education and Communication (IEC) Activities on resource conservation measures and compliance of fishery laws	(5a) Identify target audience and specific themes/ issues including climate change adaptation and disaster risk reduction												-					BFAR-IPRG	LGUs, NCWC, PIA, SUCs
	(5b) Develop IEC materials including use of local dialects							500	500	500	500	500	2,500					BFAR-IPRG	
	(5c) Publish newsletters, brochures and other advocacy materials								200	200	200	200	800					BFAR-IPRG	
	(5d) Disseminate IEC materials using tri- media							1,000	1,000	1,000	1,000	1,000	5,000					BFAR-IPRG	LGUs, NAPC, NCWC, PIA, SUCs
	(5e) Work with DepEd for curriculum integration fisheries conservation							100	100	100	100	100	500					NFARMC	BFAR, DEPED, CHED
	(5f) Conduct IEC Caravans nationwide								2,000	2,000	2,000	2,000	8,000					BFAR-IPRG	BFAR RFOs, FARMCs
	(5g) Create IEC teams at LGU /FARMC level as needed							100					100					LGU and FARMC	BFAR RFOs, FARMCs, LGU MAOs
	(5h) Conduct fora with local fisherfolks							4,500	4,500	4,500	4,500	4,500	22,500					BFAR-PFOs	LGU, FARMCs
	Sub-total							6,200	8,300	8,300	8,300	8,300	39,400						
6. Protect Philippine vessels in distant waters through presence of "whiteship" (PCG and BFAR), research vessels and navy boats where applicable and documentation of harassments	(6a) Procure "whiteships"							350,000	350,000	350,000	350,000	350,000	1,750,000					NCWC	PCG, BFAR
	(6b) Hire/Train staff complement							500	500	500	500	500	2,500					PCG and BFAR	
	(6c) Deploy "whiteships" and Navy Boats where needed							100,000	100,000	200,000	300,000	300,000	1,000,000					NCWC	DND, PCG, BFAR, PN
	(6d) Document incident of harrasments							200	200	200	200	200	1,000					PCG	BFAR, DFA, NCWC, Fishing Companies
	(6e) Recommend actions and possible policies							100	100	100	100	100	500					DFA	BFAR, PCG, NCWC, Fishing Companies
	(6f) File diplomatic protests where applicable							100	100	100	100	100	500					DFA	BFAR, PCG, NCWC, Fishing Companies
	(6g )High seas boarding and inspection under the requirement of RFMOs								1,000	1,000	1,000	1,000	4,000					BFAR	DFA, Fishing Companies
	Sub-total							450,900	451,900	551,900	651,900	651,900	2,758,500						
7. Prevent introduction/ containment of invasive/alien species (IAS)	(7a) Identify alien species which can be invasive							1,000	1,000	1,000	1,000	1,000	5,000					BFAR/NIFTC/ NFRDI	worldfish, SUCs, NGOs, Research Institutions, DENR, DOST-PCAARRRD, FARMCs
	(7b) Conduct surveillance of transport pathways to prevent entry							2,000	2,000	2,000	2,000	2,000	10,000					BFAR especially 4A	
	(7c) Identify areas and IAS to prevent translocation in other areas							1,500	1,500	1,500	1,500	1,500	7,500					BFAR/NIFTC/ NFRDI	worldfish, SUCs, NGOs, Research Institutions, DENR, DOST-PCAARRRD, FARMCs
	(7d) Apprehend, prosecute and penalize violators on FAO 221, Wildlife Conservation Act							1,500	1,500	1,500	1,500	1,500	7,500					BFAR-QRT	Wildlife Enforcement Officers, Local enforcement teams
	(7e) Conduct studies on measures to protect our waters and species from discharge of ballast waters from foreign vessels							4,000	4,000	4,000	4,000	4,000	20,000					MARINA	BFAR, DENR, PCG, NCWC, DOH, DOST, DOST-PCAARRD, SUCs, PPA, PFDA
	Sub-total							10,000	10,000	10,000	10,000	10,000	50,000						
	(8a) Conduct participatory and rapid resource assessment of critical fishery habitats and inland bodies of water							9,000	9,000				18,000					BFAR/NFRDI	NAPC, SUCs, FARMCs,
	(8b) Establish sanctuaries and conserve wetlands 500 meters from the lakeshore							5,400	5,400	5,400	5,400	5,400	27,000					DENR	LGU, FARMCs, BFAR
	(8c) Expand Philippine National Aquasilvi Culture Program (PNAP) for mangrove rehabilitation/ reforestation in coastal and inland areas							3,000	3,000	3,000	3,000	3,000	15,000					BFAR	LGUs, DENR, FARMCs, SUCs



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8. Restore fishery habitats (mangroves, seagrasses, coral reefs, wetlands and inland bodies of water) through protection and rehabilitation including pollution control	(8d) Identify and expand areas for mangrove reforestation							1,000	1,000	1,000	1,000	1,000	5,000					DENR	LGUs, BFAR, FARMCs, SUCs
	(8e) Establish Marine Protected Areas (MPAs) and fish sanctuaries in coastal municipalities and inland bodies of water							100,000	100,000	100,000	100,000	100,000	500,000					LGUs	FARMCs, BFAR, DENR, SUCs, NGOs
	(8f) Rehabilitate coral reefs through coral gardening and Artificial reefs (ARs) and fish breeding sanctuaries in inland bodies of water							2,000	2,000	2,000	2,000	2,000	10,000					BFAR and LGUs	FARMCs, DOST, DENR, SUCs, NGOs
	(8g) Review and harmonize overlapping laws and policies (i.e. NIPAS and LGU ordinances in Tanon Strait, Batanes, and other NIPAS areas overlapping with municipal waters and LLDA and LGUs)							300	300				600					LGUs	DENR/PAMB, DILG, BFAR, Fishers, Fishing Associations
	(8h) Revert or award to fisherfolks stewardship contracts over abandoned, unutilized and underdeveloped fish ponds and rehabilitate as mangrove area							3,000	3,000	3,000	3,000	3,000	15,000					BFAR	DENR, LGUs, FARMCs, NAPC, POs
	(8i) Award stewardship contract for the protection, maintenance and management of mangrove- planted areas to fisherfolk where appropriate							4,000	4,000	4,000	4,000	4,000	20,000					BFAR	DENR, LGUs, FARMCs, NAPC, POs
	(8j) Protect mangroves and associated species to restore habitats and promote tourism							4,000	4,000	4,000	4,000	4,000	20,000					LGUs	DENR, BFAR, FARMCs, SUCs, POs, Law enforcement agencies
	(8k) Conduct regular coastal clean-up and implement proper waste disposal							1,000	1,000	1,000	1,000	1,000	5,000					LGUs	DENR, BFAR, FARMCs, SUCs, POs, Law enforcement agencies
	(8l) Craft ordinances to reject proposed reclamation projects that destroy mangroves and other fishery habitats i.e. Manila Bay Reclamation Project							500	500				1,000					NAPC	FARMC, POs, NGOs, SUCs, DILG, LGUs
	(8m) Protect coastal areas from destructive development of resorts i.e. Rip-rap, seawalls, etc							50,000	50,000	50,000	50,000	50,000	250,000					LGUs	FARMC, POs, DENR, NGOs
	(8n) Harmonize agricultural practices in uplands to reduce siltation							300	300	300	300	300	1,500					DA	LGUs, FARMC, LGU-MAOs, DENR, Farmers
	(8o) Enforce ban on the collection of trumpet shells							500	500	500	500	500	2,500					BFAR	LGUs, BOC, DENR, law enforcement agencies
	(8p) Remove crown of thorns							30,000	30,000	30,000	30,000	30,000	150,000					LGUs	LGUs, BOC, DENR, law enforcement agencies
	(8q) Develop technology for the captive breeding/propagation and establish hatcheries of trumpet shells and other vulnerable/ endangered species									2,000	2,000	2,000	6,000					BFAR/NFRDI	SUCs, DOST, Private sector, SEAFDEC/AQD
	(8r) Regularly allocate in the LGUs budget/ annual investment plan for the management of fish sanctuaries												-					M/CFARMC	LGUs-C/MDC, POs,
	(8s) Regularly allocate in the LGUs budget/ annual investment plan for FARMCs												-					M/CFARMC	LGUs-C/MDC, POs,
	(8t) Apprehend, prosecute and penalize mangrove cutters							720	720	720	720	720	3,600					DENR	DOJ, LGUs, law Enforcement agencies/ teams
	(8u) Monitor factories, industries and power plants discharging harmful/polluting substances that destroy fisheries habitats and enforce establishment of waste-water treatment facilities and prosecute for aquatic pollution							3,000	3,000	3,000	3,000	3,000	15,000					DENR-EMB	LGUs, LLDA, MFARMCs
	(8v) Plant water resistant trees in riparian areas							30,000	30,000	30,000	30,000	30,000	150,000					LGUs	DENR- CENRO, BFAR
	(8w) Prevent encroachment and promote proper waste disposal in riparian and coastal areas							1,500	1,500	1,500	1,500	1,500	7,500					DENR	LGUs, FARMC
	(8x) Implement market denial measures							1,500	1,500	1,500	1,500	1,500	7,500					DENR	law enforcement agencies/ teams
Sub-total								250,720	250,720	242,920	242,920	242,920	1,230,200						
9. Delineate and zone coastal land and water uses to resolve conflicting uses consistent with	(9a) Coordinate with LGUs, NAMRIA and other agencies							250	250				500					DA	LGUs, NAMRIA, BFAR
	(9b) Identify actual water and land use							300	300				600					LGUs	
	(9c) Zoning of water and incorporate in the CLUP								75,000	75,000	75,000	75,000	300,000					LGUs	
	(9d) Mapping of CLUP								30,000	30,000	30,000	30,000	120,000					LGUs	
	(9e) Formulate zoning ordinances								500	500	500	500	2,000					LGUs	
	(9f) Implement and monitor compliance to formulated ordinance								22,500	22,500	22,500	22,500	90,000					LGUs	FARMCs, BFAR, BSWM

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Comprehensive Land Use Plan	(9g) Develop and implement fisherfolk resettlement area								300,000	300,000	300,000	300,000	1,200,000					LGUs	FARMCS, NHA, BFAR, HLURB, DSWD, DILG, DAR, Social Housing Finance Corp., DENR
	<b>Sub-total</b>							550	428,550	428,000	428,000	428,000	1,713,100						
10. Set Reference Points/Harvest Control Rules	(10a) Compile and review available relevant information for species (stocks) and environment							1,000					1,000					BFAR/ NFRDI	BFAR, SUCs, Research Institutions, NGOs
	(10a.1) Identify priority stocks/fisheries/fishing grounds/fishery management areas												-						
	(10a.2) Profile of fisheries												-						
	(10a.3) Identify gaps												-						
	(10b) Conduct workshops to evaluate candidate reference points and harvest control rules of various fisheries/fishing grounds/fishery management areas							1,000					1,000					BFAR/NFRDI	BFAR,
	(10c) Draft FAO							500					500					BFAR/ Legal	NFARMC
	(10d) Implement rule 65.2 of RA 10654 (Consultation Process)								3,000				3,000					BFAR	FARMCS, LGUs, Fishers, NGOs
	(10e) Promulgate and implement FAO								5,000	5,000	5,000	5,000	20,000					DA	BFAR, FARMCS, LGUs, Fishers, NGOs
	(10f) Monitor for compliance									3,600	3,600	3,600	10,800					BFAR	FARMCS, LGUs, Fishers, NGOs
	(10g) Continue/sustain stock assessment activities including monitoring for catch & effort (NSAP)							180,000	200,000	200,000	200,000	200,000	980,000					BFAR/NFRDI	BFAR, SUCs, Research Institutions, NGOs
11. Work for the passage of ordinances for the implementation of 10.1-15 km by small and medium scale commercial access subject to existing laws	(10h) Conduct review and institute adaptive measures as may be necessary								3,000	3,000	3,000	3,000	12,000					BFAR	BFAR/NFRDI, SUCs, Research Institutions, NGOs, LGUs
	<b>Sub-total</b>							182,500	211,000	211,600	211,600	211,600	1,028,300						
	(11a) Consultation with FARMCS and stakeholders							3,000					3,000					Fishing companies/ associations	BFAR, LGUs, FARMC
	(11b) Review stock status							1,500	1,500				3,000					BFAR/NFRDI	BFAR, SUCs, Research Institutions, NGOs, LGUs
	(11c) delineation vertically (depth: fathom) and horizontally (distance from shore:km) according to law							100,000	100,000				200,000					NAMRIA	LGUs
	(11d) Draft ordinance								100	100			200					LGU	FARMC
	(11e) Conduct public hearing showing the map where small and medium commercial vessels and gears to be used								1,500	1,500			3,000					LGU	FARMC, fishers, NGOs
	(11f) Pass and publish ordinance								200	200			400					LGU	FARMC, POs, fishers, NGOs
	(11g) Establish markers							30,000	30,000				60,000					LGU	
	(11h) Issue license and permits							100	100		100	100	400					LGU	
12. Revisit and review the 15Km distance to include the study of bathymetry and topography	(11i) Fishing operations							1,500	1,500	1,500	1,500	1,500	6,000					fishers	
	(11j) Catch reporting and documentation							2,000	2,000	2,000	2,000	2,000	8,000					fishers	
	(11k) Monitor compliance							1,500	1,500	1,500	1,500	1,500	6,000					LGUs	BFAR, FARMC, POs, fishers, NGOs
	<b>Sub-total</b>							104,500	138,400	36,900	5,100	5,100	290,000						
	(12a) Review of available information on bathymetry and topography (by Fishing ground/ Fishery Management Area (FMA)							5,000	5,000				10,000					BFAR/NFRDI	BFAR, LGUs, MARINA, NAMRIA, SUCs, Research Institutions, NGOs, Fishing Companies
	(12b) Conduct surveys to address gaps if necessary ex. Hydrography								5,000	5,000			10,000					BFAR/NFRDI	
	(12c) Present information to consult with stakeholders and LGUs								1,800	1,800	1,800		5,400					BFAR/NFRDI	
	12d) Decide on basis for revised delineation (fixed by Fishery Management Area (FMA) or by region, etc.								500	500	500		1,500					LGUs and BFAR	FARMC, Fishers
	(12e) Determine extent of proposed delineation								1,000	1,000	1,000		3,000					LGUs and BFAR	FARMC, Fishers
	(12f) Determine how delineated boundaries can be marked								300				300					NAMRIA	LGUs, BFAR, FARMC, Fishers
	(12g) Propose amendments to law									300			300					NFARMC	Congress, BFAR, DILG, LGUs, MARINA, NAMRIA, SUCs, Research Institutions, NGOs, Fishers

## Capture Fisheries Sectoral Workplan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization/ Entities	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	(12h) Amend the law/s									300	300		600					Congress	BFAR, LGUs, MARINA, NAMRIA, SUCs, Research Institutions, NGOs, Fishers
	(12i) Deploy/ install markers if possible									10,000	10,000	10,000	30,000					LGUs	BFAR, MARINA, NAMRIA, SUCs, Research
	(12j) Implement											30,000	30,000					LGUs	Institutions, NGOs, Fishers
	(12k) Monitor and evaluate implemented measures											500	500					LGUs	SUCs, Research
	Sub-total							5,000	13,600	18,900	13,600	40,500	91,600						Institutions, NGOs, Fishers
13. Promote use of appropriate fishing gears and boats/vessels	(13a) Conduct consultation/workshop identify/determine potential appropriate fishing technologies and boats/vessels							1,000	2,000	2,000			5,000					BFAR/NFRDI	BFAR, LGUs, SUCs, Research Institutions, NGOs, Fishers
	(13b) Conduct evaluations/studies/researches as maybe necessary								5,000	5,000			10,000					BFAR/NFRDI	
	(13c) Prepare and present reports/outputs and recommend use of identified appropriate fishing technologies and boats/gears								1,000	1,000	1,000		3,000					BFAR/NFRDI	FARMC, BFAR, LGUs, SUCs, Research
	(13d) Draft programs/policies as maybe necessary									1,000	1,000	1,000	3,000					BFAR	Institutions, NGOs, Fishers
	(13e) Conduct consultations on proposed policy									1,500	1,500	1,500	4,500					BFAR	
	(13f) Implement programs/policies							180,000	220,000	260,000	300,000	300,000	1,260,000					BFAR	
	(13g) Promote/ Disseminate upgraded designs of fishing boats/ vessels from wood to fiberglass							30,000	45,000	54,000	64,800	77,760	271,560						
	(13h) Conduct trainings on design and construction of new designs of fishing boats/ vessels							2,000	2,000	5,000	5,000	5,000	19,000						
	Sub-total							213,000	275,000	329,500	373,300	385,260	1,576,060						
	14. Protect spawning grounds and spawning cycles based on research and using a participatory process	(14a) Conduct scientific researches on spawning grounds, seasons, reproductive biology and oceanographic studies							90,000	90,000	90,000	90,000	90,000	450,000					BFAR/NFRDI
(14b) Draft FAO on spatial and temporal closures									1,000	1,000	1,000	1,000	4,000					BFAR	Institutions, NGOs, Fishers
(14c) Implement rule 65.2 of IRR- RA 10654									3,000	3,000	3,000	3,000	12,000					BFAR	
(14d) Promulgate and implement FAO									5,000	5,000	5,000	5,000	20,000					BFAR	
(14e) Monitor compliance									3,000	3,000	5,000	5,000	16,000					BFAR	
(14f) Implement closed seasons									10,000	10,000	10,000	10,000	40,000					BFAR	
(14g) Establish fish ladder to provide access to spawning grounds for migrating species									30,000	30,000	30,000	30,000	120,000					BFAR	FARMC, BFAR, LGUs, SUCs, Research
Sub-total								90,000	142,000	142,000	144,000	144,000	662,000						Institutions, NGOs, Fishers, DA, NIA, and Napocor
15. Strengthen/ Facilitate/ Capacitate organization of registered fisherfolk multi-purpose cooperatives and associations to enhance access to financial services and livelihood opportunities and other purposes especially for municipal fisherfolks	(15a) Deploy Fishery Livelihood and Development Technicians (FLDTs)												270,000					BFAR	LGUs
	(15b) Establish list of registered fisherfolk organizations, cooperatives and associations												-					BFAR-FLDT	LGUs, FARMC, Pos
	(15c) Sustain entrepreneurship and financial literacy, and other capacity building programs												-					BFAR	CDA, DOLE, TESDA, DTI, LGUs
	(15d) Work with government agencies i.e. BIR, CDA, etc. and financial institutions to simplify requirements and processes								200	200			400					BFAR	CDA, BIR, LGUs, SEC, DOLE
	(15e) Organize fisherfolks in coastal and barangays with inland waters to prioritize poorest of the poor beneficiaries								1,000	1,000	1,000		3,000					BFAR-FLDT	LGUs, FARMC, Pos, NGOs DSWD
	(15f) Provide technical assistance in registration procedures												-					LGUs	FARMC, Pos
	(15g) Facilitate accreditation of organization to participate in planning and decision-making												-					LGUs	FARMC, Pos
	Sub-total							-	1,200	1,200	1,000	-	273,400						
		(16a) Launch Fisheries Electronic Licensing and information System (FELIS)							3,000					3,000					BFAR
(16b) Implement Fisheries Electronic Licensing and information System (FELIS)								1,000	1,200	1,440	1,728	2,074	7,442					BFAR	LGUs, MARINA, Fishers
(16c) Continue Municipal Fisherfolk Registration (FishR) and Municipal Fishing Boat registration (BoatR)								600	500	300	200	200	1,800					LGUs	BFAR, FLDTs, FARMCs, Fishers, MARINA
(16d) Continue joint mobile registration (JMR) and licensing								1,500	1,500	1,500	1,500	1,500	7,500					MARINA and PCG	

## Capture Fisheries Sectoral Workplan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization/ Entities	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
16. Improve boat/ vessel and gear licensing including compliance to catch documentation requirement	(16e) Harmonize BFAR, MARINA and other concerned agencies regarding policies and requirements for small scale and medium commercial to create unified standards when possible							200	200				400					BFAR	MARINA, PCG, Fishers
	(16f) Review and update harmonized policies for small scale and medium commercial to create unified standards when possible									500	500	500	1,500					BFAR	
	(16g) Issue certificate of registration to BoatR registrants							1,500	1,000	750	500	500	4,250					LGUs	BFAR
	(16h) Create standard template for fish catch monitoring and documentation							200					200					BFAR	LGUs, Fishers
	(16i) Train and deploy enumerators to consolidate reported data							1,000	1,000	1,000	1,000	1,000	5,000					BFAR	
	<b>Sub-total</b>							<b>9,000</b>	<b>5,400</b>	<b>5,490</b>	<b>5,428</b>	<b>5,774</b>	<b>31,092</b>						
17. Sustain political will among implementing agencies through synchronized and	(17a) Coordination with LGUs and other agencies							1,000	1,000	1,000	1,000	1,000	5,000					LGU and BFAR	PCG, MARINA, Fishers
	(17b) Consultation with stakeholders							1,000	2,000	2,000	2,000	2,000	9,000						
	(17c) Implementation of specific activities ex. JMRL							1,000	2,000	4,000	4,000	4,000	15,000						
	<b>Sub-total</b>							<b>3,000</b>	<b>5,000</b>	<b>7,000</b>	<b>7,000</b>	<b>7,000</b>	<b>29,000</b>						
18. Identify and establish women -managed areas	(18a) Inventory of existng women-managed areas and identification of potential areas							500	500	500	500	500	2,500					Fishers & POs	BFAR, LGUs
	(18b) Coordination and preparation of management plans							500	1,000	2,000	1,000	1,000	5,500					BFAR, LGUs	Fishers & Pos
	(18c) Consultation							500	1,000	2,000	1,000	1,000	5,500					BFAR, LGUs	Fishers & Pos
	(18d) Implementation							5,000	2,000	3,000	5,000	5,000	20,000					Fishers & POs	BFAR, LGUs
	<b>Sub-total</b>							<b>6,500</b>	<b>4,500</b>	<b>7,500</b>	<b>7,500</b>	<b>7,500</b>	<b>33,500</b>						
19. Develop ICRM Plan (Inter LGU) based on PCRA	(19a) Inventory of existng ICRM and identification of potential ICRM areas							5,000	2,000	2,000	2,000	2,000	13,000					LGUs	DENR, BFAR, Fishers, NGOs, POs
	(19b) Coordination and preparation of management plans							500	2,000	3,000	4,000	4,000	13,500					LGUs & BFAR	DENR, Fishers, NGOs, POs
	(19c) Consultation							500	3,000	3,000	3,000	3,000	12,500					DENR & BFAR	LGU, Fishers, NGOs, POs
	(19d) Implementation							1,000	3,000	4,000	5,000	5,000	18,000					LGUs	DENR, BFAR, Fishers, NGOs, POs
	<b>Sub-total</b>							<b>7,000</b>	<b>10,000</b>	<b>12,000</b>	<b>14,000</b>	<b>14,000</b>	<b>57,000</b>						
	<b>Grand Total</b>												<b>16,774.812</b>						



## Aquaculture Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
1. Secure quality fry/seed supply through coordinated investments in propagation facilities (broodstock, hatcheries, nurseries, laboratories)	1. Establish & Upgrade Propagation Facilities							20,240	1,065,950	436,300	356,656	467,688	2,346,834	BFAR, DOST			SCUs, DSWD, Funding Institutions	BFAR	LGUs, SCUs, Small holders, R&D Institutions, Consolidators, Fisherfolk leaders, & Registered POs, DSWD
	■ Hatchery	12	36	35	35	31	149	120	132,500	55,500	55,500	106,000	349,620		X	X			
	> Establishment		5	4	4	3	16		85,000	8,000	8,000	6,000	107,000		X	X			
	> Upgrading		11	11	11	8	41		27,500	27,500	27,500	20,000	102,500		X	X			
	> Satellite		20	20	20	20	80		20,000	20,000	20,000	80,000	140,000		X	X			
	> Multi species	12					12	120					120		X	X			
	■ Broodstock multiplication center		1						80,000	20,000	25,000	25,000	150,000		X	X			
	■ Nursery	3	2	2	2	4	13	3,000	3,000	3,000	3,000	3,000	15,000		X	X			
	■ Strict implementation of National Shellfish Sanitation Program							2,000	2,000	2,000	2,000	2,000	10,000						
	Classification of shellfish growing areas																		
	Profiling of Existing/Potential Areas based on sanitary survey							5,000	5,000	5,000	5,000	5,000	25,000		X	X			
	Spatfall Monitoring														X	X			
	Propagation facility for shellfish		3						100,000						X	X			
	Capability Building / Skilled Training (BFAR Personnel, farmer, SUC Personnel)							10,000	10,000	10,000	10,000	10,000	50,000		X	X			
	Procurement (Equipment)														X	X			
	(1a) Suitability Assessment (Site Selection)		22				22		1,050										
	(1b) Feasibility Study and Engineering design		22				22		1,575				1,575						
	(1c) Evaluation and Approval		14	8			22		325	200			525						
	(1d) Procurement												-						
	(1d.1) Facilities		13	8			21		315,000	80,000			395,000						
	(1d.2) Equipments		13	8			21		169,500	12,000			181,500						
	(1e) Construction						0						-						
	(1f) Operation and Management		13	8			21		65,000	80,850	84,893	89,137	319,880						
	(1f.1) Broodstock Development		9	3			12		45,000	110,250	115,763	121,551	392,564						
	(1f.2) Disease Management						0						-						
	(1g) Monitoring & Evaluation		14	8			22		3,500	2,000			5,500						
	<b>Sub-total</b>							20,240	1,065,950	436,300	356,656	467,688	2,346,834						
	1. Review, update & disseminate existing Philippine National Standard (PNS) & development of species- specific standards							1,000	24,200	3,500	1,838	1,929	32,467	DA-BAPS				BAFS	BFAR
	(1a) Prioritization of commodities		7						5,250				5,250						
	(1b) Formation of Technical Working Group (including stakeholders)		7						7,000	3,500			10,500						
	(1c) Conduct of Consultation (to include stakeholders)										1,838	1,929	3,767						
	(1d) Approval of PNS		7						3,500				3,500						
	(1e) Drafting & Approval of FAO	1	2				3	1,000	500				1,500	BFAR				BFAR	
	(1f) Publication		1007				1007		450				450	BFAR				BFAR	
	(1g) Dissemination		5						7,500				7,500						
	2. Review & Finalize GAQp Manual of Operation to include system for Registration & Certification	1					1	2,000					2,000						
	(2a) Prioritization of commodities																		
	(2b) Formation of Technical Working Group (including stakeholders)																		
	(2c) Conduct of Consultation (to include stakeholders)																		
	(2d) Approval of GAQp Manual of Operation																		
	(2e) Drafting & Approval of FAO																		
	(2f) Publication																		

## Aquaculture Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
<b>2. Institutionalize Good Aquaculture Practices (GAqP) for key commodities and promote sustainable aquaculture</b>	(2g) Dissemination																		
	3. Training of Inspectors & Aqua farmers on Good Aquaculture Practices							30,000	43,330	51,729	58,161	92,746	275,966	BFAR				BFAR	SCUs
	(3a) Accreditation of BFAR Training Centers by TESDA		4	6	6	6	22		1,000	1,575	1,654	1,736	5,965						
	(3b) Training Needs Assessment		4	10	16	22	52		80	294	662	833	1,869						
	(3c) Preparation of Training Module		4	10	16	22	52		250				250						
	(3d) Conduct of Training		180	180	180	180	720		6,000	13,860	19,845	54,177	93,882						
	(3e) Laboratory Services	7	7	7	7	7	35	30,000	36,000	36,000	36,000	36,000	174,000						
	(3f) Technical Assistance via ICT	500	500	500	500	500	2500												
	4. Promote & Intensify Health Management Practices (Accreditation, Certification, Registration of Grow Out Farms)							8,100	11,960	12,153	12,356	12,568	57,137					BFAR	SCUs
	(4a) Farm Inspection and Sampling	150	200	250	300	300	1200		260	273	287	301	1,121						
	(4b) Disease Monitoring, Surveillance & Reporting	6180	7180	8180	9180	9180	39900		3,600	3,780	3,969	4,167	15,516						
	(4c) Health Certification for transboundary movement																		
	(4d) Registration, Accreditation & Certification of						0						-						
	(4d.1) Aquafarmer	350	400	450	500	550	2250	8,000	8,000	8,000	8,000	8,000	40,000						
	(4d.2) Trained Inspector	20	20	20	20	20	100	100	100	100	100	100	500						
	5. Implementation of National Residue Control Program	1	1		1	1	1	17,000	34,000	17,000	17,000	17,000	102,000						
	(5a) Upgrading and revision of the manual of operation																		
	(5b) strengthening system for monitoring, inspection, sampling, and reporting																		
	(5c) risk analysis and categorization																		
	(5d) laboratory services conforming with international standards																		
	banned substances																		
	regulated drugs and chemicals																		
	heavy metals																		
	dyes																		
	6. Strengthen Organic Farming							5,205	5,580	7,040	8,415	8,875	35,115						
	(6a) Strengthen National Center for Organic Aquaculture						0						-						
	(6a.1) Capacitate Manpower	15	15	20	20	25	95	255	255	340	340	425	1,615	BFAR				BFAR	LGU & SCUs
	(6a.2) Rehabilitation of Facilities	3	3	3	3	3	15	600	600	600	600	600	3,000	BFAR				BFAR	LGU & SCUs
	(6a.3) Upgrading of Equipment	12	12	12	12	12	60	600	600	600	600	600	3,000	BFAR				BFAR	LGU & SCUs
	(6b) Registration/Accreditation/Certification of Organic Farmers	10	15	20	25	30	100	750	1,125	1,500	1,875	2,250	7,500	BFAR				BFAR	Organic Farmer
	(6c) Formulation & Certification of Organic Feeds	3	3	4	5	5	20	3,000	3,000	4,000	5,000	5,000	20,000	BFAR		X		BFAR & Private	LGU & SCUs
	<b>Sub-total</b>							63,305	119,070	91,422	97,770	133,118	504,685						
	1. Regulate the aquafeeds safety and quality (Implementation of Philippine National Standard for Aquaculture feeds) including Halal qualifications depending on target market (RA 10611, 10654)							2,500	1,500	-	-	-	4,000						
	(1a) Creation of Technical Working Group (including stakeholders)	1						1,000					1,000						
	(1b) Draft FAO on the Registration, certification & inspection of aquafeed mills																		
	(1c) Conduct of Consultation (to include stakeholders)																		
	(1d) Approval of FAO																		
	(1e) Publication																		
	(1f) Dissemination																		
	(1g) Development of Halal & Kosher Standards (on Aquaculture)	1	1			1	1	1,500	1,500				3,000						

## Aquaculture Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
3. Assure quality and traceability of aquaculture inputs and outputs	■ Consultation (Pre-Preparation)																		
	■ Consultation (Post Preparation)																		
	■ Hiring of Staff																		
	■ Computerization & Publication																		
	■ Mobilization & Communication																		
	■ Procurement																		
	2. Registration and accreditation (product and management specific) of hatcheries & grow-out (according to standards co-developed by industry and BFAR) including acquisition of broodstock from certified/guaranteed sources		55	57	59	61	232	1,000	1,000	1,000	1,000	1,000	5,000						
	(2a) Application																		
	(2b) Inspection																		
	(2c) Review & evaluate documents																		
	(2d) Approval																		
	(2e) Disease Monitoring																		
	3. Regulate the use of drugs & chemicals in aquaculture							2,500	2,500	1,000	1,000	1,000	8,000						
	(3a) Formation of Technical Working Group (including stakeholders)	1	1				1	1,500	1,500				3,000						
	(3b) Review draft FAO on the use of drugs & chemicals in Aquaculture																		
	(3c) Conduct of Consultation (to include stakeholders)																		
	(3d) Approval of FAO																		
	(3e) Publication																		
	(3f) Dissemination																		
	(3g) Registration of Drugs Use in Aquaculture & Licensing of Establishment	5	5	5	5	5	25	1,000	1,000	1,000	1,000	1,000	5,000						
	<b>Sub-total</b>							6,000	5,000	2,000	2,000	2,000	17,000						
4. Invest on species with high commercial potential	1. Develop, Enhance & Refine Culture Technology for Emerging Species							-	14,100	10,465	10,939	11,667	47,171					DA-BFAR	DENR, DILG, LGU, Private sector
	(1a) Identification		6	2	2	2	12		300	105	110	116	631						
	(1b) Enhancementment of Technology for broodstock development, propagation, & grow-out		6	2	2	2	12		6,000	2,100	2,205	2,315	12,620						
	(1c) Development of Feed						0						-						
	(1d) Broodstock Development						0						-						
	(1e) Dissemination		6	2	2	2	12		600	210	221	232	1,263						
	(1f) Capacitate Manpower		5	5	5	5	20		6,000	6,300	6,615	6,946	25,861						
	(1g) Commercialization		2	4	4	2	12		200	630	662	926	2,418						
	(1h) Inventory & Registration of Farms						0						-						
	(1i) Establishment of Baseline Info on Fish Diseases of Emerging species			2	4	4	10						-						
	(1j) Monitoring (Biological, Physico-chemical)			12	12	12	36			120	126	132	378						
	(1k) Technical cooperation program assistance (foreign/local experts)								1,000	1,000	1,000	1,000	4,000						
	<b>Sub-total</b>							-	14,100	10,465	10,939	11,667	47,171						
	1. Profiling potential areas and validate existing mariculture parks using GIS mapping and operationalization of mariculture parks							8,850	8,950	8,750	8,700	8,700	43,950						
	(1a) Review and update existing mariculture policies guidelines and ordinances and formulate new local regulation assist in the formulation of local ordinances for new mariculture development	3	3	2	1	1	10	400	500	300	250	250	1,700					BFAR	LGU/ Stakeholders
	(1b) Survey and profiling of potential MP for development	1	1	1	1	1	5	50	50	50	50	50	250					BFAR, LGU co-shared	Stakeholders

## Aquaculture Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
5. Optimize operation of mariculture parks	(1c) Establishment of new area	1	1	1	1	1	5	5,000	5,000	5,000	5,000	5,000	25,000					BFAR, LGU	Research Institutions, SCUs
	(1d) Continue environmental monitoring of existing MP to determine nutrient flow	43	43	43	43	43	43	1,000	1,000	1,000	1,000	1,000	5,000					BFAR	Stakeholders
	(1e) Conduct of investment forum	12	12	12	12	12	60	2,400	2,400	2,400	2,400	2,400	12,000					BFAR, Landbank	LGU and Stakeholder
	2. Development of Integrated Multi Trophic Aquaculture (IMTA) Technology (milkfish, sea cucumber, abalone, sea urchin, seaweeds and other potential species)							7,350	10,850	11,814	12,863	14,584	57,461						
	(2a) Identify potential site specific commodity species in MP areas.	43	43	43	43	43	43	300	2,800	4,238	5,261	6,956	19,555					BFAR	Stakeholders
	(2b) Develop and demonstrate using combined species	43	43	43	43	43	43	6,000	6,500	6,263	6,276	6,289	31,328					BFAR under cooperators	Stakeholder Associations
	(2c) Improvement/Refinement of developed technologies and adoption of stakeholders	43	43	43	43	43	43	1,000	1,500	1,263	1,276	1,289	6,328					BFAR under cooperators	
	(2d) Intensify promotion to stakeholders	43	43	43	43	43	43	50	50	50	50	50	250					BFAR	
	3. Cages for Livelihood							118,750	118,750	118,750	118,750	118,750	593,750						
	(3a) Establishment of Cages for Livelihood	475	475	475	475	475	2375	118,750	118,750	118,750	118,750	118,750	593,750						
	4. Review and strict implementation of existing policies on FLA to optimize the use of abandoned, underutilized, and unproductive FLA areas for lucrative nursery operations in support to grow-out operations under mariculture parks							1,500	4,500	2,500	2,500	-	11,000						
	(4a) Update FAO 197-1 (FLA Regulation) through sectoral and inter-Departmental consultation	3	2					1,500	1,000				2,500						
	(4b) Develop cost effective information and communaiton technology (ICT) for FLA resources mapping and assessment								3,500	2,500	2,500		8,500						
	<b>Sub-total</b>							136,450	143,050	141,814	142,813	142,034	706,161						
	1. Conduct climate/disaster risk assessment in major aquaculture areas and recommend impact mitigation measures/interventions							1,902	3,102	3,102	2,220	2,220	12,546						
	(1a) Compile hazard maps and evaluate vulnerability assessment tools relevant to aquaculture planning							1,902					1,902						
	(1b) Translate medium-long term results of reputable climate prediction models to local aquaculture potential impacts		30	30	30	30													
	(1c) Short-list low-risk areas suitable for aquaculture use		10		10				3,102	3,102	2,220	2,220	10,644						
	2. Pilot test (case-work) business continuity planning in selected commodity value chain							2,196	2,056	11,299	11,946	16,504	44,001						
	(2a) Survey and document indigenous climate/disaster resilient farmer practice specific to aquaculture commodities	20						2,196					2,196						
	(2b) Assess disaster preparedness of existing/documented aquaculture commodity value chain in vulnerable provinces/regions		10						1,628				1,628						
	(2c) Develop a business continuity guidebook for aquaculture SME		1		1				428				428						
	(2d) Conduct introductory orientation workshop on DRRM			5	10	10				2,603	5,206	5,206	13,014						
	(2e) Conduct training/workshop on business continuity planning for selected aquaculture SME value chain			5	10	10				2,603	5,206	5,206	13,014						
	(2f) Conduct workshops to integrate climate/disaster impact mitigation in local aquaculture development planning			9		9				4,558		4,558	9,116						
	(2g) Medium-term case work in business continuity planning in selected commodity value chain (tilapia and seaweeds)			3	3	3				1,535	1,535	1,535	4,606						

## Aquaculture Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
6. Ensure climate/disaster resilient aquaculture sector	3. Evaluate and recommend effective early-warning systems technologies/approach							1,000	5,000	35,000	35,000	35,000	111,000						
	(3a) Assess effectiveness of early-warning systems/technologies							500											
	(3b) Identify ICT based platforms for effective Early Warning System (EWS) and extension support services							500											
	(3c) Promote the utilization of PAGASA knowledge products customized for aquaculture applications (integrated in BCP/DRR trainings/workshops)																		
	(3d) Partner with LGUs, BFAR Centers and aquaculture producers association to set-up PAGASA calibrated automatic weather stations and local climate information centers			100	100	100				35,000	35,000	35,000							
	(3e) Develop and launch ICT-based tools for EWS and farm advisories		3						5,000										
	4. Develop and disseminate knowledge products such as:									14,000			14,000						
	(4a) Compiled hazard/vulnerability compilation maps of major aquaculture areas in the Philippines			500						2,250									
	(4b) Climate/Disaster-resilient aquaculture practices handbook			500						2,250									
	(4c) Handbook on Agro-meteorology for Aquaculture Extension Workers			500						2,250									
	(4d) Develop set of farming environment specific aquaculture farm Advisories and early warning messages			500						2,250									
	(4e) Best practices in business continuity guidebook for aquaculture SME			500						2,250									
	(4f) Business continuity guidebook for aquaculture SME			500						2,250									
	(4g) Posters, brochures and flyers			500						500									
	5. Conduct workshop to determine priority R & D themes for climate/disaster resiliency	1	1	1	1	1				1,750	1,750	1,750	505,250						
	(5a) Funds for immediate (short-term R & D projects) climate/disaster resiliency R & D themes to include the following: 1) strain development; 2) adaptive farming techniques (e.g. submersible and/or rope-framed cages etc.); 3) evaluation/pilot testing of technology alternatives (e.g. RAS, greenhouse, aquaponics, deep water seaweeds farming etc.); 4) recommendations for "climate/disaster proof aquaculture facilities", water harvesting technologies etc.; 5) socio-economic studies and other relevant themes (crop insurance etc)							100,000	100,000	100,000	100,000	100,000							
	6. Carbon credits from massive seaweeds operations	1	1	1									188,297						
	(6a) "Identify benefits and access fund facilities from carbon credit programs" for seaweed operations							5,098	10,158	65,651	51,416	55,974							
	7. Support to adoption of climate/disaster resilient aquaculture technology practices/interventions/technologies	tbd	tbd	tbd	tbd	tbd		250,000	250,000	250,000	250,000	250,000	1,250,000						
	<b>Sub-total</b>												2,125,094						
	<b>Grand Total</b>												5,746,945						



## Post-Harvest Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
1. Improve fisheries post-harvest and cold chain technology and facilities	1. Assess post harvest losses including processing waste/by-products "Your waste can be my raw materials"	x	x			x		20,000	20,000			20,000	60,000	P				NFRDI	BFAR, SCU, LGU
	(1a) Develop assessment instrument for:																		
	1a.1 On-board fishing vessels																		
	1a.2 Trading centers/fish landing center																		
	1a.3 Aqua farm																		
	1a.4 Processing plant																		
	1a.5 Transport																		
	(1b) Field test																		
	(1c) Training of enumerators																		
	(1d) Site identification																		
	(1e) Coordination with the LGUs																		
	(1f) Actual assessment																		
	(1g) Data encoding and analysis																		
	(1h) Presentation of results to stakeholders																		
	(1i) Identification of gaps (VCA)																		
	(1j) Formulation of strategies to address losses																		
	2. Inventory, rehabilitate, improve, upgrade and establish regional and municipal including private fish ports and other existing facilities							269,000	3,030,000	3,010,000	1,900,000		8,209,000	P				PFDA	BFAR, Private Sector, LGU, DENR
	for Municipal fish port																		
	(2a) Infra assessment survey																		
	(2b) Feasibility study																		
	(2c) Conduct detailed engineering study																		
	(2d) Procurement stage	1	7	9			17	37,000	140,000	160,000			337,000						
	(2e) Implementation																		
	(2f) Training and turn over to the LGUs																		
	for Regional fish port																		
	(2g) Feasibility study																		
	(2h) Conduct detailed engineering study																		
	(2i) Procurement stage	2	10	10	8		30	232,000	2,890,000	2,850,000	1,900,000		7,872,000						
	(2j) Implementation																		
	3. Provide where appropriate: CFLO (271 units), fish stalls, air blast freezers, ice plants and cold storage facilities, refrigerated vans, solar driers /smokehouses, and warehouses												820,300						
	(3a) Social/technical preparations	271 Units						150/unit						P				BFAR	LGU, Private Sector, NAPC, PFDA, DENR, PHILMECH
	(3b) Procurement																		
	(3c) Construction							3M/site						793.8M (CFLO)					
	(3d) Turnover to the LGUs/ fisherfolk organizations													20.2 M (fish stalls)					
	(3e) Operation													6.3 M (Live seafood stalls)					
	4. Conduct training on proper handling, GMP, HACCP, and maintenance of facilities (based on Codex and other appropriate standards)	192	192	192	192	192	960	11,520	11,520	11,520	11,520	11,520	57,600	P				BFAR	SCU, Private Schools, Private Sector, LGU, DOST and other government agencies
	(4a) Training needs assessment																		
	(4b) Development of training module																		
	(4c) Site identification																		
	(4d) Coordination with private sector, LGUs, Academes and other agencies																		
	(4e) Conduct of training																		
	(4f) Post training evaluation (monitoring if for livelihood)																		
	(4g) Partnership with TESDA for accreditation																		
	Sub-total												9,146,900						

## Post-Harvest Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
<b>2. Increase production of value-added products from fish and fishery by-products / processing wastes</b>	1. Formulate policy on zero-rated VAT for all domestically grown and produced fishery products (to encourage production of value added fishery products)								60	60	60	60	440	P		P		BFAR	Private Sector, BIR
	(1a) Policy review/study	x																	
	(1b) Draft policy recommendation	x																	
	(1c) Public consultations	x						200					200						
	(1d) Lobby for approval	x	x																
	2. Assist MSMEs in developing & improving the quality / packaging & presentation/nutritional value / acceptability of value-added products (using traditional species, low volume high value species, <i>subject to the micro-biological requirements (to be world class)</i> )												240	P				BFAR	SCU, NFRDI, Private Sector, DOST, DTI, LGU and other government agencies
	(2a) Registration of MSMEs	x						500/MSME											
	(2b) Identification of target MSMEs	48	48	48	48	48	240												
	(2c) Initial assessment of current practices																		
	(2d) Provide interventions to registered MSMEs		60	60	60	60	240		60	60	60	60	240						
	(2e) Coordinate with other government agencies																		
	3. Increase R&D efforts, use new fish processing technologies							3600	5600	6600	8600	10600	35,000	P				NFRDI	SCU, DOST, DA-BAR, PhilMech, BFAR
	(3a) Identification of existing fishery processing technologies																		
	(3b) Assessment/inventory of possible raw materials (low value, high volume, by-catch processing waste) and existing fishery products that need to be developed/improved	3	3	3	3	3		100	100	100	100	100	500						
	(3c) Technology verification and application	2	2	2	2	2	10	2,000	4,000	5,000	7,000	9,000	27,000						
	(3d) Publication of Philippine Journal of fisheries	2	2	2	2	2	10	1,500	1,500	1,500	1,500	1,500	7,500						
	<b>Sub-total</b>												35,680						
<b>3. Improve compliance of fish processing establishments to relevant national and international regulations</b>	1. Facilitate compliance of fish processing establishments with requirements for approval of these establishments for export												7,520	P				BFAR	Private sector
	(1a) Training on relevant/appropriate national & international regulations/requirements		7	7	7	7	28		1,680	1,680	1,680	1,680	6,720						
	(1b) Simplify processing of documents for export (one-stop-shop under one roof)																		
	(1c) Seminar/dialogue/consultation workshop on updated regulations and standards including compliance to third party certification		2	2	2	2	8		200	200	200	200	800						
	2. Monitor and assess the levels of chemicals and microbiological hazards in fish & fishery products (e.g. histamine, etc.) in different steps of supply chain	4	4	4	4	4	20	10,000	11,000	12,000	14,000	15,000	62,000	P				NFRDI	BFAR, SCU, DOST, Private Sector
	(2a) Inventory of the fishery product per specie																		
	(2b) Identify the available data																		
	(2c) Fill up the gaps																		
	(2d) Come up with data base related to chemical and microbiological contaminants in relation to national and international standards																		
	(2e) Government intervention on prevention and mitigation across industries																		
	(2f) Collaboration with the SUCs																		
	(2g) Continuous monitoring of chemical and microbiological hazards in areas with occurrence of contaminants																		
	(2h) Information dissemination																		
	3. Increase capacity of existing testing laboratories to meet the industry requirements							500	104,500	10,500	10,500	10,500	136,500	P					
	(3a) Inventory of existing laboratories and current industry needs		X						4,000				4,000					BFAR	Private Sector, DOST
	(3b) Facilitate the linkage between the industry and government recognized laboratories	X	X	X	X	X		500	500	500	500	500	2,500						
	(3c) Procurement of additional equipment, if necessary		4 units LC-						100,000				100,000						
	(3d) Operation and maintenance of laboratory with private sector			X	X	X				10,000	10,000	10,000	30,000						
	<b>Sub-total</b>												206,020						

## Post-Harvest Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
<b>4. Increase and strengthen fishery-based livelihood and entrepreneurial programs in the coastal communities</b>	1. Provide appropriate training activities on post harvest fisheries (entrepreneurial skills, marketing, post harvest technologies) for sustainable livelihood	180	180	180	180	180		27,000	27,000	27,000	27,000	27,000	135,000					BFAR	SCU, LGU, Private Sector, DTI, ATI, DOST, TESDA
	(1a) Training needs assessment													P					
	(1b) Development of training module																		
	(1c) Site identification																		
	(1d) Coordination with private sector, LGUs, Academes and other agencies																		
	(1e) Conduct of training																		
	(1f) Post training evaluation (monitoring if for																		
	(1g) Partnership with TESDA for accreditation																		
	2. Provide technical and other assistance to coastal communities on fisheries post harvest activities (i.e. compliance to food safety requirements, post harvest technologies)	32	32	48	48	48	208	1,600	1,600	2,400	2,400	2,400	10,400	P				BFAR	SCU, LGU, Private Sector, DTI, ATI, DOST, TESDA
	(2a) Identification of target organizations																		
	(2b) Initial assessment of current practices																		
	(2c) Provide interventions (i.e. product promotion)																		
	(2d) Coordinate with other government and private agencies/organizations																		
	(2e) Standardize package of assistance																		
	3. Develop business plan models to be adopted by MSME's	2	3	4	5	6	20	300	450	600	750	900	3,000	P				BFAR	DTI, DOST, TESDA, LGU, SCU, Private Sector
	(3a) Gather and document best practices technology per product																		
	(3b) Create Technical Working Group (TWG) to develop business plan models																		
	(3c) Draft business plan models (plant lay-out, costing, equipment needed, food safety requirements, etc.) for small scale and export																		
	(3d) Consultation with the industry																		
	(3e) Finalize and adopt																		
	4. Recognize and support the role of fisherfolk as first responders in emergency situations (floods, calamities, etc.)								2,000	3,000	4,000	5,000	14,000	P				BFAR	DSWD, LGU, DILG, NDRRMC
	(4a) Coordinate with other government agencies (DILG, NDRRMC)	x																	
	(4b) Develop concepts, terms of reference and implementing guidelines	x																	
	(4c) Identify target fisherfolks		10	15	20	25	70		2,000	3,000	4,000	5,000	14,000						
	(4d) Capability training for fisherfolks (province)		x	x	x	x			500/day/ fisherfolk										
	(4e) Provide equipment for rescue operations and incentives								20 L/day (fuel) for 5 days										
	■ Communication radio								20/set										
	<b>Sub-total</b>												162,400						

## Post-Harvest Fisheries Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
5. Formulate and implement consistent policies on granting of incentives and other support services to all domestic or national companies vis a vis grants to foreign companies	1. Formulate policy on granting of incentives for domestics companies							200					200						
	Offer clear incentives to all investors (domestic first)																		
	Provide tax incentive for the construction of new and upgrading of existing processing plants / facilities.																		
	Full access to info on incentive application's																		
	Ease importation of equipment																		
	Invite private sectors to invest inside PFDA properties with very generous (and specific) incentives.																		
	Domestic companies to enjoy same incentives given to foreign companies																		
	(1a) BFAR to participate in BOI processes with the industry stakeholders	x	x	x	x	x								P				BFAR	BOI, BIR
	(1b) Policy review/study with DA, BOI	x	x																
	(1c) Draft policy recommendation		x																
	(1d) Public consultations		x					200					200						
	(1e) Lobby for approval		x																
	Sub-total												200						
	Grand Total												9,551,200						

## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
1. Expand the market for sustainable fish and fishery products (domestic and export)	1. Conduct of fish consumer and preference survey consumption							2,600	6,800	6,800	6,800	6,800	29,800					BFAR	LGUs, DOH, BFAR, PSA, ACADEME, DTI
	(1a) Identify survey areas - profiling																		
	NCR, Cebu, CDO,Davao, GenSan																		
	<ul style="list-style-type: none"> <li>national survey</li> <li>the survey will cater to all strategies identified</li> <li>development of survey forms</li> <li>include preferences of imported and local product in the form</li> <li>fish consumption and consumer preference survey</li> <li>include pricing</li> </ul>	12					12	2,500					2,500						
	(1a.1) Project Proposal Preparation	X					0	50					50						
	(1a.2) MOA with ACADEME/ SUCs		X				0	50					50						
	1a.3) Conduct of Survey		1	1	1	1	4		5,000	5,000	5,000	5,000	20,000						
	(1a.4) Submission of report and Monitoring		1	1	1	1	4		1,200	1,200	1,200	1,200	4,800						
	<ul style="list-style-type: none"> <li>data analysis</li> </ul>																		
	(1a.5) Presentation of survey results to fora, meetings, consultations		1	1	1	1	4												
	(1a.6) Incorporation of results to ICT - regular updating		1	1	1	1	4		600	600	600	600	2,400						
	2. Conduct of industry fora and consultation meetings relevant to trade and marketing																		
	<i>Industry forum</i>								14,120	14,120	14,120	14,120	56,480					BFAR	LGU, DTI, DOST, traders, processors, fisherfolk, Academe, DA, NGO, media
	1 national; 1 per region																		
	<i>consultation meeting</i>																		
	2 per province; 2 per region																		
	(2a) Activity Proposal preparation																		
	(2b) Coordination/Invitation of stakeholders																		
	(2c) Conduct of activity																		
	1 national	1	1	1	1	1	5		1,200	1,200	1,200	1,200	4,800						
	1 per region	18	18	18	18	18	90		5,400	5,400	5,400	5,400	21,600						
	(2d) Uploading of report to ICT	19	19	19	19	19	95		250	250	250	250	1,000						
	(2e) Activity Proposal preparation																		
	(2f) Coordination/Invitation of stakeholders																		
	(2g) Conduct of activity																		
	2 per province	162	162	162	162	162	810		1,620	1,620	1,620	1,620	6,480						
	2 per region	36	36	36	36	36	180		5,400	5,400	5,400	5,400	21,600						
	(2h) Uploading of report to ICT	198	198	198	198	198	990		250	250	250	250	1,000						
	3. Facilitation of market access of fishery-based individuals/ cooperatives/ assn/org to domestic and export markets							87,950	87,950	107,950	107,950	107,950	499,750					BFAR	LGU, DTI, DOST, traders, processors, fisherfolk, Academe, DA, NGO, media
	<b>A. Organize and/or participate in</b>																		
	<b>Trade fair, seafood show</b>																		
	<i>Domestic</i>																		
	2 per province; national -2																		
	<i>International - 4</i>																		
	(3a) Activity Proposal preparation																		
	(3b) Coordination/Invitation																		
	(3c) Conduct of activity																		
	Domestic/local	164	164	164	164	164	820												
	provincial	162	162	162	162	162	810	16,200	16,200	16,200	16,200	16,200	81,000						
	national	2	2	2	2	2	10	10,000	10,000	10,000	10,000	10,000	50,000						
	International	4	4	4	4	4	20	50,000	50,000	50,000	50,000	50,000	250,000						
	(3d) Assessment per event						0						-						
	(3e) Market reconnaissance/survey						0						-						
	(3f) Uploading of report to ICT	168	168	168	168	168	840	250	250	250	250	250	1,250						
	<b>B. Business and trade missions</b>																		
	(3g) Invite suppliers and buyers						0						-						



## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	(3h) Communication and coordination with agri/trade attache/gov't representative						0						-						
	(3i) Conduct business/trade mission			3	3	3	9			20,000	20,000	20,000	60,000						
	<b>C. Business/market matching 1 per province</b>							10,000	10,000	10,000	10,000	10,000	50,000						
	(3j) Activity Proposal preparation						0						-						
	(3k) Identification/Coordination/Invitation of buyers and suppliers						0						-						
	(3l) Conduct of activity	81	81	81	81	81	405						-						
	(3m) Monitoring of consummated transactions						0						-						
	(3n) Uploading of report to ICT	81	81	81	81	81	405						-						
	<b>D. Marketing through E-commerce</b>												-						
	(3o) Identify available platforms							1,500	1,500	1,500	1,500	1,500	7,500						
	(3p) Identify/invite/coordinate with suppliers, buyers and traders	100	100	100	100	100	500						-						
	(3q) Register suppliers, buyers and traders	10	20	50	75	100	255						-						
	(3r) Monitoring	10	20	50	75	100	255						-						
	<b>Sub-total</b>							90,550	108,870	128,870	128,870	128,870	586,030	-	-	-	-		
<b>2. Ensure the availability of sufficient supply in</b>	<b>1. Conduct of market linkages &amp; actions to ensure food security</b>	12	12					5,000	5,000				10,000						
	(1a) Identification of food fish-deficient and foodfish-sufficient areas (profiling/ mapping) - species, production volume, seasonality, consumer preference, demand, demographics, purchasing power of consumers												-						
	(1b) literature research & baselining of foodfish-deficient & - sufficient areas												-						
	(1c) Needs analysis using baseline data												-						
	(1d) Baseline data validation (ie. Sufficiency/deficiency level per region)												-						
	(1e) Updating of mapping/ profiling of foodfish-deficient & -sufficient areas to ICT												-						
	(1f) Presentation of validated & updated foodfish-deficiency/sufficiency data to stakeholders and uploading to ICT												-						
	<b>2. Provision and management of infrastructure &amp; institutional/ services (trading centers/posts, CFLCs, cold chain facilities, road transport &amp; communication networks)</b>		12	12	12				3,000	3,000	3,000		9,000						
	(2a) Assessment/evaluation of existing infrastructure & institutional support and prevailing logistical system (including trading & transport system)												-						
	(2b) Review available literature research/studies												-						
	(2c) inventory, assessment/evaluation of available infrastructure & institutional support												-						
	(2d) Needs analysis & recommendations based on assessment												-						
	(2e) preparation of assessment/evaluation report												-						
	(2f) Presentation of results of assessment to stakeholders and upload information in ICT												-						
	<b>3. Strengthen inter-agency collaboration and public-private partnership to reduce distribution costs</b>		12	12	12				2,500	2,500	2,500		7,500						
	(3a) Consultations / coordination with LGUs & industry players												-						
	(3b) Preparation of invitation to public consultations on the outcomes of Activities 1a & 2a												-						
	(3c) identify & invite participants to public consultations												-						
	(3d) public consultation												-						
	(4a) Project Proposal (PP)												-						
	(4a.1) Preparation of project Proposal (PP)												-						
	(4a.2) Public consultation & approval of proposed project												-						

## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
foodfish-deficient areas	(5a) MOA Signing (project approval)												-						
	(5a.1) Preparation of invitation to MOA signing												-						
	(5a.2) Identify & invite attendees to MOA signing												-						
	(5a.3) MOA signing												-						
	(6a) Phase 1- Pilot Project Implementation												-						
	(6a.1) Consultation with the implementing LGUs and cooperators												-						
	(6a.2) Bidding & procurement of construction materials												-						
	(6a.3) Construction of infra facilities (eg. trading posts, CFLCs, cold chain facilities, etc.)												-						
	(6a.4) Pilot implementation												-						
	(7a) Phase 1-Monitoring & Evaluation												-						
	(7a.1) Develop/design monitoring and evaluation tools												-						
	(7a.2) Conduct of monitoring and evaluation												-						
	(8a) Phase 2- Project Implementation in other areas with adjustments/ enhancements in consideration of peculiarities of specific areas												-						
	(8a.1) Consultation with the implementing LGUs and cooperators												-						
	(8a.2) Bidding & procurement of construction materials												-						
	(8a.3) Construction of infra facilities (eg. trading posts, CFLCs, cold chain facilities, etc.)												-						
	(8a.4) Implementation												-						
	(9a) Phase 2 - Monitoring & Evaluation												-						
	(9a.1) Review and updating of monitoring tools												-						
	(9a.2) Conduct of monitoring and evaluation												-						
	(10a) Post Evaluation upon project completion												-						
	(10a.1) Conduct of consultations												-						
	4. Include the investors/business located in/targeting in foodfish-deficient areas in the investment priority plan									2,000	2,000	2,000	6,000						
	(4a) Public-private consultations/dialogues									2,000	2,000	2,000	6,000						
	(4b) Project feasibility study for the development of investment priority plan												-						
	(4c) Development of investment priority plan (IPP)												-						
	(4d) Proposal & approval of IPP												-						
	(4e) IPP implementation												-						
	(4f) Monitoring & Evaluation												-						
	(4g) Review & Updating/Adjustment												-						
	Sub-total							5,000	10,500	7,500	7,500	2,000	32,500						
3: Increase in the number of capacitated/competitive fishery-based MSMEs that can enter the market	1. Conduct of capacity-building/ training (on credit, entrepreneurship, and marketing) and participation in trade fairs/for a/meetings and business and trade missions							15,423	14,556	13,056	13,056	-	56,091						
	(1a) Conduct profiling of fishery-based MSMEs in the Philippines																		
	(1a.1) conduct consultation-meetings for the development and formulation of survey tools	3					3	576					576						
	(1a.2) orientation of enumerators	2					2	320					320						
	(1a.3) actual survey/profiling						0	255					255						
	(1a.4) Consolidation and analysis of survey data	3					3	216					216						
	(1b) Conduct assesment/identification of training needs of the industry (TNA)						0						-						
	(1b.1) Assessment thru conduct of survey on trainings needed						0						-						
	(1c) Develop and prepare training modules	2	3				5	1,000	1,500				2,500						
	(1d) Conduct trainings for:						0						-						

## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	(1d.1) Credit access: preparation of business plans, credit worthiness training for fisherfolk borrowers, financial management, leadership training, cooperativism	34	34	34	34		136	6,528	6,528	6,528	6,528		26,112						
	(1d.2) Market access: product packaging, labelling/branding, product promotional strategies, marketing ads/commercials, development of marketing plan, marketing thru social media, technology use	34	34	34	34		136	6,528	6,528	6,528	6,528		26,112						
	(1e) Participation/exposure to seafood trade fairs and expos																		
	(1e.1) Identification of local and international seafood trade fairs and expos to participate																		
	(1e.2) Identification of participating MSMEs																		
	(1e.3) Identification of seafood trade fairs and expos to participate																		
	(1e.4) Consultation-meetings re: participation details																		
	(1e.5) Participation in the actual event																		
	(1f) Participation/exposure to business/trade missions (outbound)																		
	(1f.1) Identification of target markets (local and international)																		
	(1f.2) Identification of participating MSMEs																		
	(1f.3) Consultation-meetings with trade attaches and participants																		
	(1f.4) Participation in the actual event																		
	(1f.5) Feedbacking/ Re echoing																		
	2. Facilitation of access to financial/credit support (equipment, infrastructure, capital)							7,080	7,980	7,980	7,980	7,980	39,000						
	(2a) Orientation on available credit windows of financing institutions (Fis)																		
	(2b) Conduct of investment forum (invite GFIs to present various financing windows and schemes)	17	17	17	17	17	85	6,000	6,000	6,000	6,000	6,000	30,000						
	(2c) Conduct monitoring on the status of credit facilitated		5	5	5	5	20		900	900	900	900	3,600						
	c.1 development of monitoring forms																		
	(2d) Provision of other necessary technical assistance to enable access to credit	6	6	6	6	6	30	1,080	1,080	1,080	1,080	1,080	5,400						
	<b>Sub-total</b>							22,503	22,536	21,036	21,036	7,980	95,091						
<b>4. Establish a comprehensive market information system</b>	1. Implementation of a comprehensive market research program that will address the trade concerns of the primary and emerging markets in both domestic and foreign sectors							1,540	6,420	6,420	6,420	6,420	27,220					NFRDI/BFA R-FIDSD	BFAR Regional Offices, LGU, SUC's, DTI
	(1a) Creation of a task force to develop a national baseline data that will address the marketing needs of the fishery sector (activity)	1					1	100					100						
	(1a.1) Identify the composition of the task force (include all stakeholders)																		
	■ formulate functions, duties and responsibilities, scope of work, etc																		
	(1a.2) Issuance of Official Orders from OP to concerned agencies on the creation of task force																		
	(1a.3) Conduct of Meetings - carry out official functions	3	3	3	3	3	15	150	150	150	150	150	750						
	(1a.4) Institutionalize the task force within the appropriate agency																		
	(1b) Establishment of Comprehensive National Fisheries database								5,000	5,000	5,000	5,000	20,000						
	■ Production volume and value, location, prices																		
	■ Stakeholders's profile (suppliers, producers, traders, fisherfolk others)																		
	■ Fishery policies, laws and regulations																		
	■ Regulatory services (testing, inspection, certification, others)																		

## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	■ Registered/accredited fisheries establishments/facilities																		
	■ Fish consumption (sufficiency, consumer preferences, others)																		
	■ Extension services																		
	■ Reports																		
	■ Events																		
	(1c) Conduct or market mapping of specific fishery products by region and province in terms of volume and value of production, prices, product demand, consumer preferences, imports and exports with emphasis on surplus and deficit areas; market research relative to trading system for the establishment of market (activity)																		
	(1c.1). Conduct VCA (per region, per commodity)																		
	i. Identify priority commodities for value chain analysis																		
	ii. Identify additional commodities for market mapping																		
	iii. Conduct training on value chain analysis for regions identified as producers of priority commodities	3	1	1	1	1	7	300	100	100	100	100	700						
	iv. Data collection, Consolidation, Encoding and Analysis based on Designed Templates	4	4	4	4	4	20	400	400	400	400	400	2,000						
	e. Evaluation of regional value chain analysis results	3	3	3	3	3	15	120	120	120	120	120	600						
	v. Finalization of Regional value chain analysis	1	1	1	1	1	5	30	30	30	30	30	150						
	vi. Updating of value chain analysis		1	1	1	1	4		180	180	180	180	720						
	(1d) National Consolidation																		
	(1d.1) Compilation and analysis of regional value chain analysis	4	4	4	4	4	20	320	320	320	320	320	1,600						
	(1d.2) Presentation of VCA results to corresponding sectoral groups	1	1	1	1	1	5	100	100	100	100	100	500						
	(1d.3) Identification of Data for Inclusion to IEC/ICT	1	1	1	1	1	5	20	20	20	20	20	100						
	2. Development of Information, Education and Communication (IEC) Program for market information and marketing of fishery products (tri-media, social media and digital)							3,200	2,250	2,250	2,250	2,250	12,200					BFAR	BAS-PSA,DTI, Private Sector
	(2a) Develop a marketing webpage found in the Bureau's official website in cooperation with Fisheries Information Management Center (BFAR-FIMC)																		
	(2a.1) Conduct consultation meetings with FIMC	4					4	250					250						
	(2a.2) Planning of webpage design and layout	4					4	350					350						
	(2a.3). Planning of market information for webpage inclusion	4					4						-						
	(2a.4) Webpage development							500					500						
	(2a.5) Conduct of pilot testing of webpage	1					1	100					100						
	(2a.6) Launching of fully developed webpage							250					250						
	(2a.7) Regular updating of webpage		1	1	1	1	4		500	500	500	500	2,000						
	(2b) Develop a promotional AVP of Philippine Seafood Products in collaboration with Information and Public Relations Group (BFAR-IPRG)							750	750	750	750	750	3,750						
	(2b.1) Project proposal preparation	1					1												
	(2b.2). Conduct consultation meetings with IPRG	2					2												
	(2b.3) Identify participating markets, LGUs and stakeholders	2					2												
	(2b.4) Conduct consultation meetings with participating Market Masters, LGUs and stakeholders	3					3												
	(2b.5) Conduct of photo and video documentation of Ph seafood products	4					4												
	(2b.6) AVP development and polishing	2					2												
	(2c) Develop product promotional and service information IEC materials (brochures, posters and flyers)	1	1	1	1	1	5	1,000	1,000	1,000	1,000	1,000	5,000						

## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	3. Development and establishment of ICT in Fisheries							1,200	10,750	20,900	32,740	4,900	70,490					BFAR	DOST-ICTO, DOST-PAGASA, DTI, PSA, private sector (i.e. IGAT), CSOs (i.e. Bayang Pinoy), NDRRMC, CCC, DILG, SCUs
	(3a) Study of Different Country ICT	2					2	600					600						
	(3b) Preliminary Concept Study	2					2	600					600						
	(3c) Development of a specialized platform for e-commerce of fishery product																		
	(3c.1) Develop Schedule of Activities		3				3		1,980				1,980						
	(3c.2) Consultations with the stakeholders on the user interface		3				3		1,980				1,980						
	(3c.3) Software Development of Concept		3				3		2,250				2,250						
	(3c.4) Platform Study (open web, FLS space, mobile, etc)		1				1		480				480						
	(3c.5) Software concept upgrade		1				1		480				480						
	(3c.6) Development Inclusions		2				2		1,080				1,080						
	(3c.7) Software Development (specialized platform for fishery product)			10			10			18,400			18,400						
	(3c.8) Pilot Test Software				2		2				5,520		5,520						
	(3c.9) Verify Stability and Security				4		4				5,760		5,760						
	(3c.10) Test software to different sectors (farmer, fisherfolk producers, suppliers, traders, BFAR, DTI, associations, etc)				2		2				5,520		5,520						
	(3c.11) Launch Fully Developed Software/Roll Out				3		3				5,520		5,520						
	Improve and Update Software				3		3				5,520		5,520						
	(3d) Data Analysis		12	12	12	12	48		2,500	2,500	2,500	2,500	10,000						
	(3e) System Maintenance				12	12	24				2,400	2,400	4,800						
	<b>Subtotal</b>							5,940	19,420	29,570	41,410	13,570	109,910						
5. Strengthen enforcement of laws, policies and regulations related to trade and marketing	1. Review and analysis of existing national and international laws/policies relevant to trade and marketing (to address gaps and needs of the market)							8,600	-	-	-	-	8,600					BFAR	DTI, BFAR, BAFPS, FDA, BOC, Private Sector, DILG
	(1a) Creation of Technical Working Group (TWG)																		
	(1a.1) Conduct consultation and meetings	1					1	7,000					7,000						
	(1a.2) Draft MOA on duties and responsibilities for each agency	1					1						-						
	(1a.3) Review and approval of MOA	1					1						-						
	(1b) Scoping of policies, laws and regulations for domestic market						0						-						
	Review of domestic market policies	16					16	1,600					1,600						
	(1c) Scoping of policies, laws and regulations for export market						0						-						
	(1c.1) Review of existing market policies with trading partner	10					10						-						
	(1c.2) Update/Ammend/Issue/Legislate laws and policies to make it relevant for marketing needs						0						-						
	(1c.3) Implementation	10					10						-						
	(1c.4) Coordinate with DTI Phil National Trade Repository Secretariat for updating of trade related policies						0						-						
	(1c.5) Review of the process mapping or system audit of inspection/regulatory protocols						0						-						
	(1c.6) Conduct field validations/visits	16	16	16	16	16	80						-						
	(1c.7) Streamline and harmonize audit processes						0						-						
	(1c.8) Conduct National Forum on 3rd party audit/certification						0						-						
	2. Forging of public-private partnerships (PPPs) towards more effective , transparent, accountable regulatory schemes (self-regulation, anti-smuggling)							2,000	2,000	2,000	2,000	2,000	10,000						



## Trade and Marketing Work Plan

Agreed Consolidated Actions	Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
		2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
	(2a) Creation of a task force to forge public-private partnerships (PPPs) towards more effective , transparent, accountable regulatory schemes (self-regulation, anti-smuggling)						0						-						
	(2a.1) Identify the composition of the task force (include all stakeholders)						0						-						
	■ Formulate functions, duties and responsibilities, scope of work, etc						0						-						
	■ Develop model for private public partnership						0						-						
	(2a.2) Issuance of Official Orders from OP to concerned agencies on the creation of task force						0						-						
	(2a.3) Conduct of Meetings - carry out official functions						0						-						
	(2a.4) Institutionalize the task force within the appropriate agency						0						-						
	(2b) Forge partnership between public and private sector						0						-						
	<b>Sub-total</b>							10,600	2,000	2,000	2,000	2,000	18,600						
<b>6. Enhance capacity/competency of fishery institutions, manpower and professionals (LGUs, NGAs, academe and other industry players), specific to marketing</b>	1. Assessment and evaluation of manpower competency of fishery institutions							2,850	1,400	-	-	-	4,250					BFAR	DTI, Academe, Private Sector
	(1a) Development of survey/evaluation form	1					1	250					250						
	(1a.1) Hiring of consultant	1					1	100					100						
	(1a.2) Creation of TWG	1					1	100					100						
	(1a.3) Pre-testing of survey/evaluation form						0	150					150						
	(1a.4) Finalization of survey/evaluation form						0	150					150						
	(1b) Conduct of evaluation	19					19	200					200						
	(1b.1) Identification of focal persons (Region/National)						0	150					150						
	(1b.2) Identification of target respondents/key informants						0	150					150						
	(1b.3) Flooting of survey/evaluation form						0	250					250						
	(1b.4) Collection/Validation of survey/evaluation form						0	1,200	1,200				2,400						
	(1c) Preparation, presentation and submission of report to concerned institutions	1					1	150					150						
	(1c.1) Analysis of accomplished survey/evaluation form						0		200				200						
	2. Development of training programs/modules to capacitate the industry and government personnel (LGUs/NGAs)							1,200	6,500	5,900	6,100	6,100	25,800					BFAR/DTI	Academe, Private Sector
	(2a) Development of training programs specific to fisheries trading/marketing		5				5	1,200	250	250	250	250	2,200						
	(2a.1) Hiring of consultant		2				2						-						
	(2a.2) Creation of TWG		1				1						-						
	(2b) Conduct of trainors training (national)		2				2		600				600						
	(2c) Conduct of regional trainings	38	38	38	38		152		5,000	5,000	5,000	5,000	20,000						
	(2d) Post-evaluation on the effectivity of trainings conducted on the competency of fisheries	1	1	1	1		4		500	500	500	500	2,000						
	(2d.1) Conduct of survey (internal)						0				200	200	400						
	(2d.2) Third-party evaluation on the competency of fishery institutions/personnel involved in marketing						0						-						
	(2e) Enhancement of training programs		5				5		150	150	150	150	600						
	<b>Sub-total</b>							4,050	7,900	5,900	6,100	6,100	30,050						
	<b>Grand Total</b>							138,643	171,226	194,876	206,916	160,520	872,181						

## Crosscutting Themes Work Plan

Agreed Consolidated Crosscutting Themes		Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
			2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
1. Facilitate access to credit		Review financing programs and explore alternatives																	ACPC	GFIs, BFAR, DTI, CDA, private sector, CSOs
		Develop a borrower-friendly financing program/scheme specific for small fisherfolk and MSMEs																		
		Increase provision of guarantee funds to FIs for the availment by small fisherfolk and MSMEs																		
		Conduct orientation and investment forum on available credit windows of financing institutions (FIs).																		
		Provision of other necessary technical assistance to enable access to credit																		
		Conduct monitoring on the status of credit facilitated e.1 development of monitoring forms																		
2. Develop insurance programs for fisheries	Fishery products	Review existing programs																	PCIC	PhilHealth, BFAR, CDA, private sector, CSOs
	Fisherfolk	Conduct orientation and consultations																		
	Facilities	Provide technical assistance																		
3. Provide tax and other incentives	Development of tax incentive system	Create a TWG to review, update, formulate/develop policies on relevant tax and other incentive programs, to include among others:																	DTI-BOI	BFAR, DOF, BIR, private sector, BOC, Tariff Commission, PEZA
	Review of list of equipment and aquaculture inputs submitted to the Bureau of Customs	a. List of equipment and aquaculture inputs																		
	Review of import taxes levied on imported raw materials for feeds	b. Import taxes levied on imported raw materials for feeds																		
4. Enhance convergence of livelihood/ entrepreneurial programs	Integrate BFAR livelihood/ entrepreneurial programs with other NGA/GOCC interventions (e.g. Four Ps of DSWD and subsidized insurance programs under PCIC (note: to consolidate inputs from other sectors))	Identify agencies with fisheries-related livelihood/entrepreneurial programs							1,000										BFAR	DSWD, DTI, DOLE, DA-NCI, TESDA, NCIP, DILG, CSOs, private sector, NAPC
		Create an interagency committee to review, update, formulate/develop programs on livelihood/ entrepreneurship							3,000	3,000										
		Conduct consultation and orientation							3,000	3,000	2,000	2,000	2,000							
		Implement fisheries-related livelihood programs							500,000	550,000	605,000	665,500	732,050							

## Crosscutting Themes Work Plan

Agreed Consolidated Crosscutting Themes		Activities	Target						Budget (Php '000)						Funding Source				Responsible Agency/ Organization	
			2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
5. Develop/ Strengthen/ Harmonize Information & Communication Technologies (ICT) in Fisheries	Data collection (fishery/aquaculture)	1. Create interagency working committee to identify ICT needs/requirements, policies and implementing guidelines (note: see MDG on ICT)																	BFAR	DOST-ICTO, DOST-PAGASA, DTI, PSA, private sector (i.e. IGAT), CSOs (i.e. Bayang Pinoy), NDRRMC, CCC, DILG, SCUs
		a. Identify the composition of the IWC (include all stakeholders)																		
		b. Issuance of Official Orders from OP to concerned agencies																		
		c. Conduct of Meetings - carry out official functions																		
		d. Institutionalize the task force within the appropriate agency																		
		2. Develop ICT software/systems in Fisheries																		
		a. Develop platforms for fisheries database																		
		b. Develop Schedule of Activities																		
		c. Consultations with the stakeholders on the user interface																		
		d. Software Development of Concept																		
		e. Platform Study (open web, FLS space, mobile, etc)																		
		f. Software concept upgrade																		
		g. Development Inclusions																		
		h. Software Development (specialized platform for fishery product)																		
		i. Pilot Test Software																		
		j. Verify Stability and Security																		
		k. Test software to different sectors (farmer, fisherfolk producers, suppliers, traders, BFAR, DTI, associations, etc)																		
		l. Launch Fully Developed Software/Roll Out																		
		m. Improve and Update Software																		
		3. Data collection, to include among others: - production volume and value, location, prices - stakeholders's profile (suppliers, producers, traders, fisherfolk others) - fishery policies, laws and regulations - regulatory services (testing, inspection, certification, others) - registered/accredited fisheries establishments/facilities - fish consumption (sufficiency, consumer preferences, others) - extension services - reports, weather, new technologies, inventory of IECs - events																		
		4. Data analysis																		
		5. System maintenance																		

## Crosscutting Themes Work Plan

Agreed Consolidated Crosscutting Themes		Activities	Target						Budget (PhP '000)						Funding Source				Responsible Agency/ Organization	
			2016	2017	2018	2019	2020	Total	2016	2017	2018	2019	2020	Total	NGA	LGU	Private Sector	Others*	Lead	Participating
6. Provide alternative/ affordable source of energy for fisheries applications (to include electrification for areas without)		1. Create interagency working committee to identify power needs/requirements, policies and implementing guidelines							1,000	2,000									DOST	BFAR, DOE-Commission on Renewable Energy, CSO, private sector, SCUs, DTI-BOI
		a. Identify the composition of the IWC (include all stakeholders)							500	2,000										
		b. Issuance of Official Orders from OP to concerned agencies							500	1,000										
		c. Conduct of Meetings - carry out official functions							1,000	3,000	3,000									
		d. Institutionalize the IWC within the appropriate agency							1,000	2,000	2,000									
		2. Identify available alternative sources of energy							1,000	2,000	3,000									
		3. Pilot testing of appropriate technologies							1,000	3,000	3,000	2,000	2,000							
		4. Source funds for project implementation								1,000	1,000	1,000	1,000							
		5. Implement projects								10,000	20,000	30,000	30,000							
7. Collaborate with concerned agencies to enhance fisheries education	Curriculum review	1. Provide technical assistance (including the development of technical reference materials)																	CHED	TESDA, DepEd, DA-ATI, BFAR, SCUs, CSOs, private sector
	Support of fisheries high schools	2. Provide avenues for OJT and industry immersion																		
	Faculty development																			
	Conduct of trainers' training / on-the-job trainings																			
	Education system for agri/fishery – fisheries scholarship program																			
8. Expand fisheries scholarship program	Expansion of the fisheries scholarship program	1. Review and update fisheries scholarship program (at all levels)																	BFAR	DOST, CHED, DepEd, SCUs, NEDA, private sector, CSOs, TESDA, DILG
		2. Conduct tracer study of graduates																		
		3. Conduct needs assessment																		
		4. Expand scholarship program to include graduate studies																		
		5. Increase when appropriate the number of scholars and financial benefits																		

# **STATE OF CAPTURE FISHERIES IN THE PHILIPPINES**

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Rafael Ramiscal (BFAR Central Office)

December 2015



## State of capture fisheries in the Philippines

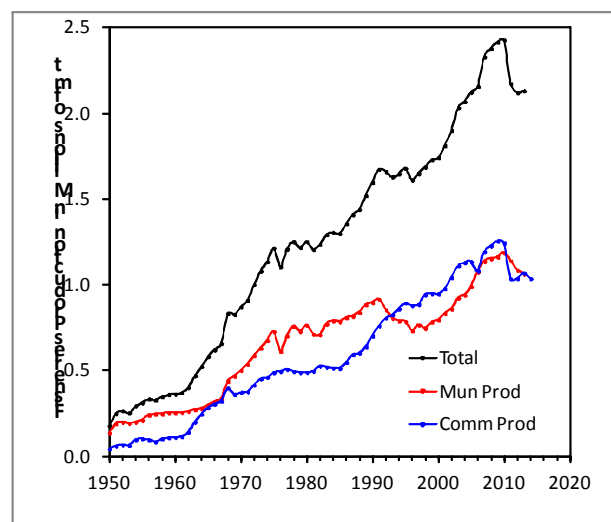
Wilfredo L. Campos & Donna M. Guarte (UPV CAS OceanBio Lab)

Rafael Ramiscal (BFAR Central Office)

This paper presents a synthesis of current available information on the status of capture fisheries in the country. These include temporal trends and geographical (regional) distribution of landings of major fisheries resources, such as tuna and tuna-like fishes, sardines and other small pelagics, and soft-bottom fish and invertebrates like squid and swimming blue crabs. Available information relating catch and fishing effort are summarized to present trends in exploitation status and in simple catch rates for various fishing grounds around the country.

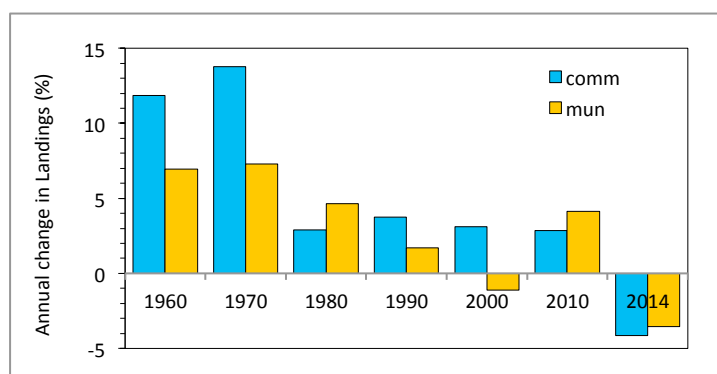
### Historical trends in marine capture fisheries production

Marine capture fisheries production from 1950 to 2014 is presented by sector in Figure 1. On a nationwide scale, the development of fisheries showed rapid growth from the 1960's to the mid-1970s. This was followed by about a decade of near stagnation in production in both sectors until



the mid-1980s (Silvestre et al., 1989). This slowdown has been interpreted as the period when the major fishing grounds of the country reached their respective maximum sustainable yields (Dalzell and Ganaden, 1987; Armada, 2004). The further increase from the late 1980s to 2010, particularly for the commercial sector may be due to expansion to fishing grounds further offshore as well as to technological advances in navigation, locating fish aggregations, and efficiency in fishing operations. The increasing trend is less consistent for the municipal sector. Figure 2 shows the average percent (%) change in annual landings by 10 year periods for each sector. The reduction in annual growth in

municipal fisheries production was consistent for at least 30 years, from the 1970s to 2000, while commercial landings remained low but changed little during the same period. Annual production has been decreasing in both sectors since 2010 (Fig. 1). In 2013, total marine capture fisheries production amounted to 2.13M mt.

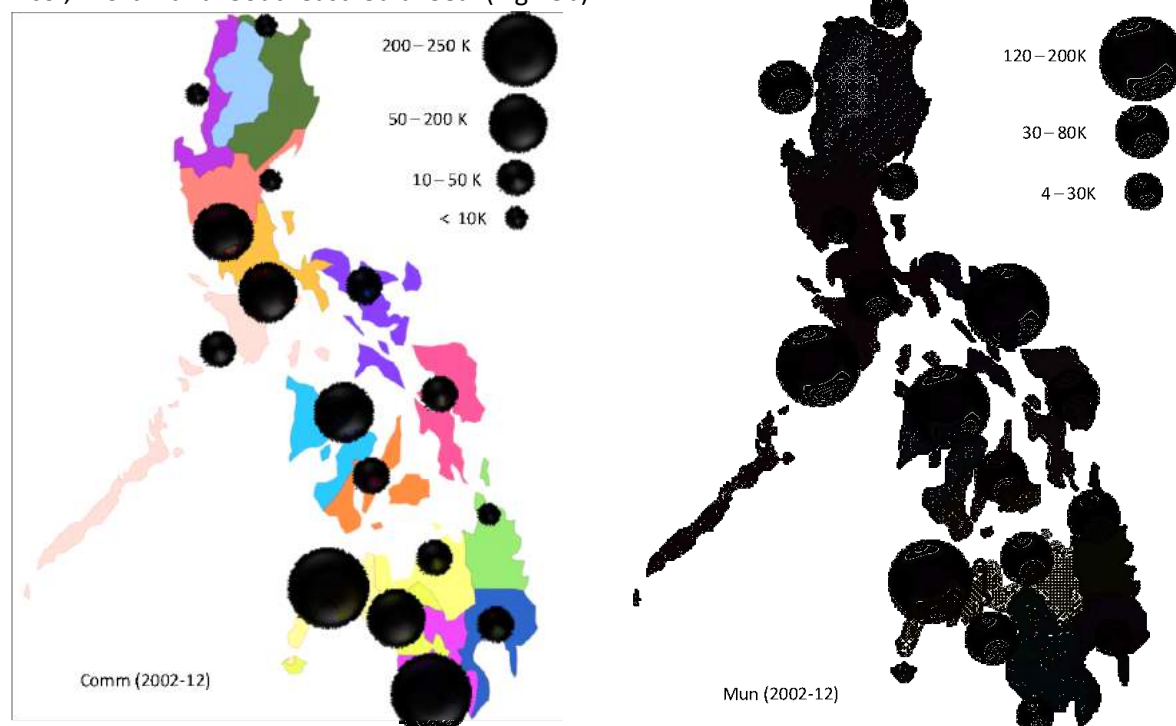


While trends in production may provide some information, the truly useful information on the performance of the industry should be of the rate of fisheries production, in terms of fishing effort, or some parameter that is indicative of it. This will be examined in a later section.

### Geographical distribution of fisheries production

Figures 3a and b show the distribution of mean annual landings (in  $10^3$  mt) by region. Most of the catches from the commercial fisheries are landed in ports along the western part of the country,

particularly in East Sulu Sea, Moro Gulf, Manila Bay and in Southern Luzon (Fig. 3a). Much of the municipal production, however, is landed in the central part of the country, namely the Visayan Sea, Bicol, North and Southeast Sulu Sea (Fig. 3b).



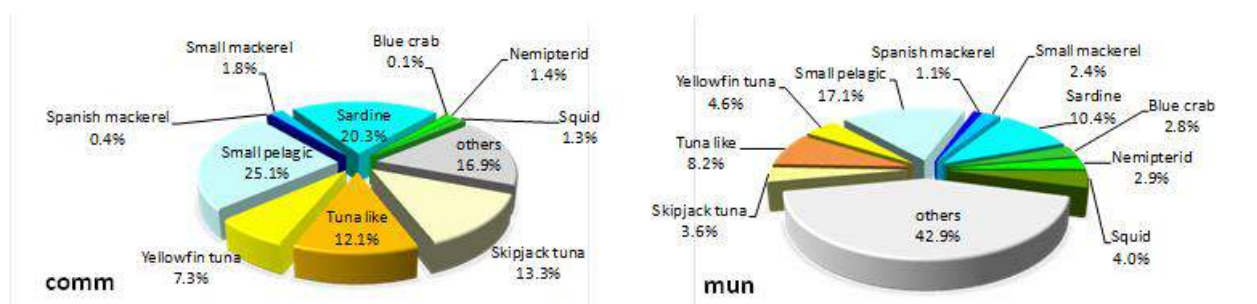
While municipal catches are typically landed within the same locality or fishing ground, the same cannot be assumed for commercial catches. Hence, Fig. 3 does not necessarily reflect the main fishing grounds of the commercial sector.

The typical composition of catches from both sectors, based on annual mean landings from 2002 to 2014, are summarized in Figs. 4a and b. Commercial fisheries landings are made up primarily of pelagic fishes, with small pelagics (scads), sardines and small mackerels making up about 48%, and tuna and other large pelagics making up another 30% or so. In contrast, over 50% of municipal catches consist of other species of pelagic and soft/hard bottom demersals, including many invertebrates.

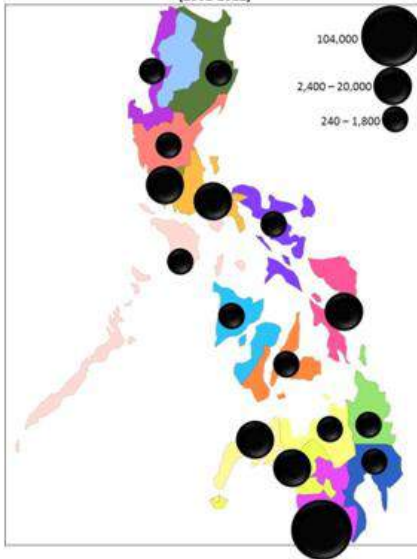
The geographical distribution of landings of major resource groups caught by each sector are shown below in Figs. 5-13. The trend in annual production for the 13yr period 2002-14 is also presented alongside for each resource group.

For the major tuna species (skipjack and yellow fin), as well as for the other tuna (Bullet/Frigate, Eastern little & Bigeye), the commercial landings are located mostly in the East/South Sulu Sea - Moro Gulf – Celebes Sea areas, while the main municipal landing area is in Southern Luzon (Figs. 5-7). These also correspond somewhat to the major fishing grounds for the respective sectors.

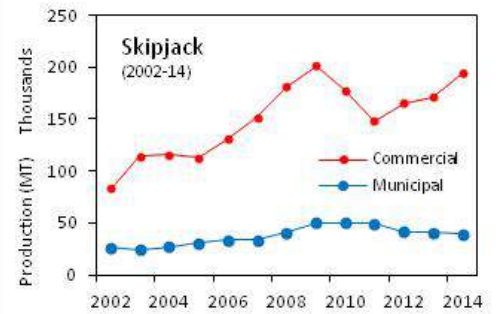
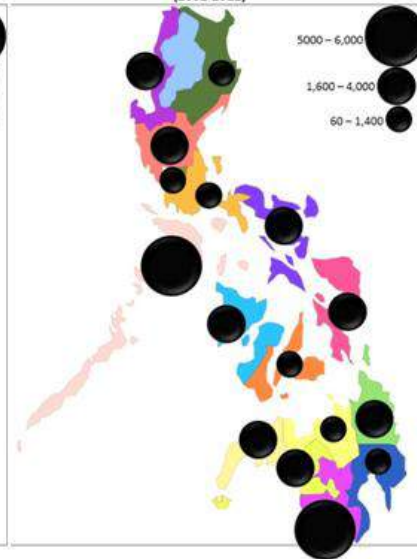
For sardines (Fig. 8), highest commercial landings are concentrated off Zamboanga, while municipal catches are landed mostly in ports along the western part of the country, including Lingayen Gulf, Visayan Sea and Moro Gulf.



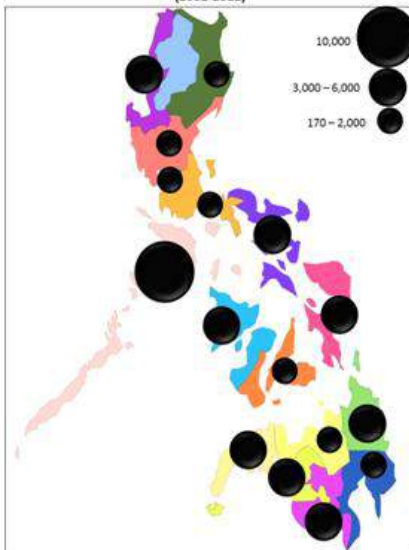
Skipjack Tuna Commercial Production (MT)  
(2002-2012)



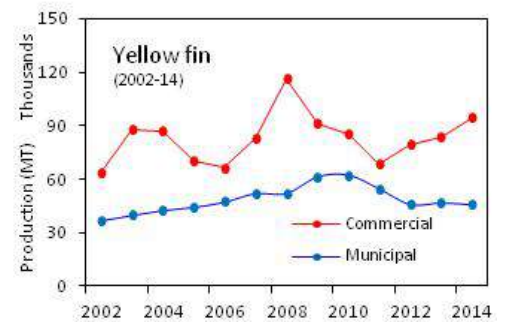
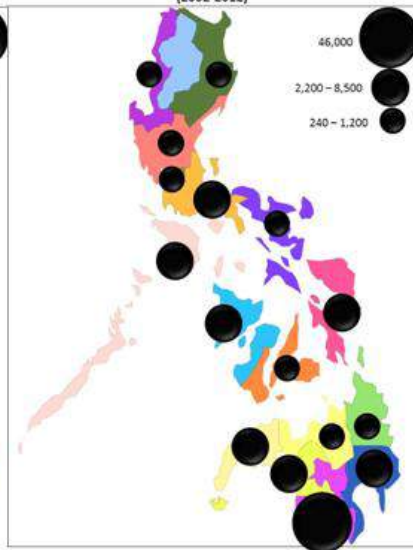
Skipjack Tuna Municipal Production (MT)  
(2002-2012)



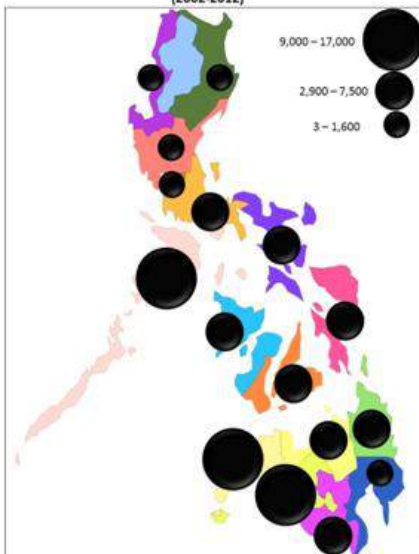
Yellowfin Tuna Municipal Production (MT)  
(2002-2012)



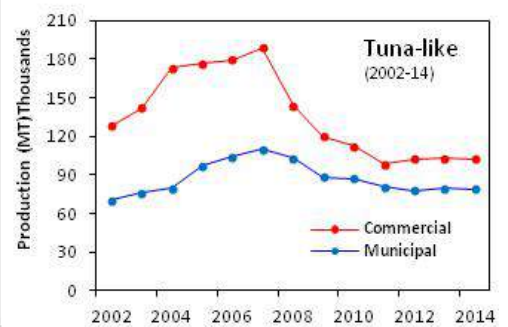
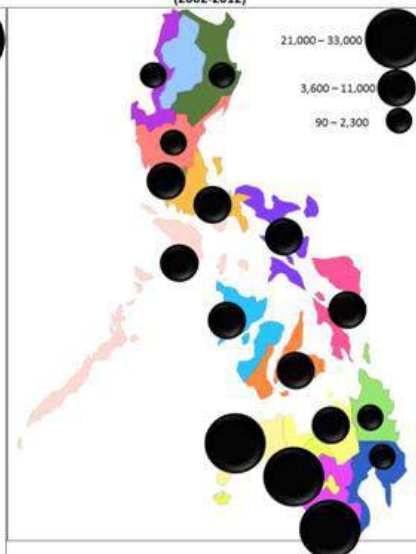
Yellowfin Tuna Commercial Production (MT)  
(2002-2012)



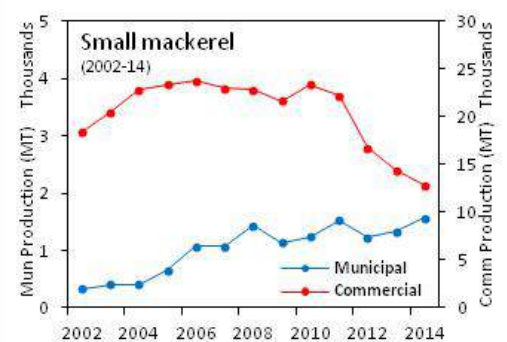
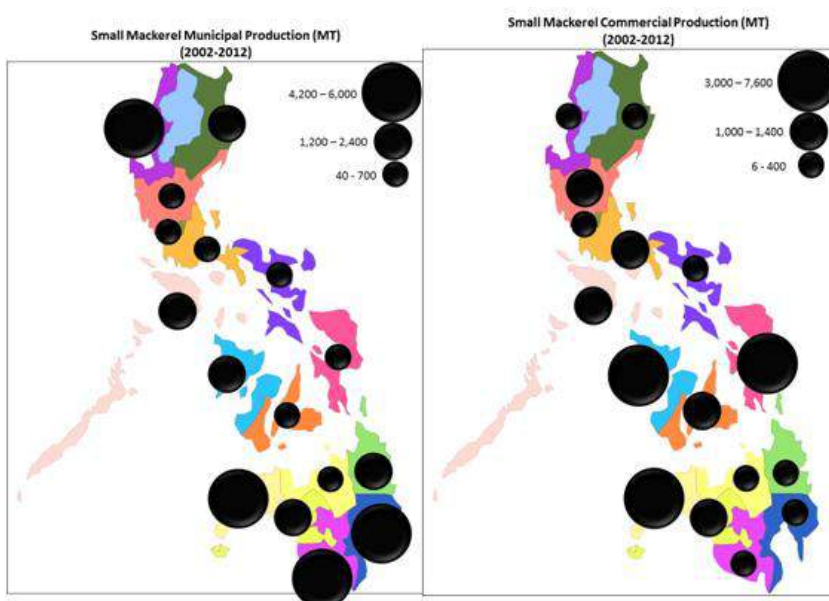
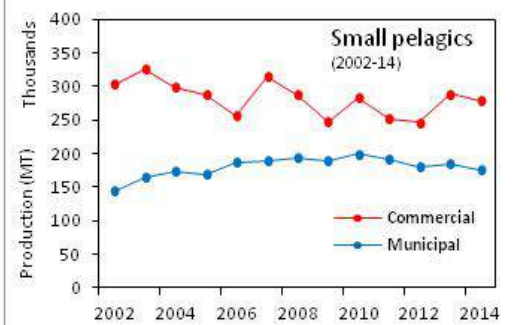
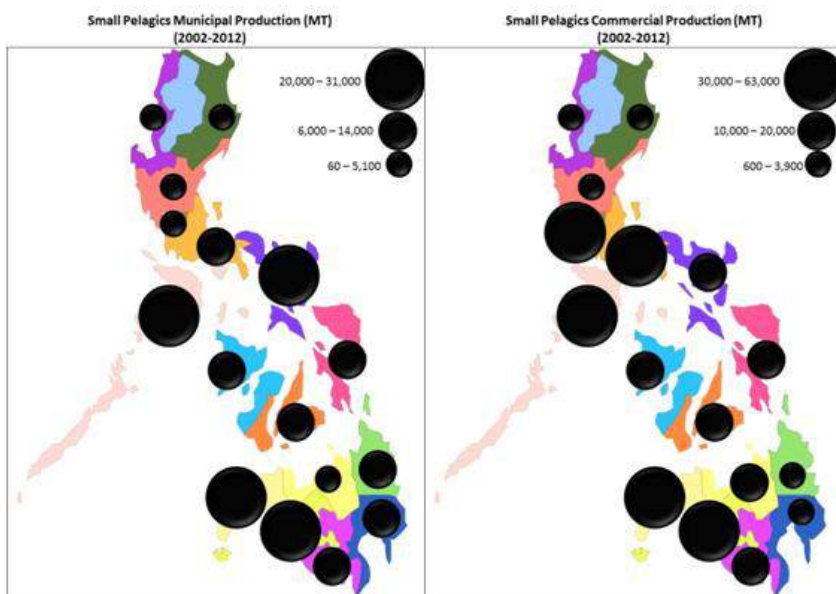
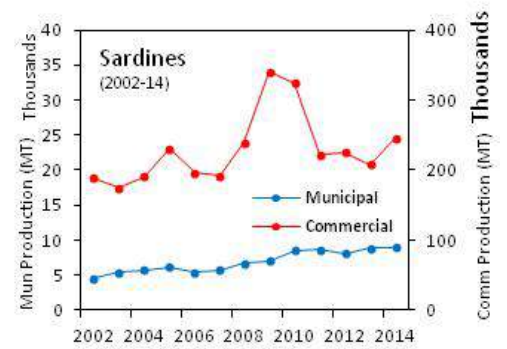
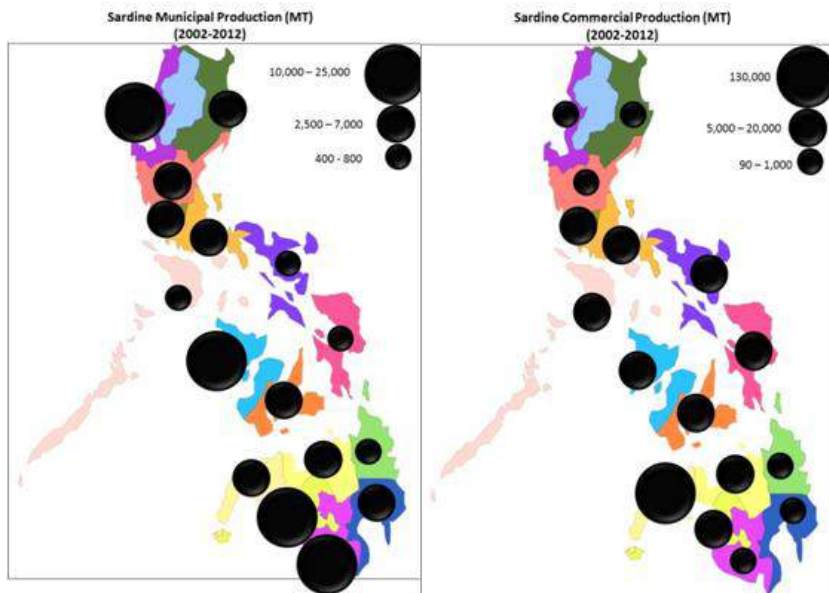
Tuna-like Municipal Production (MT)  
(2002-2012)



Tuna-like Commercial Production (MT)  
(2002-2012)







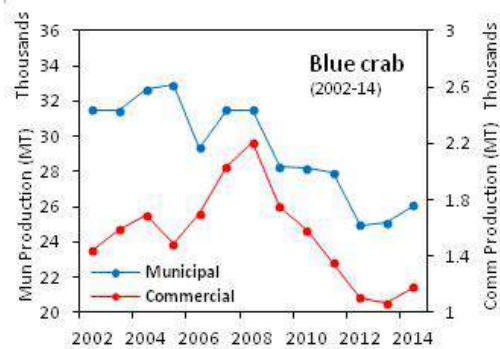
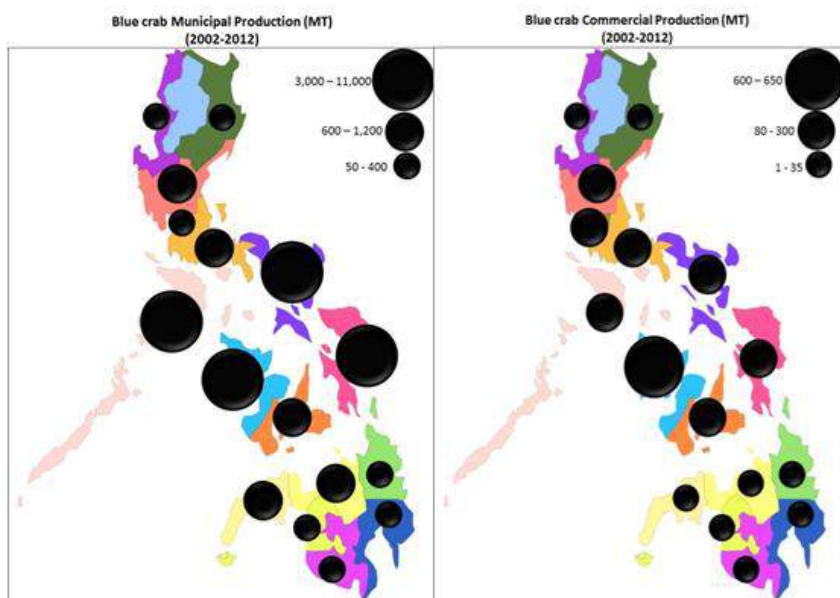
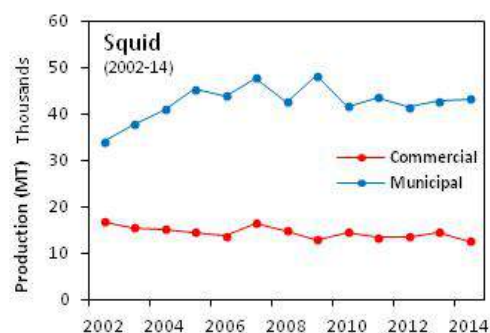
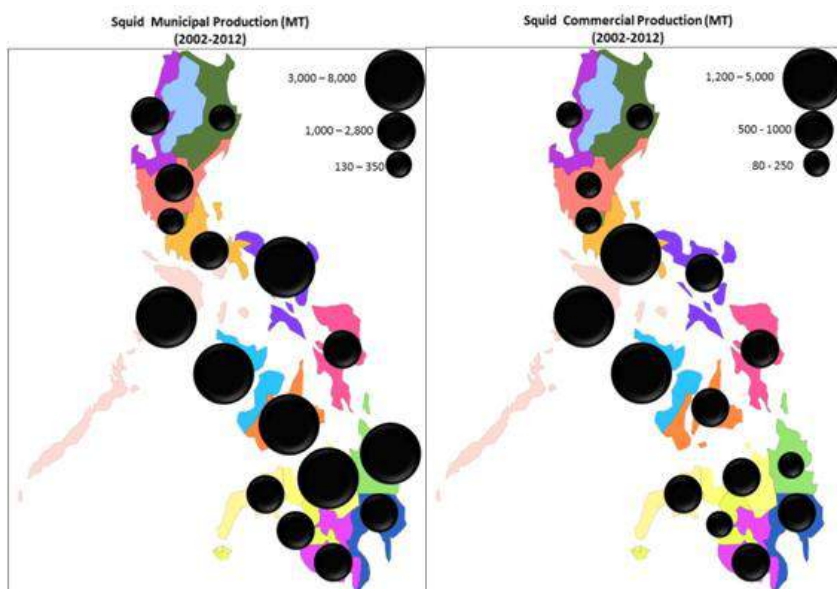
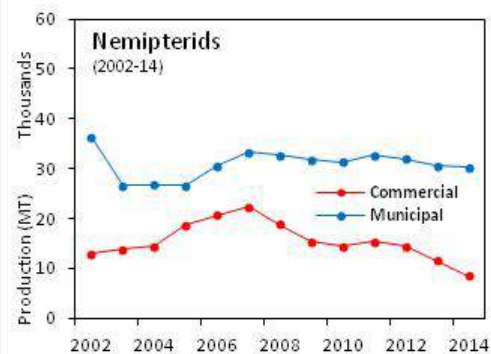
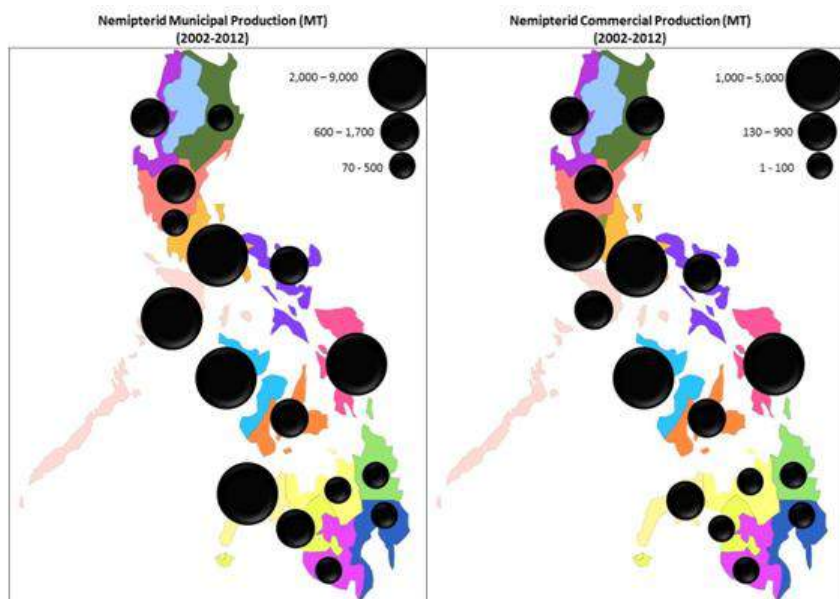
For other small pelagics, particularly the Round and Bigeye scads, the main landing areas are very similar for both sectors (Fig. 9), except for Manila Bay and southern Luzon which are major landing areas for commercial vessels. This similarity suggests that the main fishing grounds for scads are also located within the vicinity of these landing areas. Overall production of small mackerels (Indian and Indo-Pacific mackerel) is about 1/10 the production of scads (Fig. 10), but the catches of the different sectors are landed in different areas. This suggests differences in the species composition of their catches for this resource group.

On the whole, pelagic fish make up 2/3 of the country's mean annual marine capture fisheries production. These include transboundary stocks (e.g., tunas) and those that are more limited to within the country's archipelagic waters, but likely move across various fishing grounds. These are also typically schooling which are likely to be more vulnerable to fishing gear that are able to encompass large areas, and to those that use attracting accessories such as lights and aggregating devices. For all pelagic categories examined above, annual catches by the commercial sector were much higher than those from the municipal.

In contrast, municipal catches exceed from 2 to over 10X the commercial catches for demersal resources, which are limited to relatively shallow shelf areas, most of which are within 10-15km, or nearer, from the shore. The major landing areas for demersal resources are within Central Philippines, between south Luzon and north Mindanao (Fig.s 11-13). The bulk of commercial demersal catches are likely to be from trawls and modified Danish seines (hulbot-hulbot), which have been banned since late 2013.

Cephalopods are a promising resource, particularly squid, because of their fast growth and relatively high value. In overexploited shallow demersal fishing grounds, the decline in the abundance of large predators is believed to be the cause for the high abundance of squid. The reduced predation pressure allows squid to multiply rapidly, and because they continue to remain abundant in many fishing grounds (see Fig. 12), they seem to be less vulnerable to heavy fishing pressure than their vertebrate counterparts (i.e., fish). Little is known about cephalopod stocks in the country. In the case of octopus, which is now appearing in the list of major marine fisheries commodities in the country, we have no reliable catch and effort statistics anywhere.

For swimming blue crabs, the fishery has declined rapidly since the late 2000s. The major fishing ground is presently along the northern and eastern coasts of Panay in the Visayan Sea, although there is substantial production also in Bicol and Leyte (Fig. 13). Details on the status of blue crab stocks in the Visayan Sea are provided by Ingles (2004).

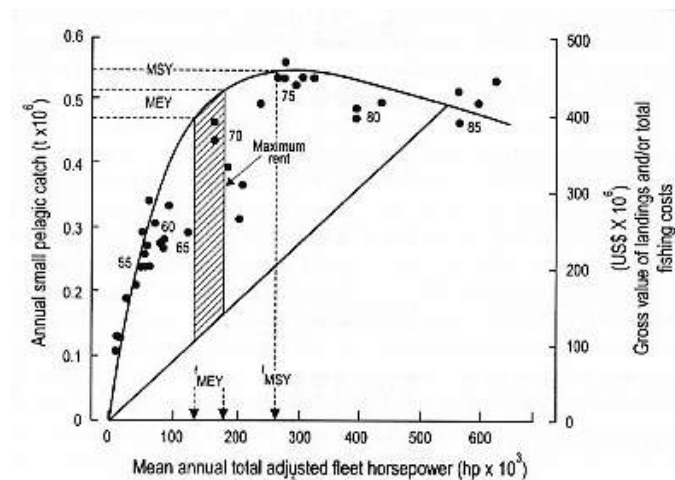




## Status of resources

### Commercial fisheries

While annual production trends may give the impression of a growing sector, they mask the status of true resource abundance, especially when fishing grounds are typically under heavy fishing pressure,

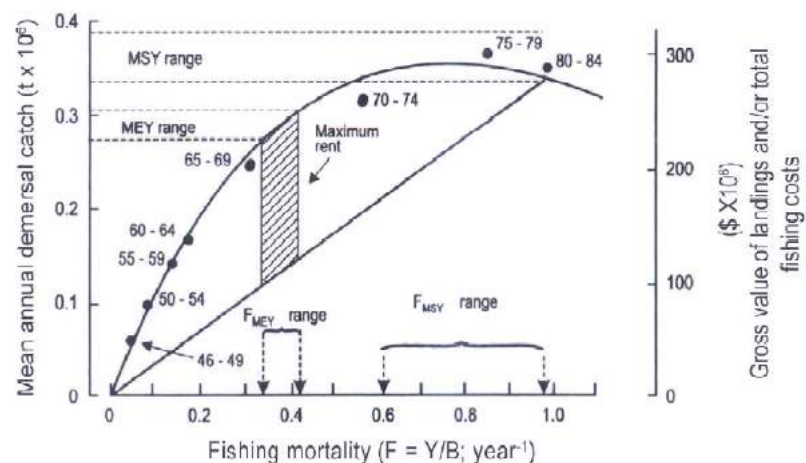


as most have been since the 1970s. Equally important as the landings is the amount of fishing effort that was spent to catch what is landed.

Relating production (catch) and fishing effort allows us valuable insight on the status of the stock. Dalzell and Ganaden (1989) and Silvestre and Pauly (1986) report their findings on MSY (maximum sustainable yield) of small pelagic and soft bottom demersal resources, respectively, in the country as a whole, based on data derived and/or gathered from the 1940/50s to the 1980s. In both

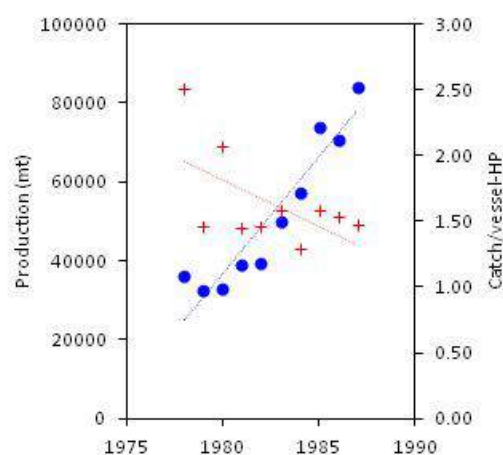
reports, MSY in most fishing grounds at the time was reached in the late 1970s, with fishing effort continuing to increase for another 5-10y at the time the studies were done.

For small pelagics, the MSY model estimated that commercial fishing effort levels in 1987 had to be reduced by 50% to allow the country's fishing grounds to regain their natural productive capacities (Fig. 14). That was 30 years ago.



For soft bottom demersals, the model showed that the

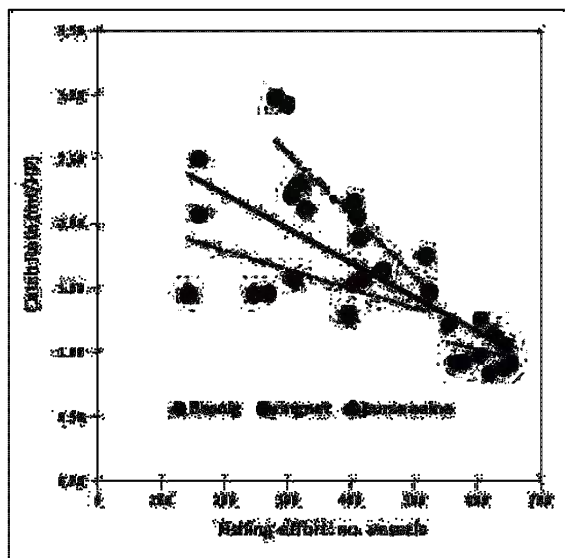
commercial fishing fleet in 1984 was catching (producing) only as much as they did in the 1970s, but with 40% more fishing effort (Fig. 15). Again, this was 30 years ago, and it is hence very likely that the level of excess (wasted) fishing effort for both resources is much more today, 30 years hence.



This decline in natural productivity of our fishing grounds becomes more obvious when we compare the trend in annual production (mt) of commercial ring net catches (blue dots) from 1978 - 87 (Barut, 2004) with the same data converted to annual catch rates (catch per vessel-HP) (red crosses) over the same period (Fig

16). The annual production increases during the said period, but only because of the parallel increase in fishing effort. The trend in catch rates (= catch per effort), however, shows the opposite trend. Hence, overall catches increase from year to year, just as in Fig. 1, but this may be due entirely to more and more people or vessels fishing year after year, and not to the unlikely increase in abundance of the resource. An analogy would be equating the resource in the fishing ground as a pie of constant size (= similar year-to-year abundance) and as more and more people take a slice from the pie, the slices get smaller. The trend in catch rates is thus more realistic, showing a decrease in each vessel's/fisher's share as fishing effort increases.

This relationship becomes even more instructive when catch rates are plotted against fishing effort. Figure 17 shows the overall decreasing trend in mean annual catch rates of commercial ring nets,



purse seines and bagnets as fishing effort increases. The data are from Barut (2004) and cover the period 1978 to 1987. This is a clear indication that catch rates of various gear types decrease as more and more vessels are fishing. This is truly what eventually happens in any fishery in the world, and the task at hand is to manage fishing effort at the right time and in the appropriate manner so that catch rates can be maintained at reasonable levels. This task becomes less achievable the longer overfishing has been taking place.

Unfortunately, there is little information on fishing effort that corresponds with our much longer time-series of production (landings) data. While MSY models provide more insights to policy

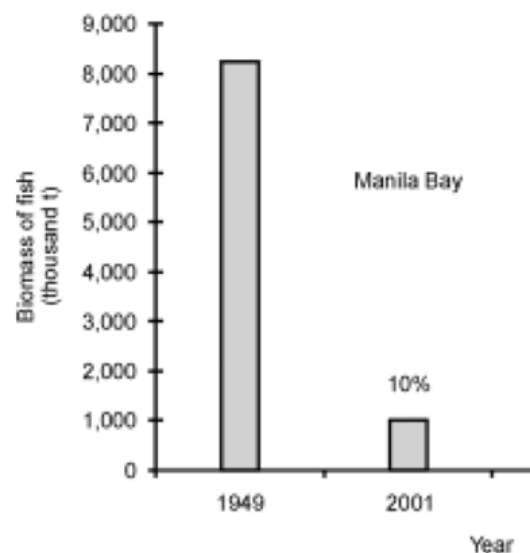
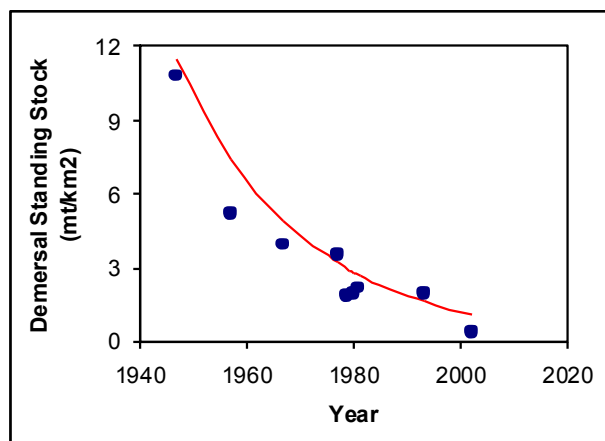
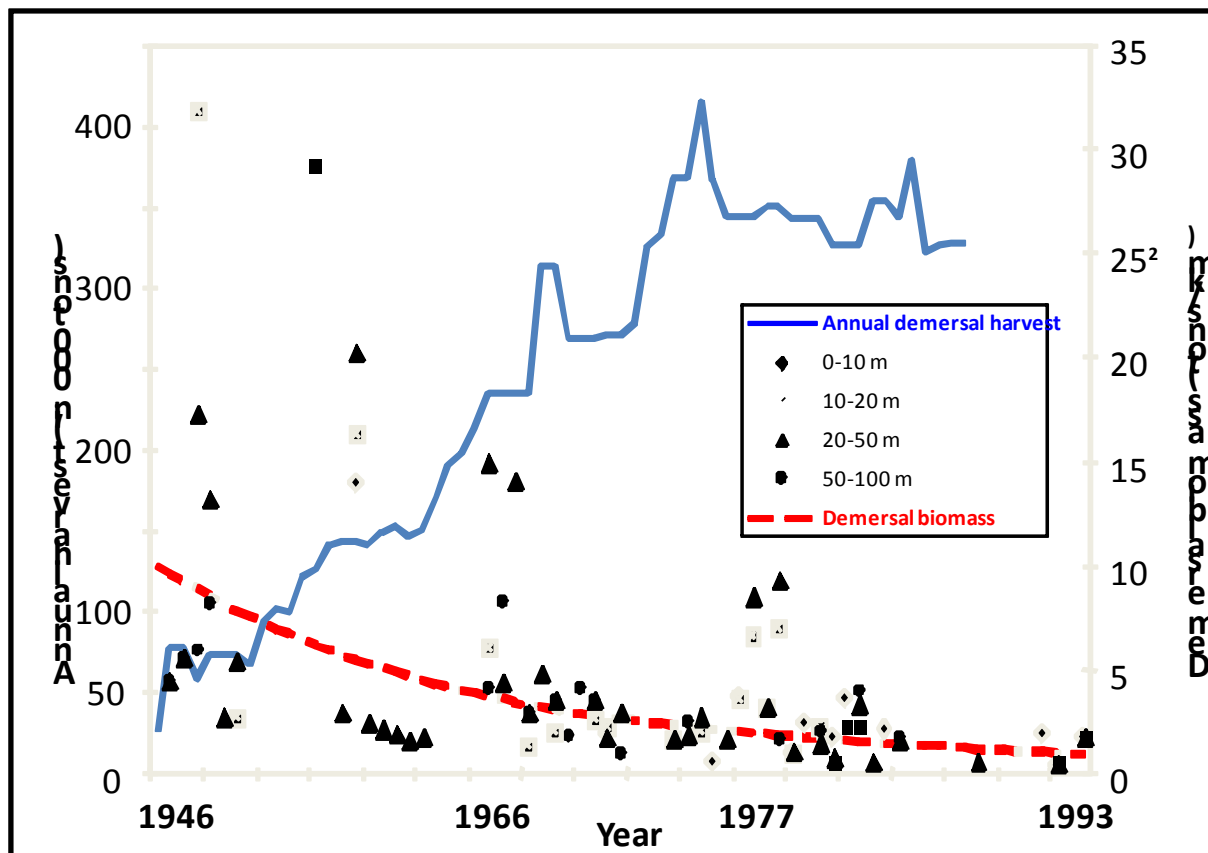
formulation, simpler trends in catch per effort (= catch rates) could have been more convincing of resource depletion early on because they truly reflect resource abundance and are useful indices of productive capacity of fishing grounds. An over-reliance on trends in production (landings) has contributed to the continued decline in our fisheries resources. A fundamental difference between natural resources in land and water is that in the former we can see and we can then appraise. In the latter, we do not see (under the sea surface), so we can only “guess” at best if we are not willing to investigate (i.e. systematically assess).

### ***Biomass of demersal resources***

Fisheries-independent trawl surveys have been conducted in various bays and coastal areas around the country since the late 1940s to systematically determine resource abundance in these fishing grounds. The most extensive effort to date was done in the late 1940s to early 1950s, covering 24 coastal areas around the country (Warfel and Manacop, 1952). For some of these areas, similar trawl surveys were conducted at different times and these provide us with a picture of how demersal resource biomass (abundance) has changed as fishing effort has increased with time.

Figure 18 shows annual production (harvest) of demersal resources from the country's trawling grounds from 1946 to 1987 (blue line) and fishery independent estimates of demersal biomass (abundance) at various depth strata in various fishing grounds around the country from the late 1940's to 1993 (Armada, 2004). Mean annual harvest has stagnated since the 1970s, while demersal resource biomass in various grounds continued to decline. Demersal biomass levels in the early 2000s were estimated to be only 10% of their levels in the late 1940s (i.e., considered as virgin

biomass levels because of cessation of all fishing during WWII). Figures 19a and b show changes in demersal biomass in Sorsogon Bay (Hilomen et al., 2002) and Manila Bay (Armada, 1998 and Green et al., 2003).



### Municipal fisheries

The only estimate of MSY for a resource that is primarily exploited by the municipal fisheries is provided for the swimming blue crab, *Portunus pelagicus*. In the 1980s, the main fishing grounds for swimming crabs included Ragay Gulf and the Visayan Sea, but catch and effort data were only available for the latter area. Using catch and effort data for the 1990s, Ingles (2004) showed that

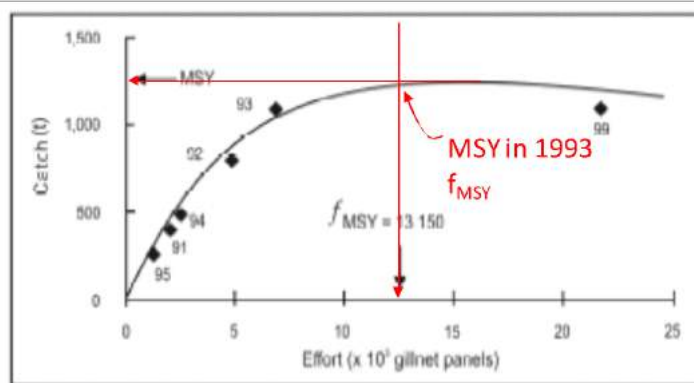


Figure 20. MSY of blue swimming crab in Western Visayan Sea (ngles, 2004)

Other available information on catch rates for the municipal fisheries are from various fishing grounds and cover different periods. The long term information is from interviews from different sources. Figures 20a and b show indicative catch rates (kg/fisher/day) from various gear types based on interviews of fishers representing a wide range of ages in Honda Bay, Palawan (Fig. 20a) and Olango, Cebu and Tukuran, Zamboanga-Sibugey (Fig. 20b). Though they cover different periods, they show parallel trends of

MSY for the western Visayan Sea was reached around 1993 (Fig. 20), and that a further increase of 40% in fishing effort over the next 6 years did not increase overall landings from the fishery. A plot of mean daily catch rates (catch per trip) from 1992 to 1998 (Fig. 21) clearly shows a decreasing trend, with catch rates in 1998 being about 50% of catch rates in 1992.

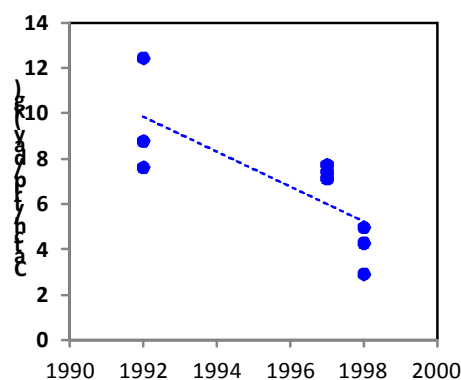


Figure 21. Trend in catch rates (catch/trip) of blue swimming crab in the 1990s.

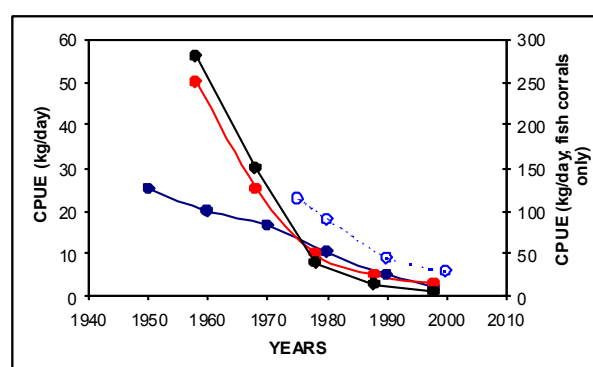
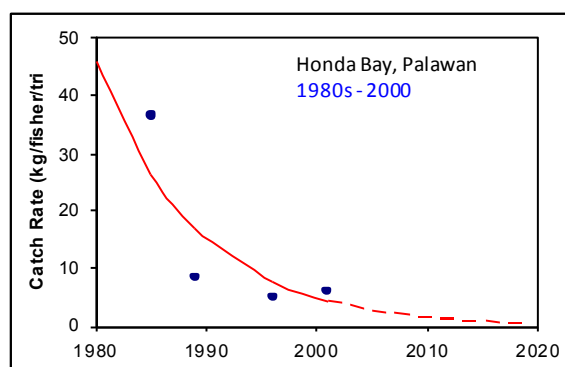


Figure 22. Catch rates of various municipal gear types based on interviews in various sites around the country.

decreasing catch rates (kg./fisher/day) over a few to several decades. For coral reef fisheries, historical catch rate information based on interviews are summarized by Alino et al. (2004) (Fig. 21). Based on indicative information, they estimate that catch rates from reef fisheries have decreased by at least fivefold since the 1950s. This situation is similar to municipal fishers targeting small pelagics. Derived catch rates (mt/HP/yr) from several fishing grounds

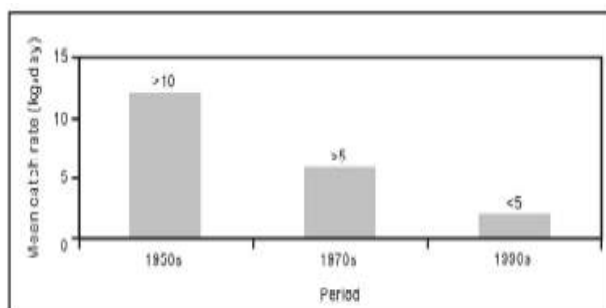
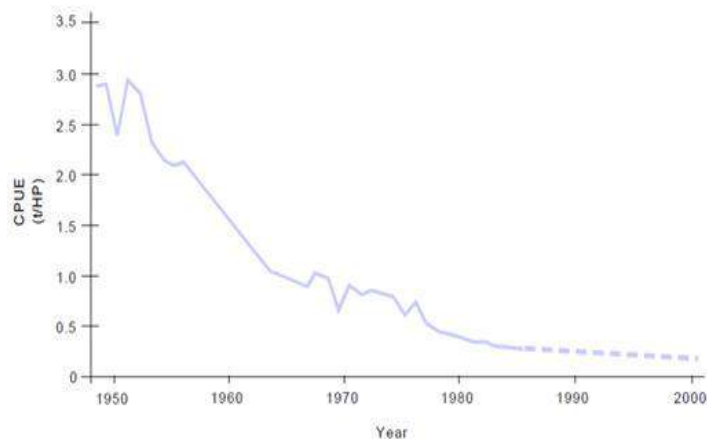


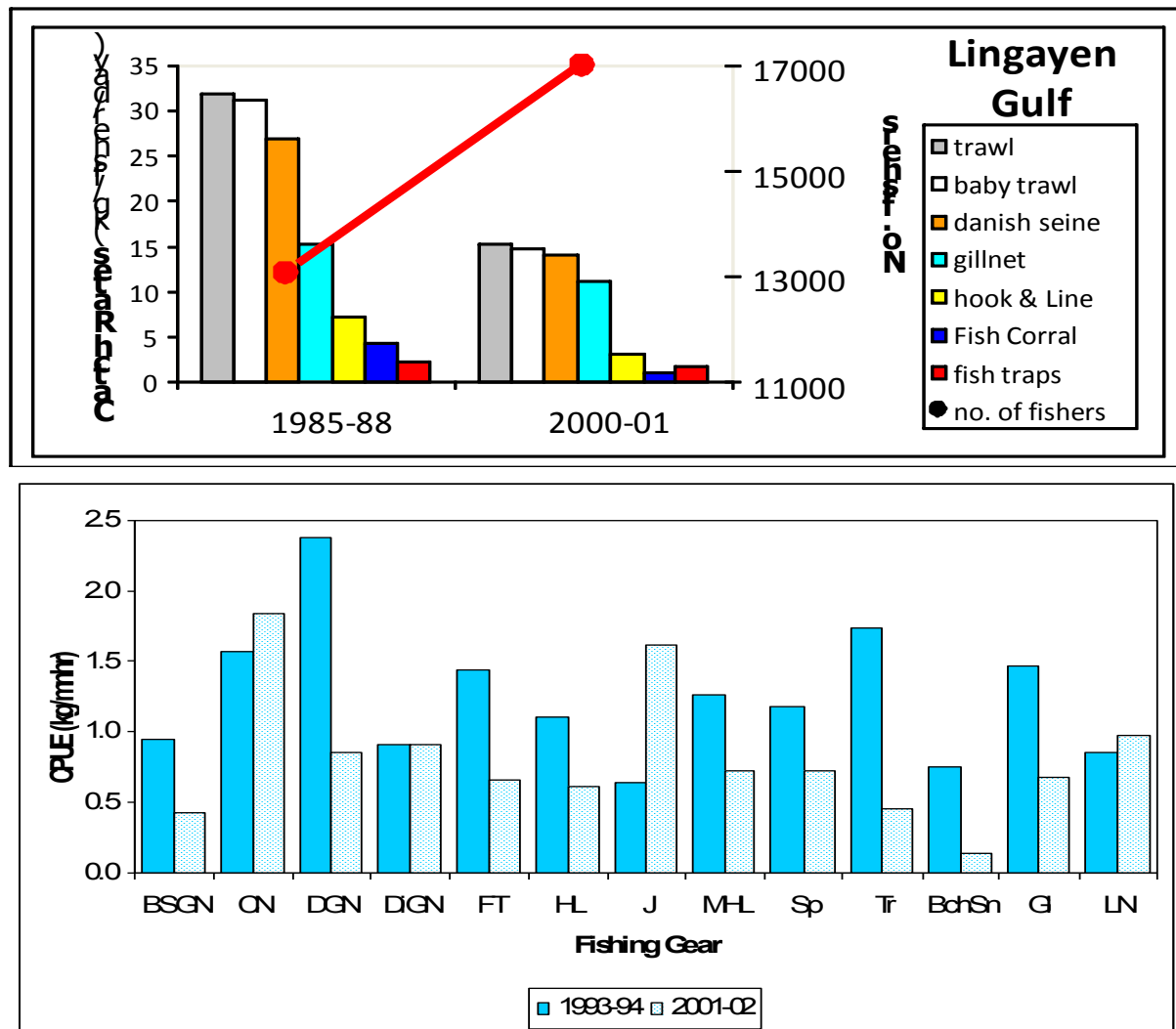
Figure 23. Compilation of historical information on catch rates from reef fisheries based on interviews in a range of reef sites.

combined, over the period 1948-85, also show a fivefold decrease from the 1950s to the 1980s (Fig. 24).



**Figure 24.** Historical trend in catch rates (mt/HP) of small pelagics in the municipal fisheries of several fishing grounds from 1948 to 1988.

Over shorter time intervals, the FSP/FRMP Resource and Ecological Assessments (REAs) in the 1990s and 2000s show changes in catch rates that are consistent over a wide range of fishing gear. Figure 25 compares catch rates (kg/fisher/day) of seven (7) gear types in Lingayen Gulf for the period 1985-88 with those 12-15 years later (Hilomen et al., 2002). Catch rates decreased in all gear types, with traps showing the smallest change. Associated with this is an increase of about 30% in the population of fishers

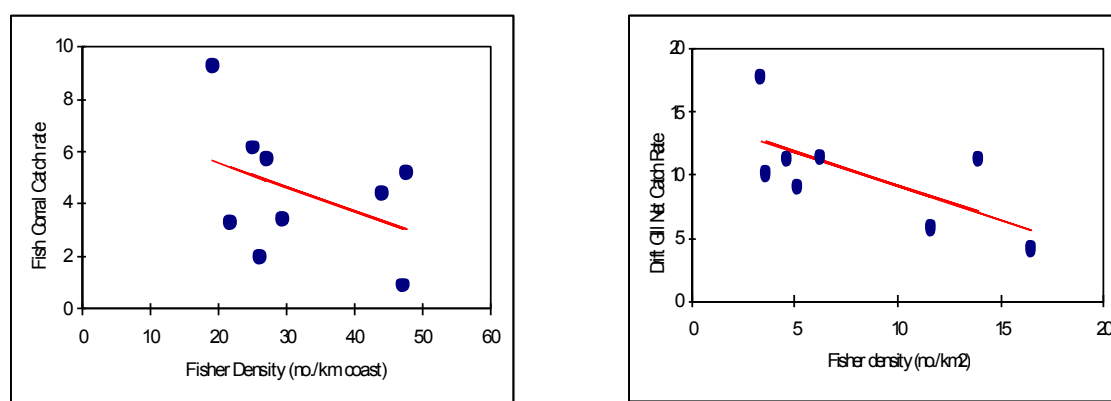


**Figure 25.** Comparison of catch rates (kg/fisher/day) of various gear types in (a) Lingayen Gulf (above) between 1985/88 and 2000/01. The increase in number of fishers in the Gulf is also shown; and (b) Sogod Bay, Southern Leyte between 1993/94 and 2001/02.

in the Gulf during the same period. Hilomen et al. (2002) also documented a corresponding increase in the duration of fishing operations during the same period. The latter simply means that in spite of fishing longer (more hours) on average, fishers in the Gulf still caught less than they did in the mid 1980s. This clearly indicates a decrease in the abundance of the resources, and its close correspondence with the increase in number of fishers during the same period strongly suggests a negative relationship between fishing pressure and catch rates.

A similar situation was observed in the other side of the country (Sogod Bay) in the southern part of Eastern Visayas. Figure 25b shows an average reduction of 30% in catch rates of 10 out of 13 fishing gear types used in the Bay between 1993/4 (Silliman University, 1995) and 2001/2 (BFAR-FRMP, 2003). Catch monitoring in all FSP/FRMP REAs followed a standard protocol of regular monitoring at several municipal fish landing sites every other day over a period of 12 months. Hence, results from these estimates cannot be dismissed as merely incidental.

Figure 26a shows mean daily catch rates over a period of 1 year for fish corrals in relation to relative



**Figure 26.** Mean daily catch rates of (a) fish corrals in 9 fishing grounds, and (b) mean catch rates of drift gillnets covered by the FSP/FRMP REAs.

fisher density (fishers/km of coastline) in nine (9) different fishing grounds around the country. The fitted regression shows that daily catch rates from fish corrals decrease by 0.1kg with every additional 1 fisher/km coastline.

Similarly, drift gillnet catch rates also decreased as fisher densities (fishers/km<sup>2</sup>) increased (Fig. 26b) in eight (8) fishing grounds. This decrease translates to about 0.5kg/fisher/trip for every additional 1 fisher/km<sup>2</sup> of area fished (SUPFA, 2006).

The overall mean daily catch rates in reef fisheries also decreases as fisher density (fishers/km<sup>2</sup>) increases (Fig. 27). This is based on data compiled from seven (7) reef areas in various parts around the country (Campos et al., 2004).

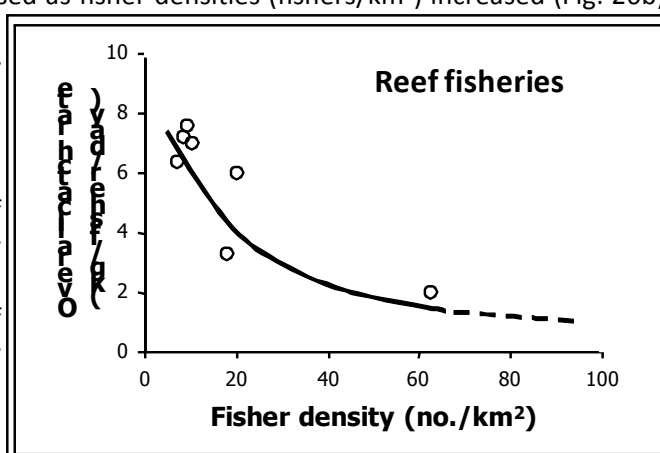


Figure 28 shows the location of sites or fishing grounds in the country where decreasing municipal or small-scale catch

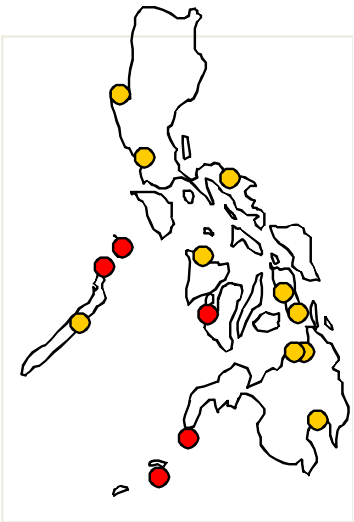
**Figure 27.** Overall relationship between mean catch rates of various gear types and fisher density (fishers/km<sup>2</sup>) in various reef sites in the country



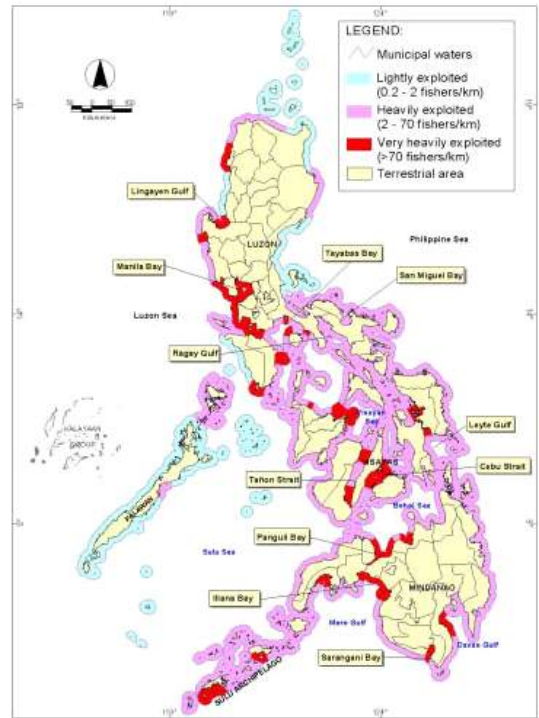
rates have been documented based on actual on-site monitoring efforts. It is clear from the wide geographical distribution of the points, that fishing grounds with depleted resources are not “isolated” cases, but they represent the typical or usual conditions around the country.

### Geographical distribution of fishing effort

In the 1980s, around the time that the small pelagic and demersal fisheries around the country reached their MSY levels, the distribution of fishing effort in terms of number of fishers per km of coastline, already showed high concentrations (> 70 fishers/km) in several areas including Lingayen Gulf, Verde Island Pass (VIP), NE Panay, Tanon Strait, Danajon



**Figure 28.** Geographical distribution of fishing grounds where reports of decreasing resource abundance have been documented.



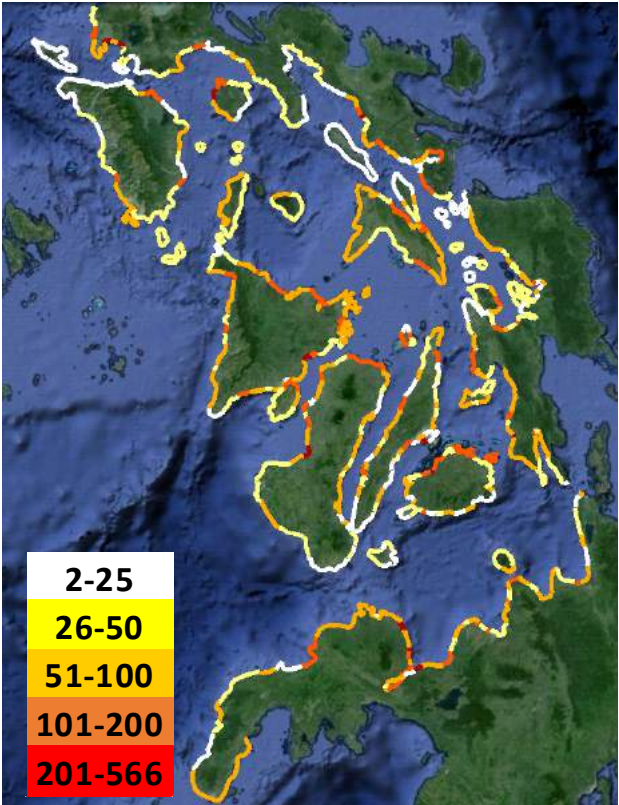
**Figure 29.** Distribution of fishing effort based on data from the 1980s (Tandog-Edralin,

included waters around Palawan (except the Calamianes island group), the Cuyo Island Group and atolls within Sulu Sea, and waters off Aurora, Isabela and Batanes along the country’s Eastern Seaboard (Fig. 29)

An update of this map is provided in Fig. 30, using fisher population estimates per municipality from the fisher registration program (FishR) spearheaded by the BFAR in coordination with LGUs nationwide, which was initiated in 2014. Lengths of the coastlines of each municipality were

Bank, Samar Sea, Iligan Bay, Iliana Bay and parts of Davao Gulf (Tandog-Edralin, 1987).

Most coastal waters were already assessed as heavily-exploited at the time, with only a few areas considered as lightly exploited, where fisheries could still sustain further growth. The latter

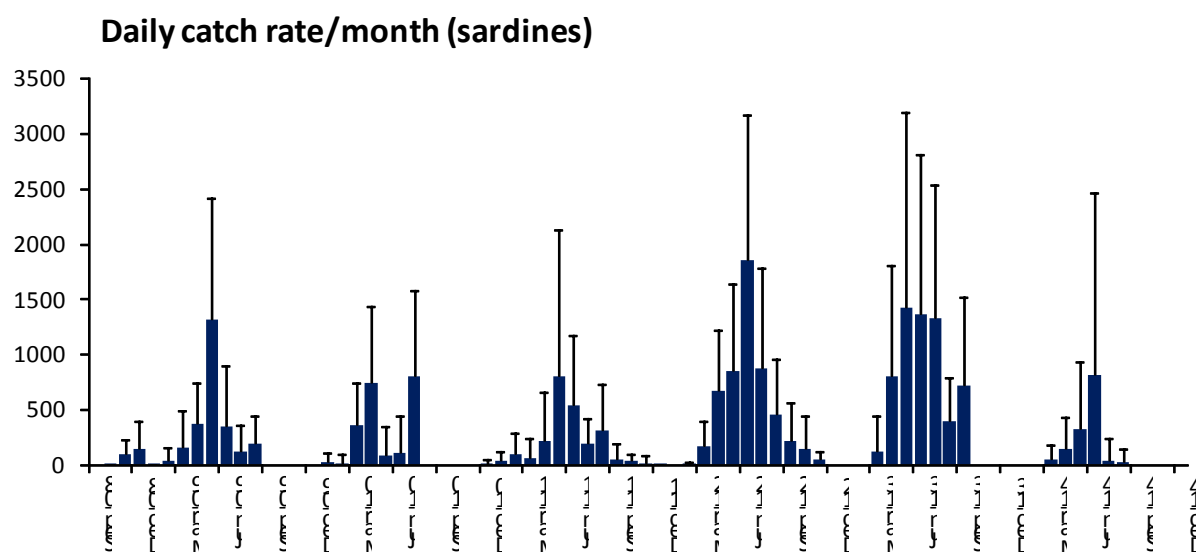


**Figure 30.** Distribution of fishing effort based on data from the FishR (2014/15).

estimated using Google Earth and barangay boundaries from the PhilCore Project. Just to facilitate comparison, only interisland waters between the south Luzon and northern Mindanao are shown in Fig. 30. It appears that the available estimates from FishR are not yet complete, since the process is still on-going. The fisher densities derived nevertheless provide us with a snapshot of fishing effort distribution about 30 years after Tandog-Edralin's work. The areas with highest fishing pressure as of 2014/15 include the VIP, Ticao Pass between Sorsogon and Masbate, Northern Panay & northern Negros, Guimaras Strait, Danajon Bank, Iligan Bay and Sindangan Bay in northern Zamboanga. These waters have fisher densities > 100 and up to 500 fishers/km coastline, which represents a possible 2-5 fold increase in fisher density during the 30 year interval.

Figure 30 will be more representative of municipal fishing effort, since commercial vessel operations are not restricted to local waters.

### ***Sardine fishery and closed seasons***



**Figure 31.** Trend in mean daily catch rates (catch per vessel per trip) of ringnet operations in Northern Zamboanga presented by month based on logbooks of a single buyer (Campos et al., 2014).

Mean daily catch rates (catch per vessel per trip) by month of ringnet operations in northern Zambonaga from late 2008 to Dec 2014, were computed from records of a single buyer of catches bought from several vessels each day. Daily records ranged from 1 to 5, with at least 20 days of records each month. Again, these data cannot be dismissed as incidental, or isolated, or non-representative.

Daily catch rates declined from 2009 to 2011. After imposing a 3-month closed season (Dec to March) starting in 2011, catch rates increased in 2012 and 2013, most likely resulting from the closed season. The drop in catch rates in 2014, however, may be due to some other factors. Field observations showed generally smaller fish that year, and this may have contributed to the decline in catch rates for that year. Clearly, while the closed season appears to have had a positive effect, other factors may mask this apparent effect. We need to continue monitoring such fisheries to know what these factors are.

### **Overall Summary**

There is sufficient information showing that most, if not all, interisland fishing grounds in the country are already overfished. Many have been so for over 20 years. As such the nature of the resources in these fishing grounds have already changed in terms of species composition and in terms of productive capacity. Using MSY as a reference point is no longer practical because of the critical lack of catch and effort data covering the early part of the fisheries. Instead, there are other measures that can be used to regulate exploitation.

While the primary need to reduce the number of fishers (i.e., fishing pressure) is not a realizable possibility in the near future, there is a need for a combination of measures to reduce the worsening conditions of our fisheries resources. A five or even ten year plan will not solve this problem, but may “buy us time” to build on longer term solutions to the problem of excessive fishing. Clearly, the task of providing other livelihoods for future generations will require investments from sectors outside of fishing itself. What the fisheries sector can do is to regulate use of the resource, maintain habitat health and ensure resources are able to reproduce and complete their life cycle.

### Recommendations

- Prioritize management & conservation of resources for *local food security*
- Integrate mandates of concerned agencies of the National Gov't, the DENR (for habitats) & BFAR (for fisheries resources)
- Strengthen regional capabilities of the BFAR to assist Province & LGUs in fisheries Mgt
  - Increase engagement of the academe and research institutions to assist in fisheries mgt capacity building
  - Formalize and strengthen partnerships of all institutions involved in capacity building for fisheries mgt
- Strengthen the role of the Province for integrating & coordinating LGU mgt efforts within common fishing grounds
- Require LGUs to formulate and implement Fisheries Mgt Plans
- Partner conservation/protection efforts with Fisheries Mgt
- Establish *Fisheries Mgt Areas* (FMAs)
- Determine FMA *harvest control rules* (HCRs) & reference points
  - based on *stock status & distribution*
  - *Fishery-dependent & -independent* investigations
  - *Regular monitoring* of fishery independent parameters
  - *Periodic review of HCRs* to allow adjustments
  - *Partnerships* between BFAR, Academe/Research Institutions & NGOs
- Reference points for *Highly migratory sp/straddling stocks* from WCPFC
- *Licensing system* specific to FMAs & based on reference points of FMA
- *Science Advisory Group* (SAG) to provide guidance on data collection, standard methodologies & policy recommendations

# **STATE OF AQUACULTURE FISHERIES IN THE PHILIPPINES**

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## OVERVIEW

Fish provides protein to more than 2.9 billion people at 20% of intake and 4.3 billion at 15% per capita animal protein intake (FAO, 2014). With the growing world population, demand for fish is expected to expand enhanced by the increasing per capita income in the developing world, rising production of crustaceans and mollusks and the relative decline in their prices. This is reflected in the world apparent per capita consumption of fish which increased from 9.9 kg in 1960s to 17 kg, 18.9 kg, and 19.9 kg in 2000, 2010, and 2012, respectively (FAO, 2014).

Aquaculture remains one of the fastest growing food production sectors in the world but has declined from the highest annual increase of 10.8% in the 1980s (1980-1990) to 6.2% for the period 2000-2012 with average annual growth of 8.6% in the last three decades (Figure 1.; FAO, 2014). With no prospects for increased harvests from the sea in the long term, the shortfalls in the supply of fishery products must have to be sourced out from aquaculture whose increasing role in food security is most tangible in Asia (Figure 2). It accounts for 49% of fishery products used for human consumption in 2012 from 5% in 1962 and 37% in 2002.

Share of aquaculture in total fish production (FAO, 2014)

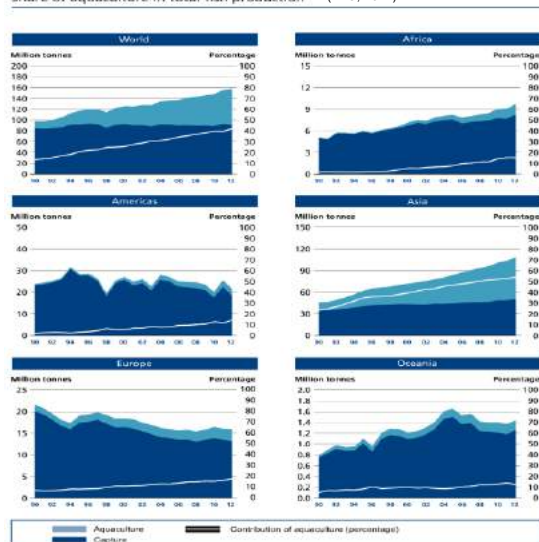


Figure 1. Share of aquaculture in total fisheries production

World capture fisheries and aquaculture production (Modified from FAO, 2014)

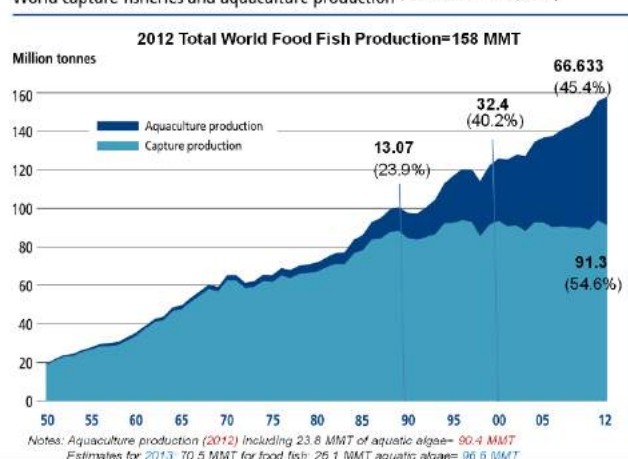


Figure 2. World fisheries and aquaculture production

For aquaculture to continue however, it has to produce more fish than it consumes. There is an indication that the utilization of fish for fishmeal and fish oil production (Figures 3 and 4) may not be as voluminous as previously projected (Figure 5) because of the increasing trend on the use of fish by-products in the manufacture of compound feed. Fed-aquaculture may also need to look for other sources of protein to partially or completely replace fishmeal in formulated diets. Recent studies have shown that this is feasible although this might be difficult to achieve in the case of fish oil for which, there is as yet, no known effective replacement. The importance of the search for novel sources of fishfood is best illustrated in Figures 6 and 7. This dictates a re-examination on the use of feed conversion ratio (FCR) in measuring aquaculture efficiency. It also suggests that fish conversion efficiency (FCE) may become a better measure in relating impacts of fed-aquaculture to open-water fishery.

Total Volume=620 Million Tons	
Farmed Species	Share in Consumption (%)
Poultry	38
Pigs	32
Cattle	24
<b>AQUACULTURE*</b>	<b>3 (18.6 Million Tons)</b>

\*the smallest sector for major farmed animal feeds but the largest consumer of the two common ingredients in many animal feeds: **fishmeal and fish oil** (provide an excellent source of animal protein, essential amino acids, omega 3 fatty acids, vitamins and minerals and energy (Hertrampf & Piedad-Pascual, 2000). Moved beyond feed supplements to become the major components of aquaculture feeds.

Figure 3. Feed production for major farmed animals (Gill, 2005)

Sector	Fishmeal (%)	Fish Oil (%)
Aquaculture	46	81
Poultry	25	
Pork	25	
Industrial uses and human consumption		nearly 20 (Pike, 2005)

From 1994 to 2003:  
- fishmeal expanded from 963,000 to 2,936,000 tons  
- fish oil increased from 234,000 to 803,000 tons

Marine species represent about 25% of global aquaculture production yet consumes 75% of fishmeal and fish oil used in aquaculture

Figure 4. Consumption of fishmeal and fish oil (IFFO, 2006)

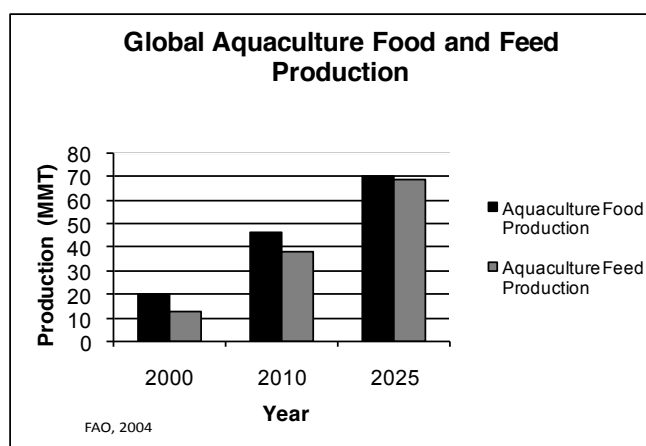


Figure 5. Projected Aquaculture Feed Requirement by 2025 (FAO, 2004)

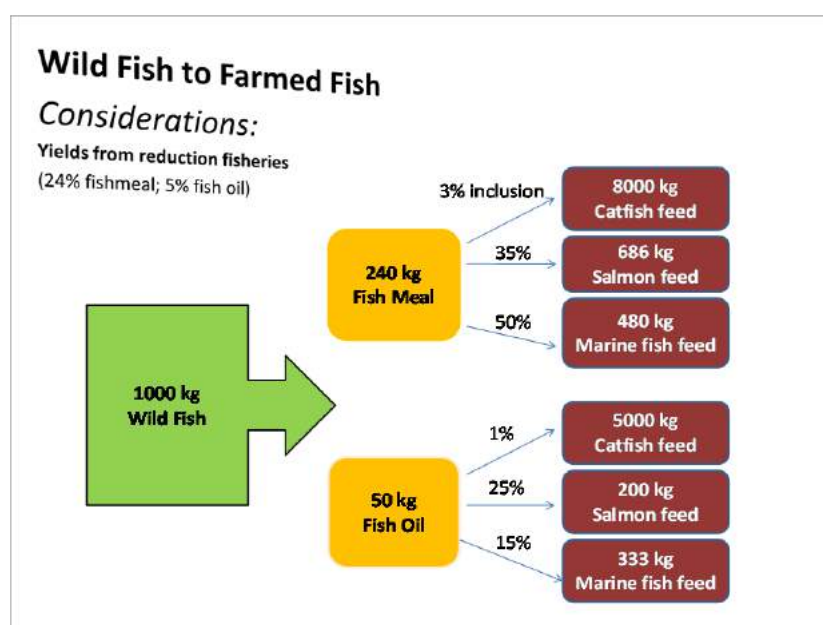


Figure 6. Conversion of wild fish to farmed fish. ((Notes: Data for Figures 5 and 6 were obtained from: Boyd et al. 2005 (catfish FCR=2); Robinson et al. 2001 (fishmeal (3%) and fish oil inclusion (1%); Tacon, 2005 (salmon FCR=1.3, fish (35%) and fish oil inclusion (25%); FIN, 2006 (marine finfish FCR=2.2, fishmeal (50%) and fish oil inclusion (15%)). Yields from reduction fisheries at 24% fishmeal and 5% fish oil (FAO, 1986; Hardy and Tacon, 2002; Pike, 2005; and IFFO, 2006).



## Feed Conversion Ratio or Fish Conversion Efficiency?

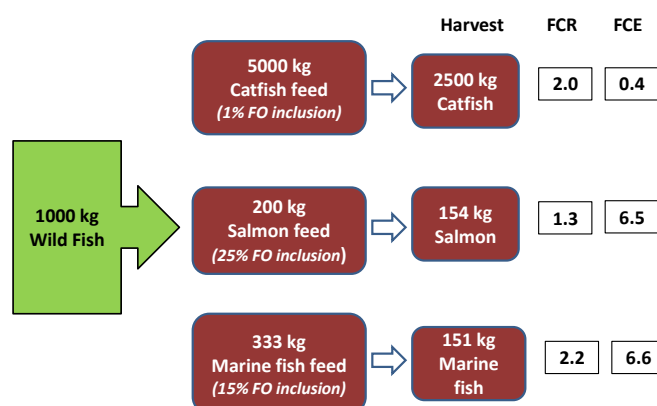


Figure 7. Measures of aquaculture efficiency.

As with the world trend, Philippine aquaculture production has dramatically increased in the last three decades. It declined and registered negative growths however, in 2012 (-2.54 %) and in 2013 (-6.63%) and continued until 2014, attributable to the decline in the production of most commodities with significant reduction in the production of seaweeds for the period 2012 and 2013 (Figure. 8). Share of different species in aquaculture production is shown in Figure 9.

The outlook for foodfish production is bullish especially for major commodity like milkfish and tilapia which peaked in 2008, then declined in subsequent years. It showed a certain level of recovery starting 2011 but declined slightly in 2014 caused by both natural disasters and perhaps, stricter implementation of regulations like the reduction of culture structures (Taal Lake) or complete cessation of culture operations in some areas (e.g., Magat Dam).

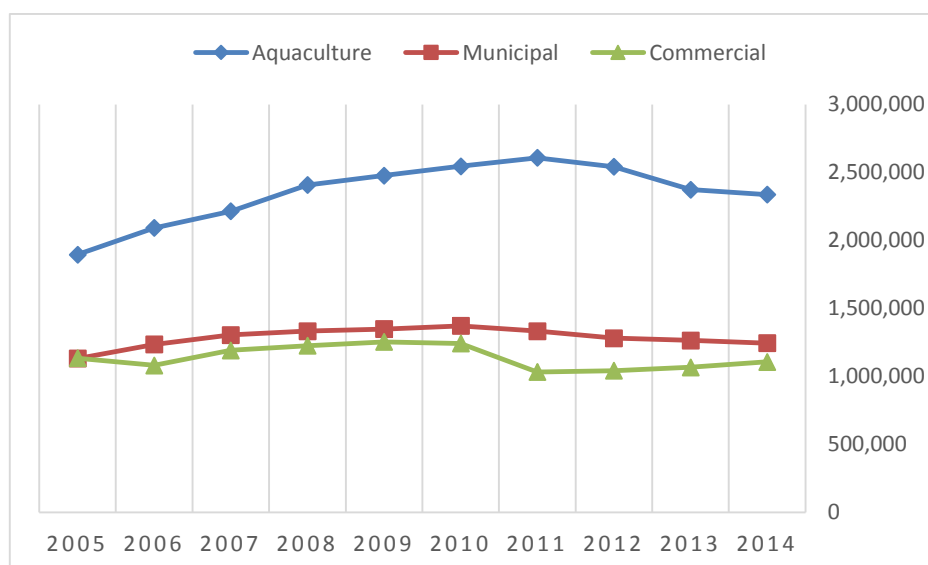


Figure 8. Total Philippine Fisheries Production (2004-2013)

Shrimps hove around 50,000 MT while oyster and mussels for a long time, had not breached half that volume. High value finfish species did not show any significant contribution either. Production of grouper and siganids had been oscillating below the 30,000 MT mark. These are indicative of the challenges faced in the sustainable production of these species in marine aquaculture.

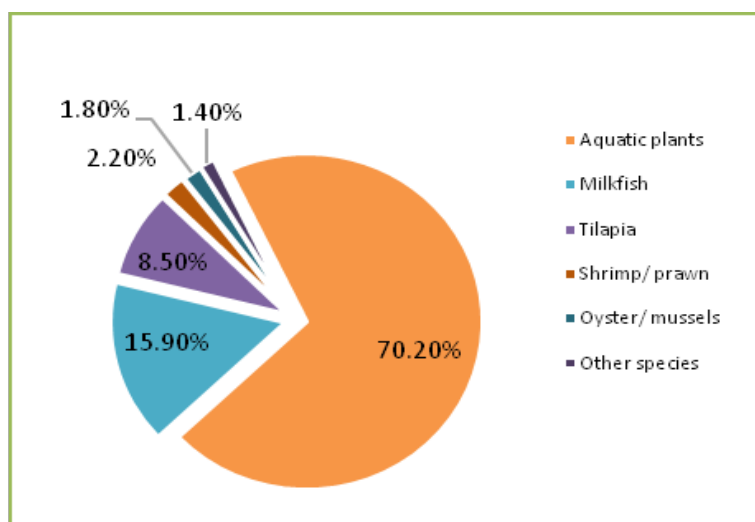


Figure 9. Philippine aquaculture production (FAO FishStat Database, 2014)

The shift to the coastal marine environment for aquaculture expansion is the most viable option in the foreseeable future. About 67 mariculture parks (MPs) had been established by BFAR in collaboration with LGUs but only an estimated 2.58% is operational. MPs are potential areas for expansion but had to be revalidated and profiled to ascertain their suitability and viability vis-a-vis the lukewarm adoption and seeming failures in certain sites. It can replace production from the brackishwater ponds where productivity increases may not be realized because of expensive inputs and infrastructures required for intensification. Unless high value species (e.g., seabass, grouper, and siganids) are used, intensification is a lost proposition. The ban on further expansion in the mangrove areas (Fisheries Code of 1998) and the growing environmental lobby on the reversion of abandoned and unproductive ponds to mangroves also restrict production increases from the existing brackishwater fishponds. With climate change, new systems, resilient and adaptive species must also be developed to arrest decline in production and reduce reliance of fed-aquaculture on reduction fisheries.

The increasing contribution of marine cages to the total milkfish supply might drive conversion of grow-out milkfish ponds to nursery systems to support the requirements of the milkfish cage industry. It is almost imperative for a cage operation to have land-based nurseries as it is difficult to grow small fish in the marine environment where conditions can be hostile. The need to grow natural food for nursery operations is another consideration that makes the ponds a convenient alternative. The positive consequence of this shift is the reduction in the area requirement and less invasive and destructive farming practices thereby relieving some of the pressures from the mangrove ecosystem.

Since it is difficult to initiate change with regard to private properties, perhaps it can begin with government fishponds (Fishpond Lease Agreement or FLAs) estimated at 59,556.09 has (Ferrer, et al., 2012). It is therefore imperative that the reported 40% abandoned and unproductive FLAs be validated so their reversion to mangroves or continued use as fishponds can be decided, once and for

all. Depending on their status and locations, some of these FLAs can serve as nursery system for farming of marine finfishes in the nearshore environment. A sizeable portion of this unproductive area after long years of neglect may already be hosting secondary growth of mangroves hence, their continued use as fishponds may no longer be tenable because of legislative prohibitions.

Many issues confront the local aquaculture industry ranging from apathy (as indicated in the CNFIDP draft report of 2005) to intrinsic and extrinsic factors. It would appear that the failure of the industry in meeting the desired targets have a lot to do with enforcement and compliance to policies and regulations that are either conveniently ignored, or treated with impunity. Effective governance however, requires not only attitudinal change (managers and resource users) but as well as policies and regulations anchored on sound science. Accurate and timely information is also imperative in responding appropriately to the changing market forces and environment and in reliably projecting and casting the future of the industry.

Post-harvest losses are not expected to be sizeable in aquaculture but improvement for some farm practices that diminish quality and value needs to be done. Trading and marketing are also paramount in promoting fishery products both in domestic and foreign markets. Impetus for the improvement of some fishery products in both value and volume can be provided by better accessibility, storage and value addition. It will incentivize production increases especially for fish commodities which are of low value but essential in addressing food security concerns of the country.

Increase in aquaculture production involves the whole gamut of breeding, nursing and growing fish. For long term sustainability, aquaculture must aim for precision and reliability. This dictates complete control of aquaculture production systems and processes through persistent innovations, modernization and reduction of human errors. Empirical evidence points to human engagement as the key factor affecting sustainability and profitability of aquaculture operations. The way forward is automation and mechanization that should diminish uncertainties caused by human frailties.

## **CURRENT STATUS OF THE AQUACULTURE AND MARICULTURE INDUSTRY IN THE PHILIPPINES**

### **A. Major Culture Species**

Trends for the last 10 years (2005-2014, BFAR Philippine Fisheries Profile) show that seaweeds dominate aquaculture production by volume (Figures 10 and 11). In terms of value, milkfish contributed significantly higher revenues (Figure 12). Production of milkfish largely comes from brackishwater fishponds with contribution from marine cages and freshwater pens. Tilapia is supplied primarily from freshwater fishponds and fish cages with minor contribution from freshwater fishpens. Seaweeds is produced from mariculture areas in Mindanao, MIMAROPA, Central Visayas and Bicol Region (Figure 11).

While there are other fish species of commercial importance, these are not produced in sizeable quantities indicative of their value to the diet of Filipinos, accessibility and availability of markets, profitability and sustainability of produce as affected by supply of seedstocks and availability of technology.

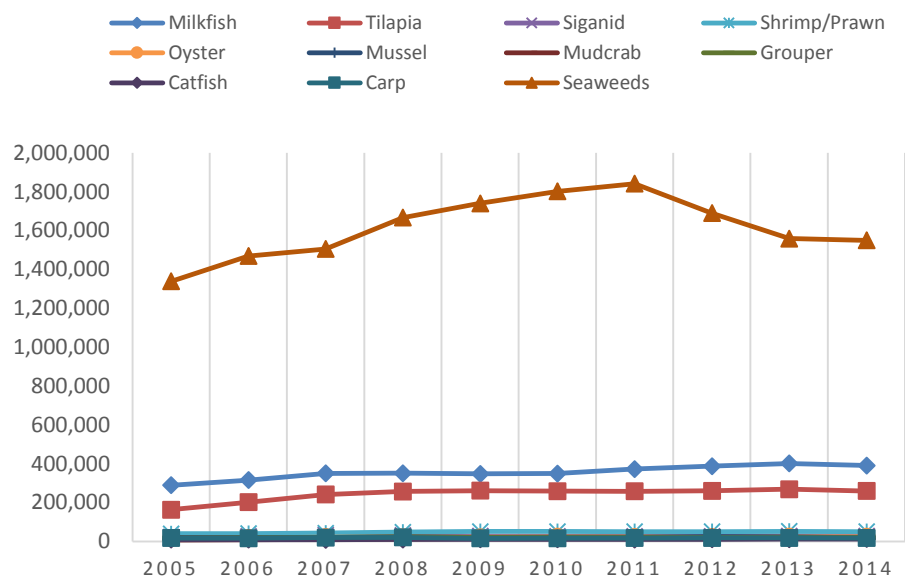


Figure 10. Aquaculture production (2005-2014), by Commodity and Volume (in MT)

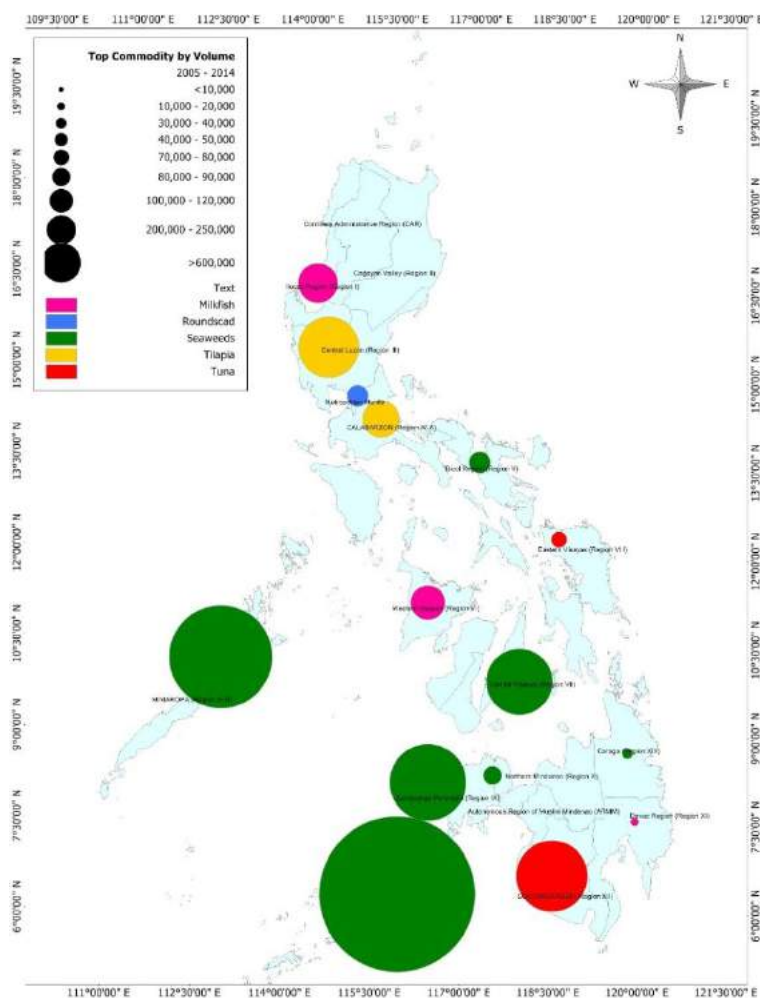


Figure 11. Volume of selected fish commodities and their production areas

Milkfish for instance has been cultured for hundreds of years and myriad studies and product development efforts helped in the advancement of its culture and acceptability to the local consumers although it still has to make significant inroads in foreign markets. Tilapia although fairly recent, also gained wide acceptance through constant R & D and promotion. Unlike milkfish however, tilapia is popular and more acceptable in many parts of the world. Seaweeds on the other hand are important export commodity and its farming provides livelihood opportunities to hundreds of thousands of people in marginalized coastal communities. Production areas and value of these three prime commodities are presented in Figure 12.

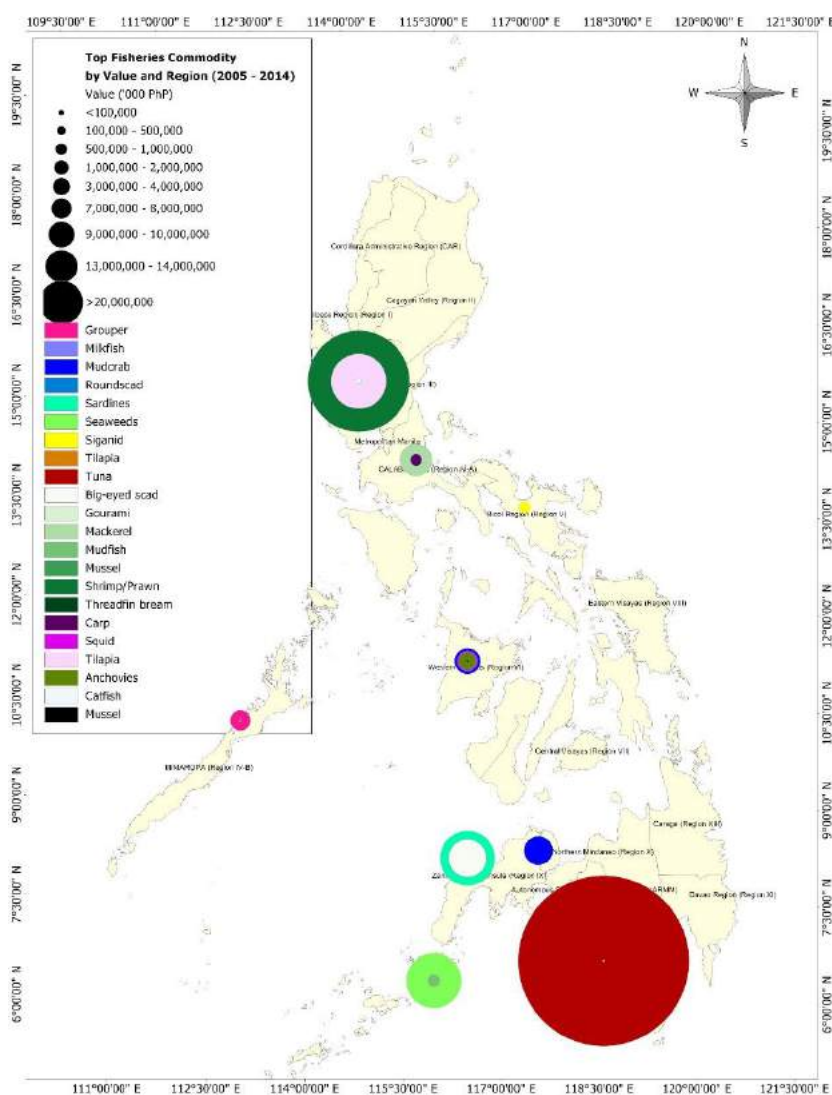


Figure 12. Value of selected fish commodities and their production areas in the Philippines.

## B. Location and Scale of Aquaculture

Data (unofficial) show that majority of the accredited aquaculture farm operators (~345) in the Philippines (Figure 13) is located in Region 1 (21%); this is followed by Regions 5 (15%) and 6 (13%).

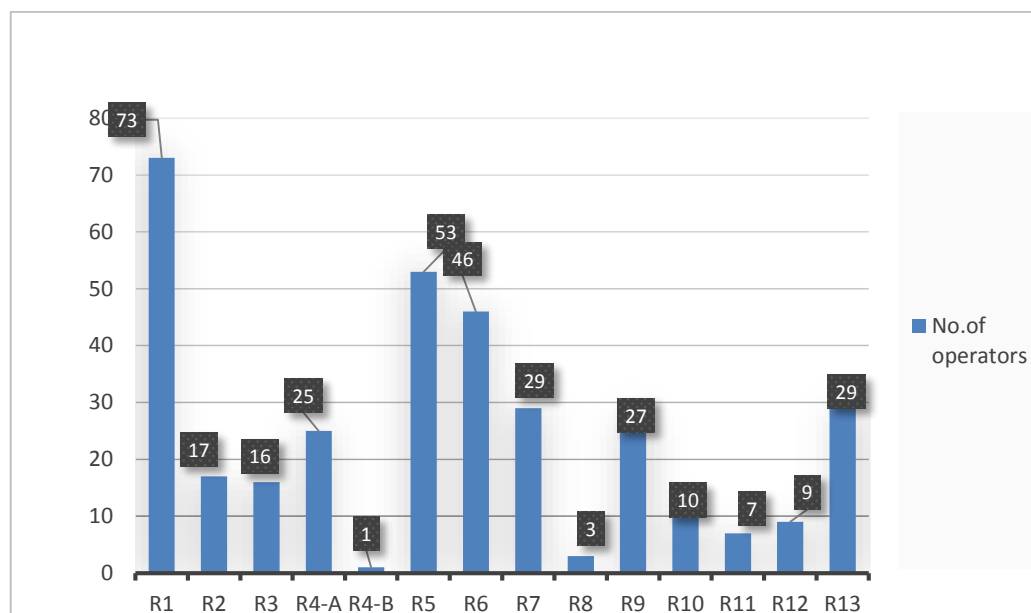
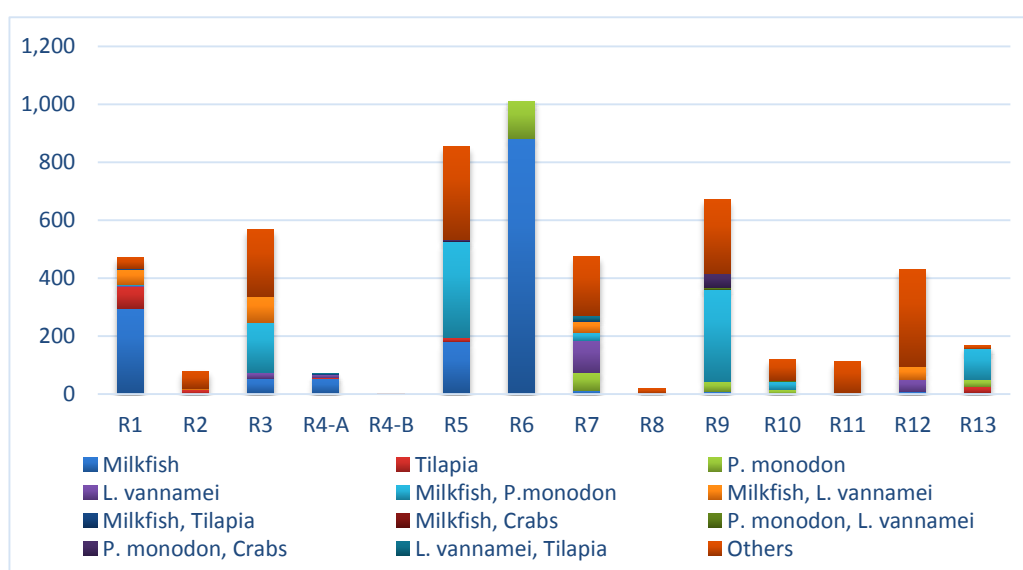


Figure 13. Accredited Aquaculture Farm Operators in the Philippines, by Region (BFAR Unp. data)

In terms of productive area, Region 6 ranked first with 1,012 ha, followed by Region 5 and 9 with 855 ha and 651 ha, respectively (Figure 14).



Figures 14. Accredited Aquaculture Farms in the Philippines, by Region and Productive Area (in has).



In terms of productive area per commodity, milkfish monoculture constitutes the largest area, followed by farms that are into polyculture of milkfish and tiger prawn. Farms growing 3 or more aquatic species are lumped into the Others category (Figure 15).

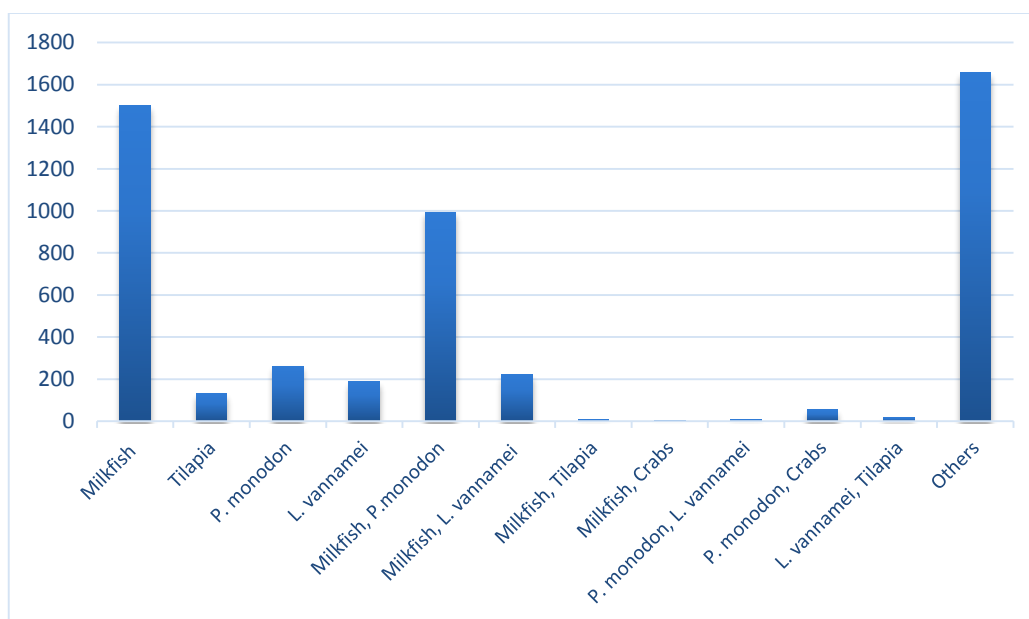


Figure 15. Accredited Aquaculture Farms in the Philippines by Total Productive Area (in ha) and by Commodity (BFAR, Unp. Data).

### C. Profile of Operators

It is estimated that the aquaculture sub-sector in 2002 has 226,195 operators (Fisheries Profile, 2013) which seems to reflect only those engaged with the fishpond industry. The Philippine Statistics Authority (2003) reported a higher figure of 500,000 which seems likely reflecting also those employed with the seaweeds industry that number in hundreds of thousands.

#### i. Operators / Producers / Farm Owners / Investors / Financiers

People that directly produce, manage, market and supply aquaculture products to the society or community. They are the ones that belong either to the high income families, corporation, companies or even low income family that directly purchase goods and services to meet production needs. These people employ manpower and skilled labor for production and operation.

#### ii. Feed millers / Feed Manufacturers

People who have a big influence on the operation of aquaculture business since feeds and feed stuff are the primary food source of any aquaculture business. Feed millers are usually a corporation or a company owned by high income families.

#### iii. Skilled Manpower / Labor

People directly engaged in the production, management and marketing of aquaculture products (feeders, harvesters, sellers, boat operators, divers, etc.). They are the driving

force of production and usually belong to a lower income bracket in the society.

**iv. Fabricators and Suppliers**

People who supply necessary materials and equipment to aquaculture operators, feed millers, fish brokers, and retailers. Fabricators are usually corporations or families which belong to the middle or high income group.

**vi. Fish brokers, Viajeros and Retailers**

People who are engaged in actual selling and marketing of aquaculture products in fish ports, wet markets, and supermarkets. Fish brokers and supermarket owners usually belong to the high income families while wet market and fish retailers usually belong to the middle or lower income families.

## D. Production Trends

The production areas and the value of aquaculture products (Figures 16-21) tell of many stories and possibilities. They show influence of environment (availability and suitability), culture and traditions to which production systems must have to adapt to. The preponderance and acceptability of freshwater species in landlocked areas and where freshwater resources abound is a classic example. The maps also readily reveal where interventions and expansion plans can be carried out to further improve productivity and acceptability of aquaculture products.

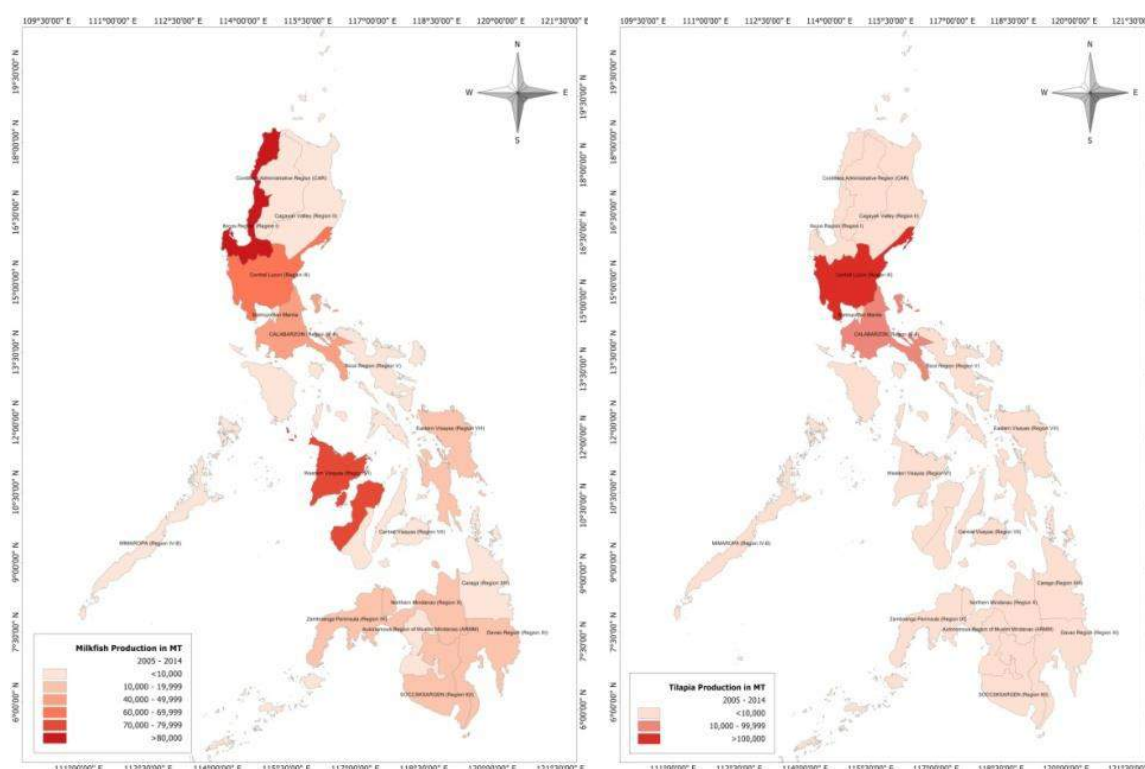


Figure 16. Milkfish (left) and tilapia (right) production volumes and areas. Dark shades indicate higher production in specific regions in the Philippines.

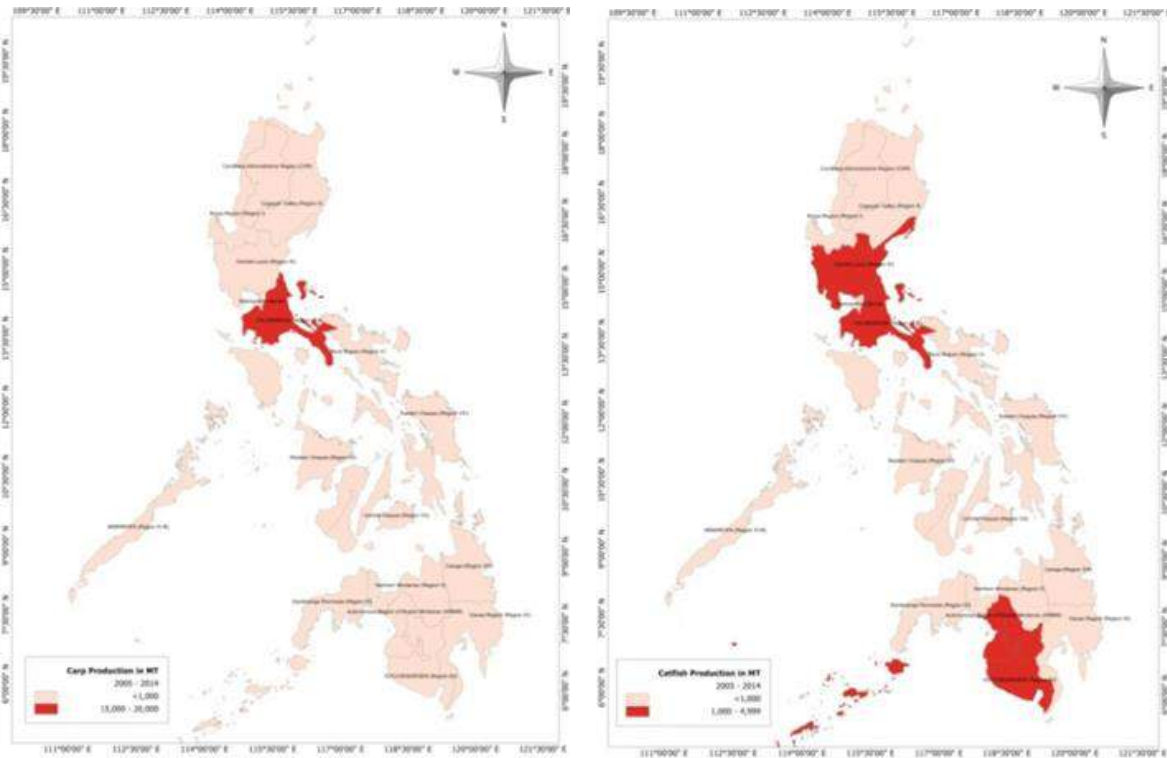


Figure 17. Carp (left) and catfish (right) production volumes and areas. Dark shades indicate higher production in specific regions in the Philippines.

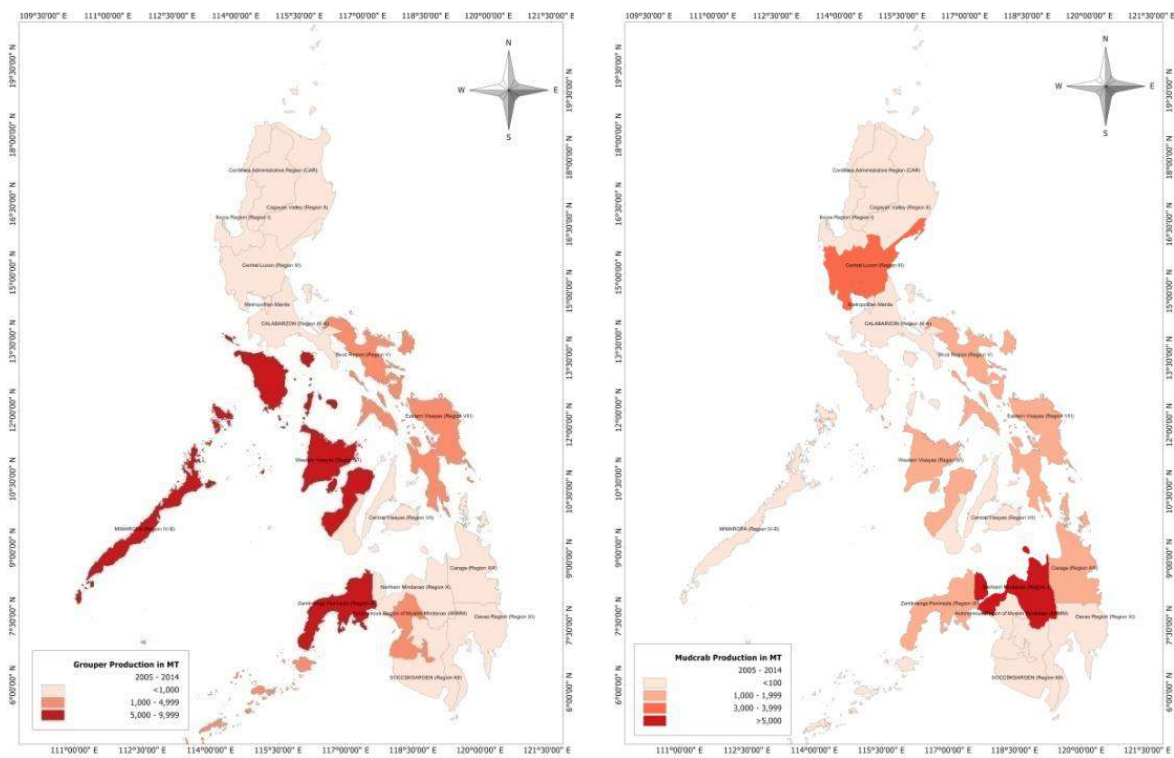


Figure 18. Grouper (left) and mudcrab (right) production volumes and areas. Dark shades indicate higher production in specific regions in the Philippines.

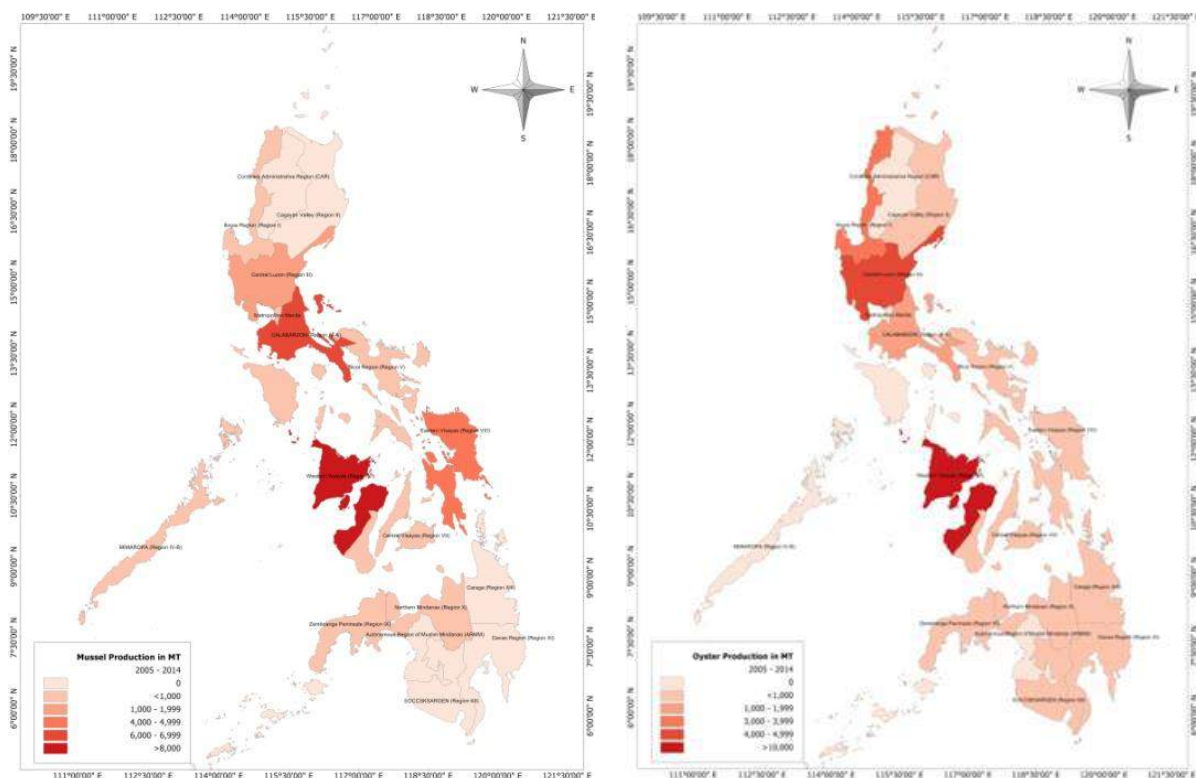


Figure 19. Mussel (left) and oyster (right) production volumes and areas. Dark shades indicate higher production in specific regions in the Philippines.

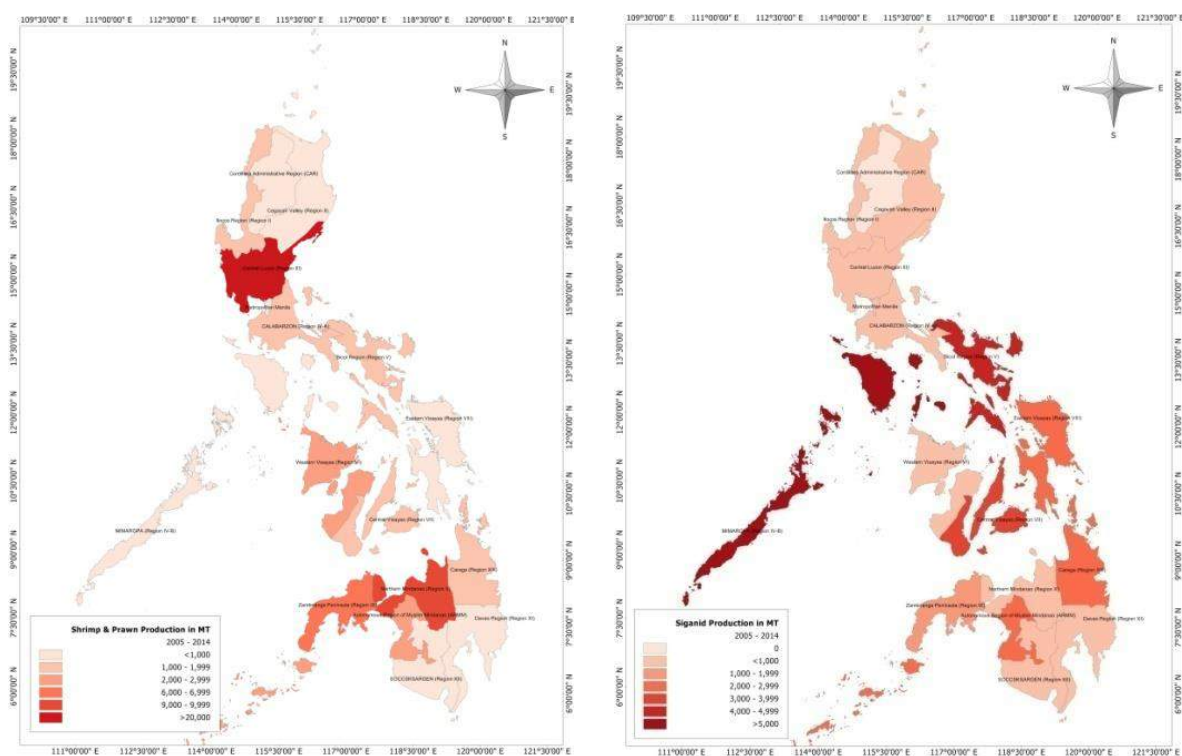


Figure 20. Shrimp/prawn (left) and siganid (right) production volumes and areas. Dark shades indicate higher production in specific regions in the Philippines.

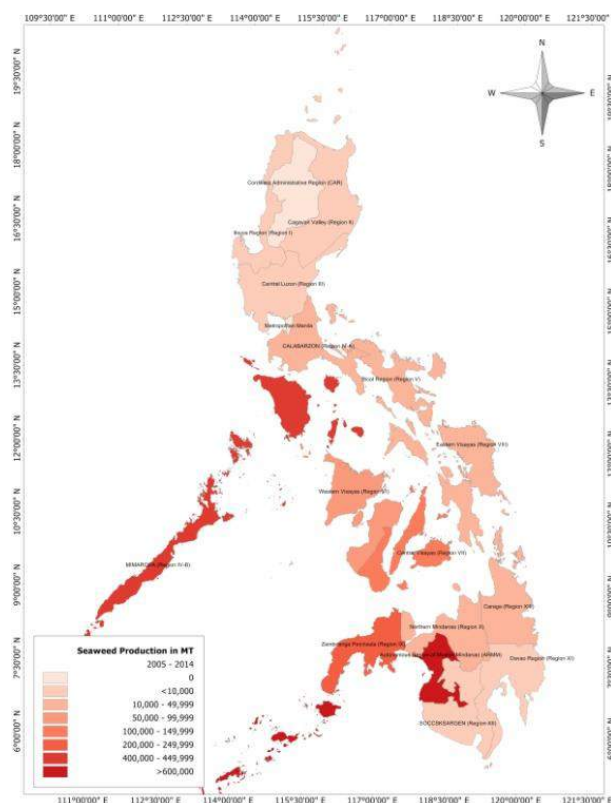


Figure 21. Seaweed production volumes and areas. Dark shades indicate higher production in specific regions in the Philippines.

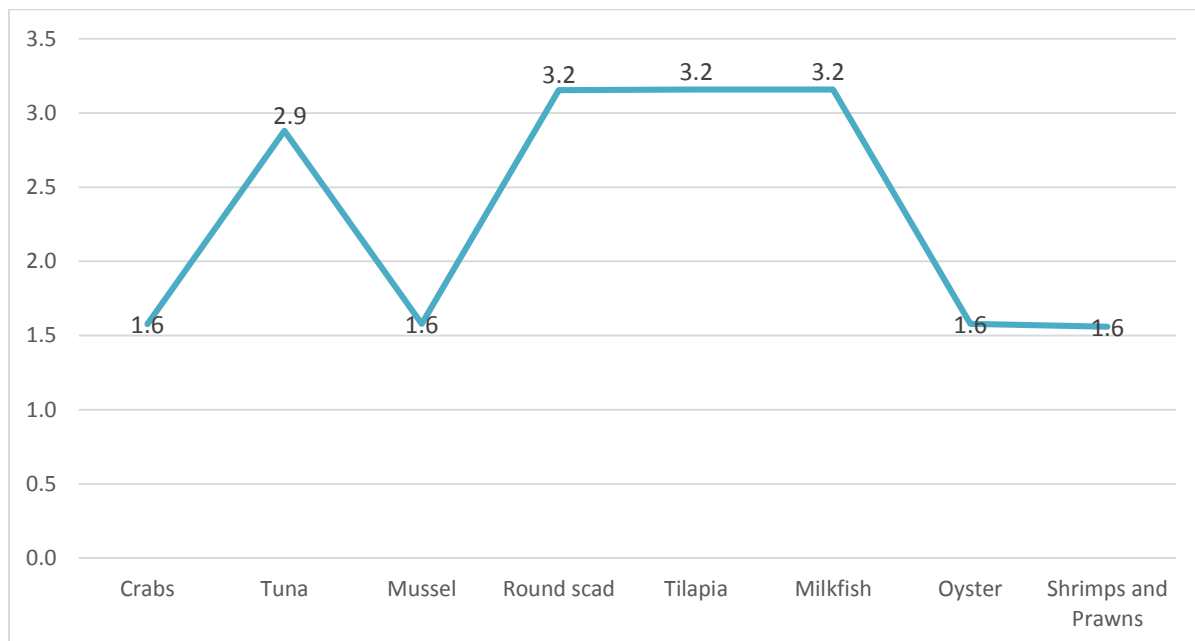
## E. Current Status, Trends, Opportunities and Threats and Prospects for the Next 5 Years

### Philippine Supply & Demand on selected fish commodities

This section deals in details with major fisheries commodities that have direct consequences on food consumption patterns of Filipinos. Milkfish and tilapia being the major aquaculture species consumed in the Philippines, are given particular attention while others although not totally ignored, are not discussed at length because they are either more important as export commodities, or data are not as readily available making analysis a bit difficult.

Production and population growths are based on the patterns from 2005 until 2014 (PSA, 2015; BFAR Fisheries Profile, 2015 (advance copy)). Projections for the food demand from 2015 until 2020 were based on the 2013 report on per capita utilization of fish in the country (FNRI-DOST, 2013).

Figure 22 illustrates the possible wastage in Philippine fisheries including some important aquaculture commodities while per capita utilization of most preferred species, is presented in Figure 23.



Percentage was computed from FSIS 1990-2009.

Figure 22. Percent (%) wastage in Fisheries, per Commodity, from 1990-2009 (PSA-FSIS).

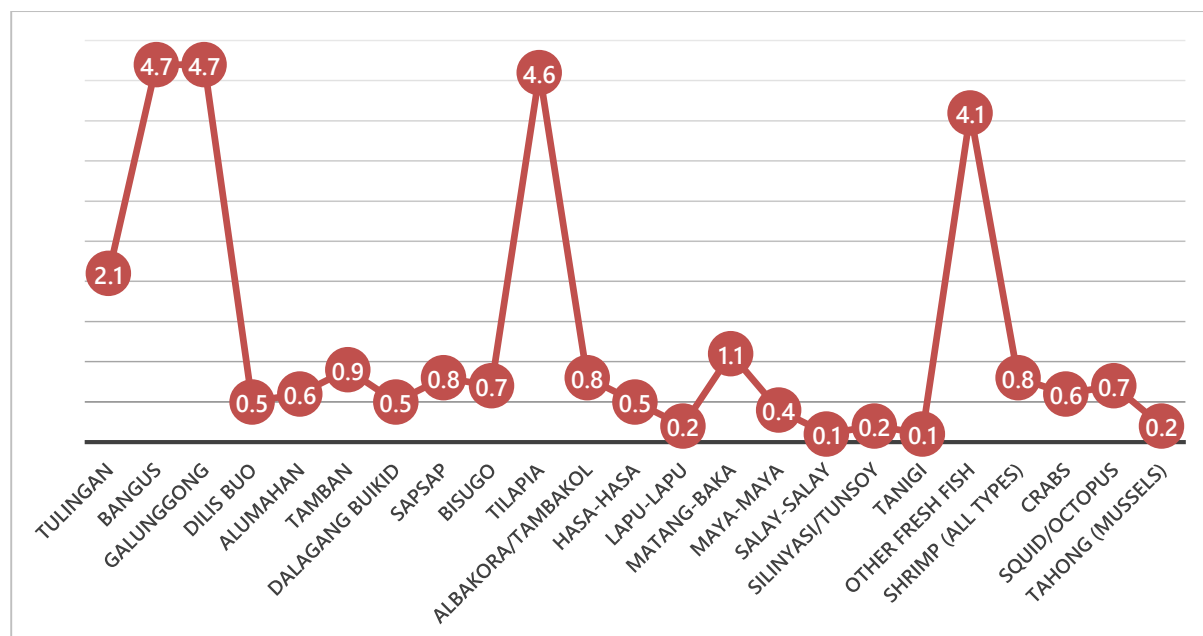


Figure 23. Per Capita Consumption (kg/yr of Fish and Fishery Products) (FNRI-DOST, 2013).



## MILKFISH

From 2005 until 2012, milkfish has been supplying more food than what was consumed by Filipinos (Figure 24). Supply deficits however, has been recorded since 2013 with per capita consumption almost doubling at 4.7 kg. Based on industry growth of 3.0% from 2005-2014, milkfish production will continue to be insufficient for the requirements of Filipino population estimated to increase from 101.47 M in 2015 to 111.48 M by 2020. Even with projected growth target set by the industry at 4.0 %, deficits will continue (Figure25). To attain self sufficiency, an alternative growth target of 6% is being proposed. At this level, surplus production is expected starting 2019 (Figure 26).

Additional milkfish production can be sourced out from five (5) Mariculture Parks which will be operational in the next five years and improvement of production from brackishwater fishponds to at least 1.5 tons/ha/yr. At present, pond productivity is low, estimated at 1.2 tons/ha/yr while out of the 67 designated Mariculture Parks in the country, only 2.58% is operational. This is slightly higher than the earlier reported utilization of only 0.54% (Salayo et al., 2012) of the earmarked 50,150 has for MPs indicating a tremendous potential for expansion. The low utilization however is also indicative of the nebulous problems that undermine adoption of this strategy in achieving increased sustainable production from milkfish aquaculture.

Increasing production of milkfish is two-pronged: improved productivity of both land-based and water-based production systems; and expansion of water-based culture facilities. The downside in increasing the volume of milkfish products is the possible slump in prices. Without a parallel decrease in the cost of inputs, it may not be attractive for milkfish growers especially those who are land-based to improve productivity level which is easily attainable, but cost-prohibitive.

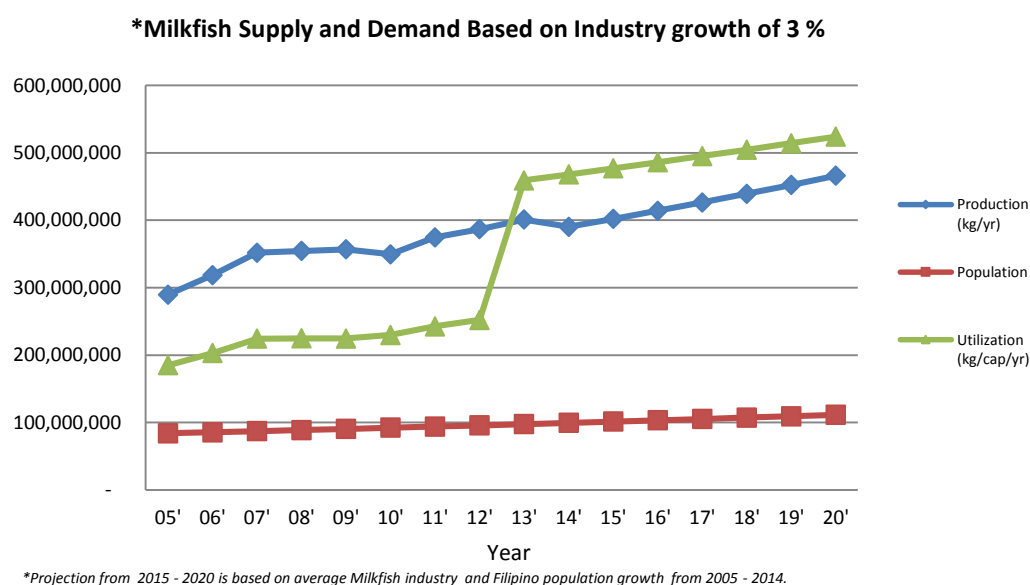


Figure 24. Population growth, milkfish production and utilization in the Philippines (2005-2020).

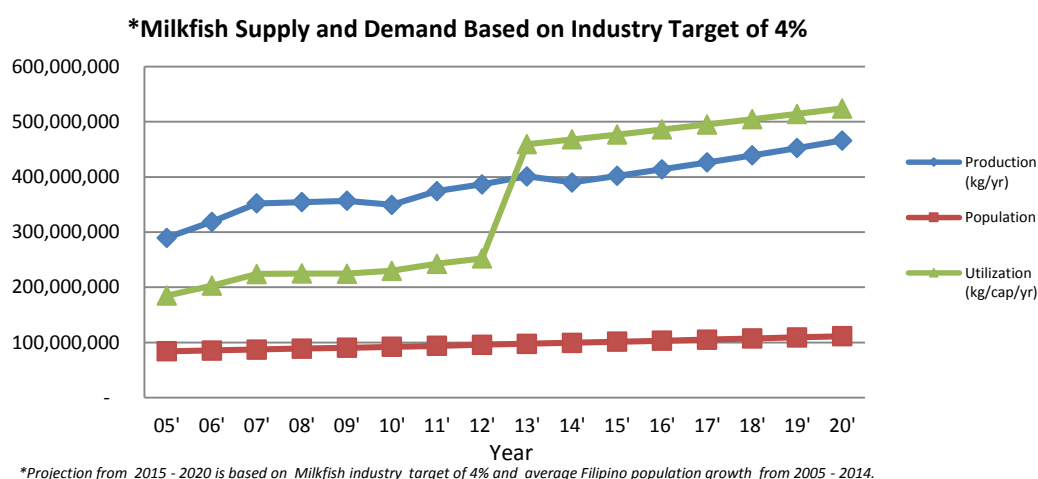


Figure 25. Population growth, milkfish production and utilization in the Philippines (2005-2020).

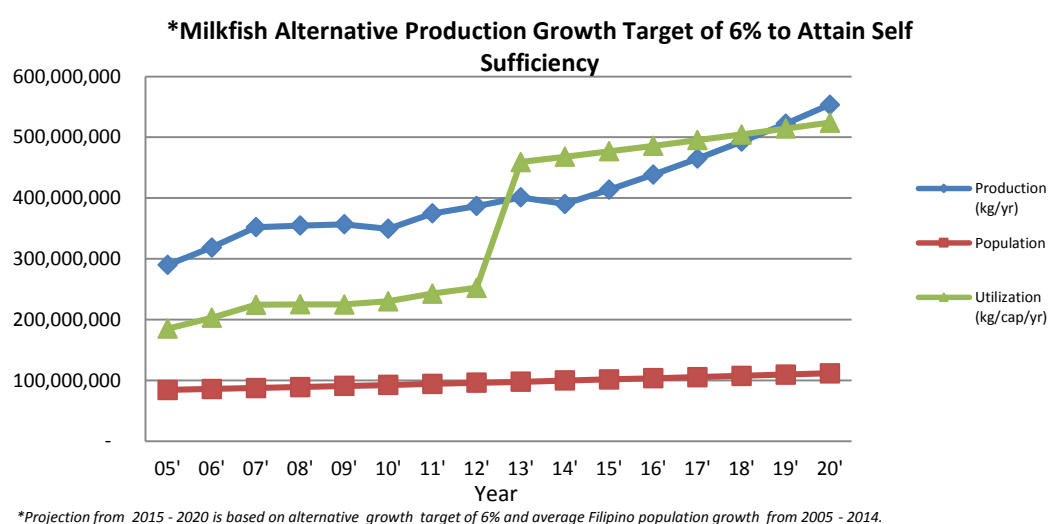


Figure 26. Population growth, alternative milkfish production and utilization in the Philippines (2005-2020).

## i. Current Status of Milkfish Cage Operation

The mariculture area in the Philippines have been set with an area of 50,150 hectares (Salayo, et al., 2012), and most major production site such as the Sual Mariculture Zone in Pangasinan, are now being delineated. Most cage operators, especially corporations and large scale operators, engage in nursery operations due to the constant shortage of good sized and quality fingerlings. Adverse weather conditions, typhoons and location of cage structures, compel operators to invest on stronger materials. Cages are now made up of sturdy materials mostly of high density polyethylene (HDPE) and metal frames. Commercial feeds, with almost 90% of operators using pressure pelleted sinking feeds, are used. Only about 10% are using extruded floating feeds and slow-sinking feeds. However, no evaluation and monitoring on the amount of feed wastage and their effects to the environment are being done.

Production efficiency in cage farming is relatively low with feed conversion ratio (FCR) of 2.5 to 2.8. To produce a kilogram of good sized milkfish (ABW 500g to 650g), almost three kilograms of feeds are needed. This suggests some problems on commercial feed efficiency, production management, quality of milkfish fingerling, or water quality. These factors should be evaluated and analyzed. Production information on different culture systems is shown in Table 1.

Recent studies on the culture of milkfish in marine cages showed that the problems on fish kills may have been due to the degradation of environmental quality caused by improper feed and feeding practices that result in feed wastage estimated at 10-30% (Saclauso et al., 2015). This could have been exacerbated by the crowding of cage structures and non-compliance to regulations with respect to location and distance between cages. In that report, it was also illustrated that cages need not be deeper than 6 meters since about 75% of fish stay at shallower depths. With shallower cages, water exchange and circulation in culture areas can improve. This in turn will improve water quality and growth of fish in cages.

Production in cages (Table 2) improved with automation and mechanization (Saclauso et al., 2015). Fish are bigger and of fairly uniform sizes at harvest with lower FCR (from industry average of 2.5-2.8 to less than 2.0). This improvement including environmental protection, translates to reduced costs, increased profitability and sustainability. Automation and mechanization allow also culture of fish at higher densities because of improved access to food using mechanical devices (top and bottom feeders) and floating feeds.

Table 1. Current production information of milkfish in the Philippines.

Operation	Commercial	Density	Milkfish				
	Feeds	(pcs/m3)	Survival	Output (kg/m3)	Initial ABW(g)	Harvest ABW(g)	DOC
Fishpond	Floating	0.5 to 1	60%	0.2 to 0.3	1	300	120
Fish Pen	Sinking / Floating	10 to 15	85%	3 to 5	10	400	180
Fish Cage	Sinking / Floating	30 to 50	85%	10 to 12	15	500	210

Table 2. Cost analysis per kilogram of milkfish produce in cages.

Milkfish Cage Cost Analysis per Kilo			
Cost Factor	Amount (Php)	% cost	Rank
Feeds	64.23	75.19%	1
Fry	3.66	4.28%	4
Harvest	5.61	6.57%	3
Broker	8.11	9.50%	2
Labor	2.09	2.45%	5
Rental / Permits / Depreciation Costs	1.72	2.01%	6
Total Cost / Kg	85.42	100%	

## ii. Current Status of Milkfish Pen Operation

Fish pen production (Table 3) is mostly situated in brackishwater or freshwater areas with good protection from waves and adverse weather conditions. Milkfish pen frames in the Philippines are usually made up of light materials which include bamboo and nylon rope. Production efficiency is a little bit higher compared to cage farming with feed conversion of 2.0 to 2.5 for a good-sized harvest weight. Production is only at an average of one cycle per year with a culture period of six to seven months with an average body weight of 400 to 500 grams milkfish at harvest. The other months of the year is dedicated to structure repairs, nursery of fingerlings and avoidance of typhoon season. Mainly pressure pelleted sinking feeds are used in this segment. Use of extruded floating feeds is gaining popularity in fish pens situated in areas with minimal current.

A unique operation of milkfish pens apart from other milkfish pen productions in the country is found in Laguna de Bay. The operation in this area uses minimal feed or feed stuffs or even without any commercial feeds at all. Food source for milkfish are natural food from the lake or in the form of uneaten or expired food products (chips, noodles, etc.). Production for one cycle could last for almost two years before harvest and there is no record on production efficiency and economics.

Table 3. Cost analysis per kilogram of milkfish produce in fish pens.

Milkfish Pen Cost Analysis per Kilo				
Cost Factor	Amount	% cost	Rank	
Feeds	61.39	73.04%	1	
Fry	4.37	5.19%	4	
Harvest	8.37	9.96%	2	
Broker	5.32	6.33%	3	
Labor	2.18	2.59%	6	
Rental	2.43	2.89%	5	
Total	84.06	100%		

## iii. Current Status of Milkfish Pond Operation

Milkfish production in fish ponds (Table 4) might be the oldest form of aquaculture production in the Philippines. This segment can be divided into three production types: traditional, semi-intensive and the intensive production. For the traditional production, milkfish are cultured using only farm grown natural food called “Lab-lab” and “Lumot”. Harvest volume in the traditional type of production is usually low with small sized milkfish (200 - 300 grams). Culture period for traditional pond operations depends on the availability of natural food in the pond. For the semi-intensive pond production (Table 4), milkfish are initially fed with natural food and after the natural food have been consumed, additional food in the form of either commercial feeds or supplemental feeds (rice bran, cracked corn, self-mixed feeds) are given until the desired weight for harvest is achieved. The intensive culture of milkfish in ponds can be

easily differentiated from the traditional and semi-intensive production. In this production strategy, milkfish are reared in high density (>1 piece per square meter), using commercial feed diets (usually extruded floating feeds) during the culture period. Use of support systems in the form of aerators, blowers, etc. is resorted to when fish are cultured at even higher densities.

Table 4. Cost analysis per kilogram of milkfish produce in fish ponds.

Milkfish Ponds Cost Analysis per Kilo				
Cost Factor	Amount	% cost	Rank	
Feeds	40.92	56.29%	1	
Fry	1.98	2.72%	2	
Harvest	7.90	10.87%	4	
Broker	9.80	13.47%	3	
Labor	7.06	9.71%	6	
Rental	5.04	6.94%	5	
Total	72.70	100%		

#### iv. Current Status of Milkfish Hatchery and Nursery

Milkfish hatchery systems in the Philippines are still limited in terms of output and reliability of year-round supply. In 2002 an estimated 358 million milkfish fry were imported from Taiwan and Indonesia (BFAR-NIFTDC) suggesting that during those times when the Philippines was only producing 225,337 MT of milkfish (BAS, 2006), the country was already importing a large number of fry from other countries. Given the figures, it would be safe to assume that the amount of imported fry also increased by as much 72% as the increase in production in ten years from 2002 to 2012 was recorded at 386,728.92 MT (BAS, 2012). It is likely that hatchery operations in the Philippines are now following the satellite hatcheries system of Indonesia that somehow ensure constant and reliable supply of milkfish fry.

Nursery operations in the Philippines are characterized by small ponds ranging from 0.5 hectare to 2 hectares. Milkfish fry are stocked at very high densities and grown to desired sizes (1 inch to 6 inches) depending on the demand of the buyers or farm requirements. Traditional milkfish pond protocol is usually employed with “lab-lab” as the main source of food for the fry. However, in some medium to large scale nurseries, high density (high nutrient) or booster feeds are used together with natural food for better fry foundation and increased fingerling survival.

#### v. Major Concern and Issues

Major concern in milkfish operations is the recurring massive “fish kill”. Mortalities of juvenile milkfish occur at an average daily rate of 5 - 10 pieces. Another constraint in production is the slow growth of milkfish during the late juvenile stage (ABW of 400- 500 grams / piece) which extends culture period of up to 8 months to harvest fish at ABW of 650 grams / piece. High turbidity caused by run-off during and after heavy rains or typhoons also results in loss of appetite or mass mortalities.

Increasing cost of inputs and the low farm gate prices are some of the other concerns that are discouraging farmers. Profitability of operations in cage and pen is now one of the top concerns and may very well be regarded as the major issue in the milkfish industry. Operators are now disheartened with constant increase in production inputs (commercial feeds, fertilizers, nets, ropes, cage materials, etc.), salary and incentives of skilled labor. Particularly prohibitive is feed costs that constitute about 70% - 75% of production costs in cage operation. The farmgate price (FGP) of milkfish is not increasing and highly volatile with prices changing daily (Table 5). Prices usually start high but stabilize at a lower level than the opening price.

Table 5. September - October 2015 Milkfish price monitoring of different harvest weights in three major fish ports / markets in the Philippines

<b>Dagupan Market</b>			
<u>Size (g)</u>	<u>Opening Price</u>	<u>Price Drop</u>	<u>Average Price</u>
300.00	85.00	70.00	77.50
400.00	90.00	80.00	85.00
500.00	100.00	90.00	95.00
600.00	105.00	90.00	97.50
<b>Malabon - Navotas Market</b>			
<u>Size (ABW)</u>	<u>Opening Price</u>	<u>Price Drop</u>	<u>Average Price</u>
300.00	85.00	65.00	75.00
400.00	90.00	80.00	85.00
500.00	105.00	90.00	97.50
600.00	110.00	90.00	100.00
<b>Iloilo Market</b>			
<u>Size (ABW)</u>	<u>Opening Price</u>	<u>Price Drop</u>	<u>Average Price</u>
300.00	85.00	80.00	82.50
400.00	95.00	90.00	92.50
500.00	110.00	100.00	105.00
600.00	115.00	105.00	110.00



## **vi. Production Trend**

Milkfish production in cages and pens will be gearing towards harvest of bigger sizes which command high market prices. Consequences of this strategy will be the extension of culture period, lower cycles per year, higher risk of experiencing “fish kill” and increased exposure to unpredictable adverse weather conditions. Fish pond operator will maintain semi-intensive and traditional operations producing good sizes fish with lesser inputs but at lower volume or tonnage.

The business of producing milkfish will soon become a domain for high income families or corporation given the cost of production and the relatively low farm gate prices. The strategy of people that will engage in milkfish operation will be towards backward integration, producing all necessary inputs from fry or fingerling to production of self-mixed and formulated feeds to reduce costs of inputs. All production strategy will likely be on a large scale basis to further reduce cost of inputs per unit of produce. A downward trend will be expected in terms of labor and employments since large operators will focus more in efficiently utilizing farm labor and will gear towards automated and mechanized operations.

## **vii. Opportunities and Threats**

### **Opportunities**

The Philippines is an archipelago with vast coastline and numerous cove-like locations that are very conducive for mariculture operations. Considering that of the planned 50,150 hectares of water area for mariculture, only 273 hectares are utilized (Salayo et al., 2012) yielding low harvests estimated at 6 to 8 kilograms per cubic meter and at even lower volume of 3 to 5 kilograms per cubic meter based on 2012 survey of the writer, the potential if fully utilized, is tremendous.

The current supply and production of milkfish could be increased exponentially by implementing a production strategy with adequate density, support system and infrastructures (ice plants, processing plants, storage and packaging facilities, etc.). Efficiently utilizing MP's and other coastal resources for milkfish production will also exponentially increase the demand for good quality milkfish fingerling. The opportunity in delivering quality fingerling at a cheap price will be a big challenge for pond operators but will enable them to achieve higher income versus current grow-out operation. Establishing “satellite nurseries” will be the next frontier in milkfish pond production that could increase overall output and profitability of pond operations. Support programs for satellite nurseries will be a viable project supplying adequate quantity and quality fry to cage farms.

### **Threats**

Milkfish production in the Philippines focuses on fast income rather than long term profitability. Current practices in all segment of production may it be in pond, cage or pens, tend

to neglect proper management which will eventually lead to environmental degradation. Inappropriate farming practices such as overfeeding, inappropriate feed type (sinking), crowding of structures (Plates 1 and 2). All these promote high nutrient loading, pollution and blockage of water flow that at present, are not monitored and evaluated. Similar situations are happening to fish ponds which are operated without proper pond preparation and management. Also, with the current low supply of good quality fry and fingerling this leads to high mortality in production during the early stage of operation. Sustainability will be the challenge for this industry going towards increased production and supply.

Unstable and low market prices that are controlled by fish broker, contract buyers and “viajeros” will always be problem to milkfish producers considering the stable and constant increase of farm inputs.



Plate 1. Milkfish cages in Bolinao, Pangasinan (left), and Tilapia and milkfish cages in Taal Lake (with seismic activity shown in red dots, right), Philippines (Digitized from web-based images and actual 2012 field survey data using Quantum GIS software. In: Saclauson, et al., 2013 and 2015 unpublished Technical Reports)



Plate 2. Cages in San Nicholas and Laurel, Taal Lake Batangas after demolition and realignment (2012)

### viii. Prospects for the Next Five Years

Programs should be focused in increasing productivity at sustainable levels. These can be achieved through effective and efficient utilization of our mariculture resources and existing brackishwater fishponds. Reversion of abandoned ponds to mangroves and conversion of

unproductive ponds to nursery or satellite nurseries will reduce pressure on mangrove ecosystem. Milkfish ponds will become more sustainable and profitable given the high turn-over rate of fingerling production with less inputs and low environmental degradation.

Three growth scenarios are presented (Table 6; see also Figures 24-26) to illustrate how the industry copes with the demands of the increasing Filipino population. It reveals the need for the industry to come up with innovative solutions to address the impending shortage of milkfish products.

Sources and projections on additional productions of milkfish under certain assumptions are detailed in Tables 7, 8 and 9.

Table 6. Projected supply and demand for milkfish under three growth scenarios

<b>Milkfish Industry Growth Scenarios vs Supply Sufficiency</b>					
(Based on FNRI-DOST 2013 Report)					
YEAR	Production (*3% growth )(kg/yr)	Population (# of persons)	Projected Demand (kg/yr)	Production Deficit / Surplus (kg/yr)	Utilization (Kg/cap)
2015	401,939,505.90	101,468,435.00	476,901,644.48	(74,962,138.58)	4.70
2016	413,997,691.08	103,396,335.26	485,962,775.73	(71,965,084.65)	4.70
2017	426,417,621.81	105,360,865.63	495,196,068.46	(68,778,446.65)	4.70
2018	439,210,150.46	107,362,722.08	504,604,793.76	(65,394,643.30)	4.70
2019	452,386,454.98	109,402,613.80	514,192,284.85	Detailed i(61,805,829.87)	4.70
2020	465,958,048.63	111,481,263.46	523,961,938.26	(58,003,889.63)	4.70
<i>*Based on average growth from 2005 - 2014</i>					
YEAR	Production (*4% growth) (kg/yr)	Population	Projected Demand (kg/yr)	Production Deficit / Surplus (kg/yr)	Utilization (Kg/cap)
2015	405,841,831.20	101,468,435.00	476,901,644.48	(71,059,813.28)	4.70
2016	422,075,504.45	103,396,335.26	485,962,775.73	(63,887,271.28)	4.70
2017	438,958,524.63	105,360,865.63	495,196,068.46	(56,237,543.84)	4.70
2018	456,516,865.61	107,362,722.08	504,604,793.76	(48,087,928.15)	4.70
2019	474,777,540.24	109,402,613.80	514,192,284.85	(39,414,744.61)	4.70
2020	493,768,641.84	111,481,263.46	523,961,938.26	(30,193,296.41)	4.70
<i>*Based on industry target as per CNFIDP 2015 - 2020</i>					
YEAR	Production (*6% growth) (kg/yr)	Population	Projected Demand (kg/yr)	Production Deficit / Surplus (kg/yr)	Utilization (Kg/cap)
2015	413,646,481.80	101,468,435.00	476,901,644.48	(63,255,162.68)	4.70
2016	438,465,270.71	103,396,335.26	485,962,775.73	(47,497,505.02)	4.70
2017	464,773,186.95	105,360,865.63	495,196,068.46	(30,422,881.51)	4.70
2018	492,659,578.17	107,362,722.08	504,604,793.76	(11,945,215.60)	4.70
2019	522,219,152.86	109,402,613.80	514,192,284.85	8,026,868.01	4.70
2020	553,552,302.03	111,481,263.46	523,961,938.26	29,590,363.77	4.70
<i>*Alternative production target to attain self sufficiency</i>					

Table 7. 2016 - 2020 Projected MP usage with Milkfish output in MT using available and sustainable high density technology production of 24kg/m<sup>3</sup>.

Year	MP usage	Projected	Production Volume		Output	MP Output
	(ha)	Growth	Area (m <sup>2</sup> )	Depth (m)	(kg/m <sup>3</sup> )	(MT)
2015	273.00	50%	10,000	5	24	327,600
2016	409.50	50%	10,000	5	24	491,400
2017	614.25	50%	10,000	5	24	737,100
2018	921.38	50%	10,000	5	24	1,105,650
2019	1,382.06	50%	10,000	5	24	1,658,475
2020	2,073.09	50%	10,000	5	24	2,487,712

Table 8. Increased output in milkfish pen operations with use of extruded floating pellets and good management practice.

Year	Production Volume		Output (kg/m <sup>3</sup> )	Output / Fish Pen (MT)
	Area (m <sup>2</sup> )	Depth (m)		
2015	10,000	2	4	80
2016	10,000	2	5	100
2017	10,000	2	6	120
2018	10,000	2	7	140
2019	10,000	2	8	160
2020	10,000	2	9	180

Table 9. Comparison of milkfish grow-out and nursery pond production output.

Operation	Production Volume		Density (pcs/m <sup>3</sup> )	ABW (g)	Survival	Output (kg)	DOC
	Area (m <sup>2</sup> )	Depth (m)					
Grow-out	10,000	1	1	300	60%	1,800	120
Nursery	10,000	1	50	10	40%	2,000	60

## TILAPIA

Similar to milkfish which has shown growths over the years notwithstanding fishkills and natural calamities, tilapia production has been oscillating but generally increasing (Figure 10). It is interesting to note that tilapia through the years has gained acceptance even better than milkfish, as shown by the increasing per capita tilapia utilization. There has been a surplus in the availability of tilapia for consumption since 2005 until 2013 given the present industry growth of 5.67% (Figure 27). Deficit has been experienced since 2014 and will continue until 2020 if industry growth remains constant. Even with industry target of 6%, deficit will continue until 2020 (Figure 28). Alternative growth target of 9% is being proposed to attain self sufficiency by 2020 (Figure 29).

Prospects for tilapia which are also discussed in this paper may not be as good as that of milkfish because of limitations in expansion areas and the prohibition set forth by laws on the use of freshwater areas. Even intensification scenarios for tilapia culture may not be as optimistic as that of milkfish because of the intrinsic characteristics of the species. High density loads in milkfish cages does not result in low survival but commonplace in tilapia which unlike milkfish, show overt intra-specific aggression under crowded conditions that often results in high mortalities. For instance, personal interviews of the author with cage operators in Taal Lake revealed that regardless of stocking densities, survival of tilapia hovers under 50%. This is also the reason why operators tend to overstock to compensate for the low survival which does not really make any ecological sense, but seems to be providing better economic incentives.

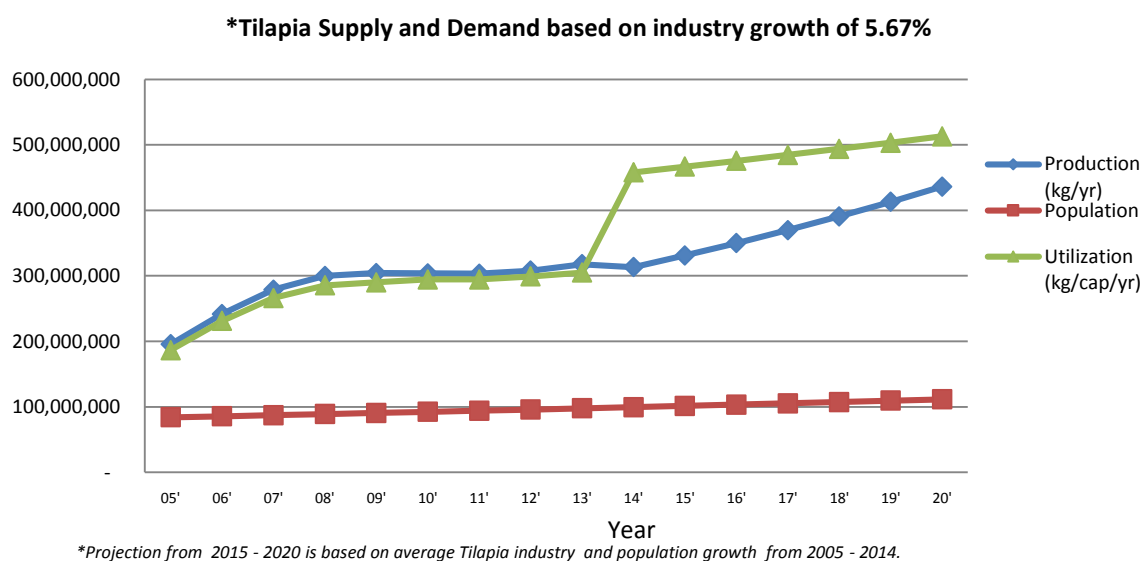


Figure 27. Supply and Demand for tilapia from 2005-2020 based on average industry growth.

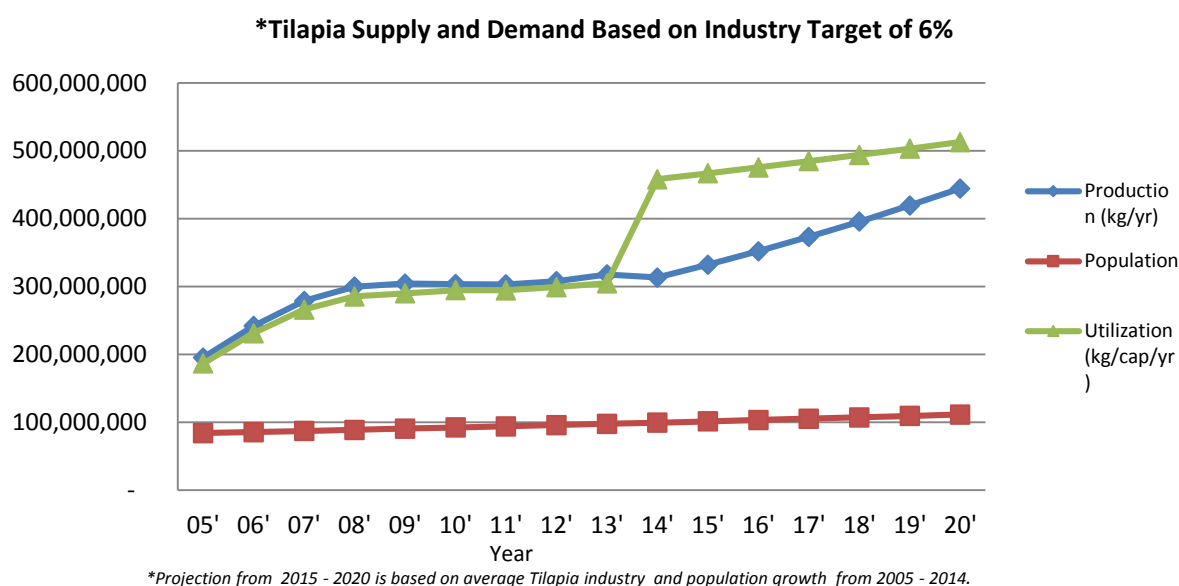


Figure 28. Supply and Demand for Tilapia based on industry target.

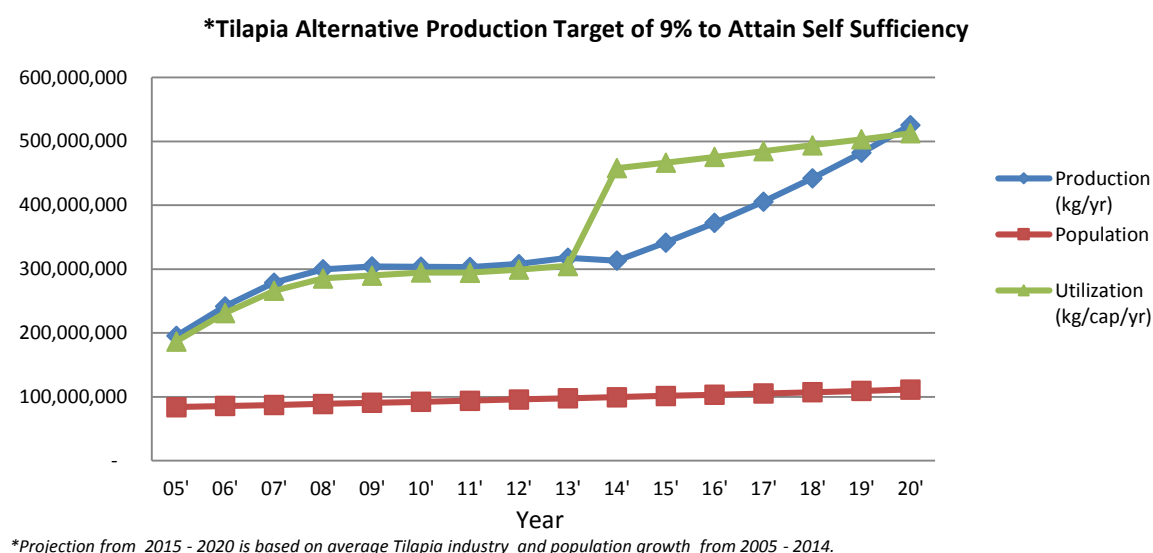


Figure 29. Supply and Demand for Tilapia based on alternative target to attain self-sufficiency.

#### i. Current Status of Tilapia Cage Operations

Tilapia cage operations in the Philippines are mostly situated in freshwater lakes with structures made up of bamboo, nylon ropes and netting materials. The top productive lakes for Tilapia cage operations in the Philippines are Taal Lake, Seven Lakes in Laguna, Lake Bato and Lake Buhi in the Bicol regions. Operators from the top three producing provinces in the Philippines (Batangas, Laguna and Camarines Sur) often perceive investment in high cost materials for tilapia cages (HDPE and metal cages) would be costly for such a low value fish commodity. Management and maintenance including repair of cage frames are not



implemented until the cage structure is on the verge of collapse or already collapsing.

The main nutrient for tilapia in cages are mainly commercial pressure pelleted sinking feeds with relatively low number of operators using extruded floating feeds. The efficiency of tilapia in production should be higher compared to bangus since tilapia can obtain significant nutrition from grazing on algae and biofilms, which results to lower feed costs versus other farmed fish. However, according to the data gathered by BFAR-NIFTDC in Taal, Batangas, milkfish is more efficient than tilapia with efficiency ratio of 2.14:1 and 2.22:1 respectively. Very high densities of up to 214 pieces per cubic meter (BFAR-NIFTDC EMMA report; Plate ) are stocked in cages in Taal, Batangas while other production areas like in Camarines Sur and Laguna (seven lakes) stocked at low density of only 10 - 50 pieces per cubic meter achieving very low conversion rates of up to 1:1. Tilapia is usually harvested if it reached the good market size ranging from 200 to 400 grams per piece in about 3.5 to 6 months.



Plate 3. Overstocking of Tilapia in Taal Lake, Batangas.

## ii. Current Status of Tilapia Pen Operations

Fish pen operations for tilapia is characterized by low density (10 - 30 pieces per cubic meter) production that uses both naturally occurring food in the water and the use of commercial feeds. Mostly pressure pelleted sinking feeds are used with minimal operators using extruded floating feeds. Production efficiency in this segment is relatively high with feed conversion ratio ranging only from 1.5:1 to 1:7:1. This production efficiency does not include operators in Laguna de Bay and Rizal area which only use very minimal commercial feeds and feed stuff.

Fish pen structure like tilapia cages are made up of light materials such as bamboo, nylon ropes and netting. Fish pen productions are usually seasonal in nature with producers avoiding the rainy or typhoon season just like in the Ilocos regions. However, with fish pen in Rizal and Laguna de Bay, due to low production cost and minimal usage of commercial feeds, tilapia operations tend to be whole year round with culture period extending up to one year per cycle. tilapia fish pen operations in the Mindanao area (Sultan Kudarat, Davao, Maguindanao, etc.) are operated whole year round due to good weather throughout the year and no strong typhoons during the rainy season. Harvest sizes for fish pen operations varies in different provinces with

Rizal and Laguna de Bay harvesting bigger sizes of 400 - 600 grams, Fish pens in Bicol region and Mindanao area harvesting 300 grams and a more conservative harvest sizes of 180 to 250 grams could be seen in the Ilocos region.

### **iii. Current Status of Tilapia Pond Operations**

Tilapia pond operation is characterized by ponds with depth of 0.8 meters up to 2 meters and an area of 500 square meters up to 10 hectares for a single pond. Density for this segment is still on the conservative side with an average density of only 3 to 5 pieces per square meters. Tilapia production in ponds is continuously increasing with the price stability and the low production cost in this segment. Even with a low farm gate price of Php 65.00 to 80.00 per kilo in Pampanga and Pangasinan, it is still the main fish pond producers of tilapia and operators are still looking at a stable industry. Availability of cheap but good quality fingerling in the area together with the use of low cost commercial feeds and natural food contributed to this business healthy production. Even with the recurring occurrence of massive fishkill and off flavor (“lasang gilik”), operators are still positive on the movement of tilapia products in the market.

In the central and northern part of Luzon, the effects of massive fishkills due to high heat and constant weather changes coupled with low prices, are taking its toll on the producers. Tarlac and Nueva Ecija provinces are experiencing heavy losses due to small scale type of operations which is high in operating expense compared to its production output. Prices in Isabela, Cagayan provinces and Ilocos region are relatively high compared to other top tilapia pond production area with prices ranging from Php 90.00 to 110.00 per kilo. However, industry operators are experiencing very low margin in their harvest due to very high cost of inputs coming from central Luzon and Metro Manila. Northern provinces mentioned above have seasonal production which are set during before the typhoon season.

The Visayas is the area considered to be eating mostly marine products or sea caught fish with only milkfish and shrimp as the preferred aquaculture product. However, with the viability of growing tilapia and the growing acceptability in the market, this product will likely be the focus of aquaculture production next to milkfish. Tilapia will likely replace most catfish farm in this region given its good market price, ease of operation and high market requirement.

### **iv. Hatchery and Nursery**

The demand for a steady supply of good quality but cheap tilapia fry and fingerlings is continuously challenging hatchery and nursery operators in the Philippines. Tilapia hatchery have slowed down since the scarcity of good quality breeders and genetic modification programs did not progress. However, there is still a high number of good quality and fast growing strains available in the market (Table 10).

On the other hand, tilapia nursery operation is gaining popularity among industry operators. Nursery strategy includes purchase of day old tilapia fry (“kawag”) from hatcheries which is very cheap and then transferred to existing ponds and grown to stocking sizes of 5 to 10 grams. With this strategy, nursery operators can select fast growing batches of fingerling and eliminate the rest or sell to other operators.

Table 10. List of good quality Tilapia strain available in the market

Strain	Name	Information
GIFT	Genetically Improved Farmed Tilapia	Originally developed in the Philippines from eight farmed and wild strains collected from around the world. The breeding program continues under the auspices of the WorldFish Centre at Jitra, Malaysia.
GST	Genomar Supreme Tilapia	The Genomar strain was developed by a partnership of biologists from Brazil and Norway. It also included a large hatchery project in China, the Trapia project in Malaysia and a hatchery in the Philippines.
Chitralada	Chitralada	The Chitralada strain was developed in Thailand, and actually was started from the stocks of tilapia given to the King of Thailand who kept them in ponds at the Chitralada Palace. Breeders in Thailand continued to work with this strain and eventually developed the line that still bears the Chitralada name. It has also been used as an important line in some of the other breeding programs.
TabTim	Genetically Improved Farmed Tilapia	Developed in Thailand by the CP Group as their branded tilapia strain. The line is derived from several salt tolerant red tilapia lines, including some from Thailand, the Bahamas and the University of Arizona. Tab Tim has been successfully branded as a premium tilapia which receives an increased price and now is produced and marketed in Indonesia and Malaysia as well as Thailand.
GIFT Excell	GIFT Excellent Strain	The GIFT Excell line is derived from some of the GIFT tilapia that were left behind in the Philippines, when the GIFT program proper was moved to Malaysia. Some of the original GIFT biologists have worked in the original location and have partnered with various hatcheries to improve the strain.

#### v. Major Concerns / Issues

The major concern of tilapia as an aquaculture fish aside from recurring fish kills is the occurrence of off flavor or “lasang gilik” especially those coming from either Pampanga or Rizal. These suggest that the environment is on the brink of collapse due to improper production practices. When this information is known to the market, prices are often marked down to the lowest price possible.

The increasing costs of inputs and inflation rates with continuing low farm gate prices have pushed the profit margins of farmers into a break-even production. Feed millers and other companies that supply aquaculture inputs are constantly increasing their prices to maintain product quality and services. Another issue which is similar to the milkfish industry is the constant increase of farmed inputs with farm gate price not increasing at the same rate and excessive feeding (Plate 4). The latter reduces profitability and degrades water quality of the culture environment.



Plate 4. Excessive feeding in tilapia cages in Taal Lake, Batangas.

#### v. Production Trend

The increasing acceptability of tilapia in the Philippine market has made it the second most cultured fish in the Philippines, next to milkfish. Even though tilapia is an introduced species, it has worked its way as a locally available food fish for the Filipino community. The total production of tilapia for freshwater fish cage alone reached 85,160.84 MT in 2012 (BAS, 2012). Freshwater fish pens reached 21,379.50 MT in 2012, slightly lower by 3.99% versus the previous year (BAS, 2012). Freshwater pond is the highest contributor of tilapia producing 139,105.16 MT in 2012 (BAS, 2012). Production trends under different culture systems are presented in Table 11.

Table 11. Current production Information of Tilapia in the Philippines.

System	Commercial Feeds	Density (pcs/m <sup>3</sup> )	Tilapia				
			Survival	Output (kg/m <sup>3</sup> )	Initial ABW(g)	Harvest ABW(g)	DOC
Pond	Floating	3 to 5	85%	1 to 2	1	200	100
Pen	Sinking/Floating	15 to 30	85%	5 to 10	5	250	120
Cage	Sinking/Floating	30 to 60	60%	10 to 20	5	300	150

#### vi. Opportunities and Threats

Adequate supply of good quality fry and fingerling is required to sustain grow-out production. Even with the numerous hatchery and nursery operators the industry still lacks the adequate supply of good quality tilapia fry and fingerlings. This offers opportunities for the expansion and improvement of hatchery systems but also become a threat to increasing grow-out production if not addressed. Continuous R & D to generate information and technology for the genetic improvement of tilapia will provide the necessary support for the production of climate resilient, good quality and fast growing strains.

The occurrence of off-flavor on tilapia produced in some areas in the country, also provide

opportunity for research to improve culture management practices. This has to be addressed at the soonest to improve market prices and utilization.

## vii. Prospect for the Next Five Years

Tilapia will continue to be the second most cultured fish in the Philippines. The deficit in local requirements and utilization (Table 12) should be addressed by reviving old freshwater dam, reservoirs and lakes for sustainable cage operation using high quality inputs. Improvement and usage of original parent line should be implemented in local hatcheries accompanied with accreditation. Strict implementation of proper production management and sustainability programs should be implemented in existing production areas (ex. Taal Lake and Lake Sebu).

Saline tolerant tilapia is an alternative culture species for brackishwater (even to the point that this is a secondary species for polyculture with milkfish) if milkfish is not available or if the price of tilapia in the area commands a more profitable operation. It is recommended that a concrete data on the production output of brackishwater tilapia should be established to indicate the corresponding hatchery or pilot hatcheries/nurseries to be created. Quality fry will always be a product of quality broodstocks, therefore one of the main target for this hatchery strategy should be the acquisition or importation of pure strain for brackishwater or saline environment tilapia species (example, *Tilapia zillii* or red bellied tilapia) then cross-bred with our improved tilapia strain.

Table 12. Projected supply and demand for Tilapia under three growth scenarios

Tilapia Industry Growth Scenarios vs Supply Sufficiency					
(Based on NFRI-DOST 2013 Report)					
YEAR	Production (*5.67% growth) (kg/yr)	Population (# of persons)	Projected Demand (kg/yr)	Production Deficit / Surplus (kg/yr)	Utilization (Kg/cap)
2015	331,146,532.60	101,468,435.00	466,754,800.98	(135,608,268.38)	4.60
2016	349,922,541.00	103,396,335.26	475,623,142.20	(125,700,601.20)	4.60
2017	369,763,149.07	105,360,865.63	484,659,981.90	(114,896,832.83)	4.60
2018	390,728,719.63	107,362,722.08	493,868,521.56	(103,139,801.93)	4.60
2019	412,883,038.03	109,402,613.80	503,252,023.47	(90,368,985.44)	4.60
2020	436,293,506.28	111,481,263.46	512,813,811.91	(76,520,305.63)	4.60
*Based on average growth from 2005 - 2014					
YEAR	Production (*6% growth) (kg/yr)	Population (# of persons)	Projected Demand (kg/yr)	Production Deficit / Surplus (kg/yr)	Utilization (Kg/cap)
2015	332,180,680	101,468,435	466,754,801	(134,574,121)	4.60
2016	352,111,521	103,396,335	475,623,142	(123,511,621)	4.60
2017	373,238,212	105,360,866	484,659,982	(111,421,770)	4.60
2018	395,632,505	107,362,722	493,868,522	(98,236,017)	4.60
2019	419,370,455	109,402,614	503,252,023	(83,881,568)	4.60
2020	444,532,682	111,481,263	512,813,812	(68,281,130)	4.60
*Based on industry target as per CNFIDP 2015 - 2020					
YEAR	Production (*9% growth) (kg/yr)	Population (# of persons)	Projected Demand (kg/yr)	Production Deficit / Surplus (kg/yr)	Utilization (Kg/cap)
2015	341,582,020.00	101,468,435.00	466,754,800.98	(125,172,780.98)	4.60
2016	372,324,401.80	103,396,335.26	475,623,142.20	(103,298,740.40)	4.60
2017	405,833,597.96	105,360,865.63	484,659,981.90	(78,826,383.94)	4.60
2018	442,358,621.78	107,362,722.08	493,868,521.56	(51,509,899.78)	4.60
2019	482,170,897.74	109,402,613.80	503,252,023.47	(21,081,125.73)	4.60
2020	525,566,278.54	111,481,263.46	512,813,811.91	12,752,466.62	4.60
*Alternative production target to attain self sufficiency					

## WHITE SHRIMP

### i. Current Status of Shrimp Pond Operations

The graph below (Figure 30) represents mainly the intensive farms (those who are using feeds heavily), which comprise 80% of the market share. Unaccounted shrimp farms falls more on extensive operations.

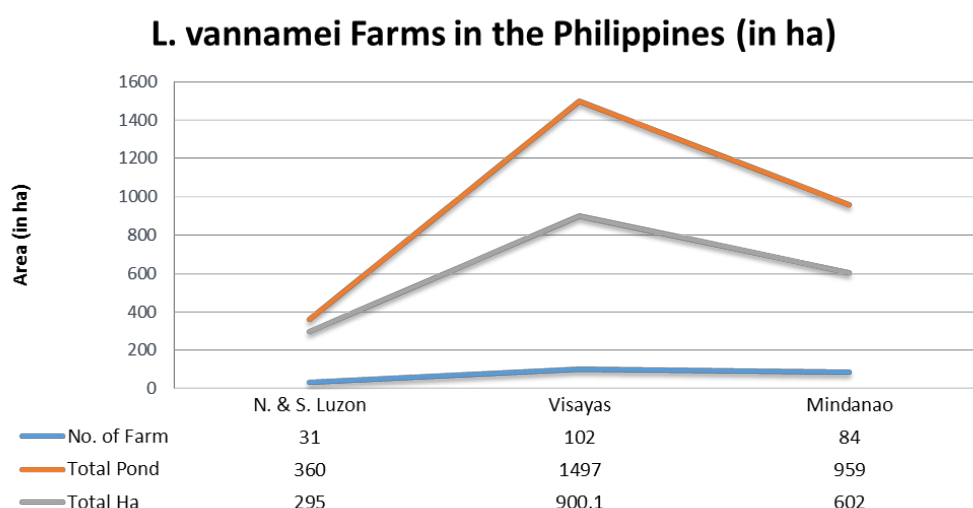


Figure 30. Production areas of *L. vannamei* in the Philippines (Private Company, Unp. data)

### ii. Hatchery

Adequate supply of specific-pathogen free (SPF) and specific pathogen resistant (SPR) fry is essential to increase and sustain production. With culture systems not well secured from horizontal and vertical contamination, use of SPR may be a better strategy. After leaving the hatcheries, shrimp PL's are very susceptible to the culture environment hence, their natural resistance to disease is a paramount concern to prevent outbreak during culture. Only a number of hatcheries in the Philippines produce SPF/SPR fry. Most hatcheries especially backyard producers are not certified and unregulated.

### iii. Major Concerns and Issues

Disease prevention and outbreak containment is a common concern. Even with the advances of technology and research in shrimp production, the problem in preventing diseases and containing disease outbreaks is still one of the major challenges the industry faces. Aquaculture certification could be a way in meeting global competitiveness. It should impose compliance to regulations and issue only certification to those who are compliant.



With the intensification of shrimp production, prices are now decreasing due to increased supply which cannot be absorbed by the local market. The once luxurious high value shrimp products are becoming a common commodity with affordable prices in the export market. The Philippines could not compete with the top producers from other countries which offer cheaper shrimps due to their lower production costs.

#### iv. Production Trend

Production of shrimps is erratic and generally peak in August to September (Figure 31).

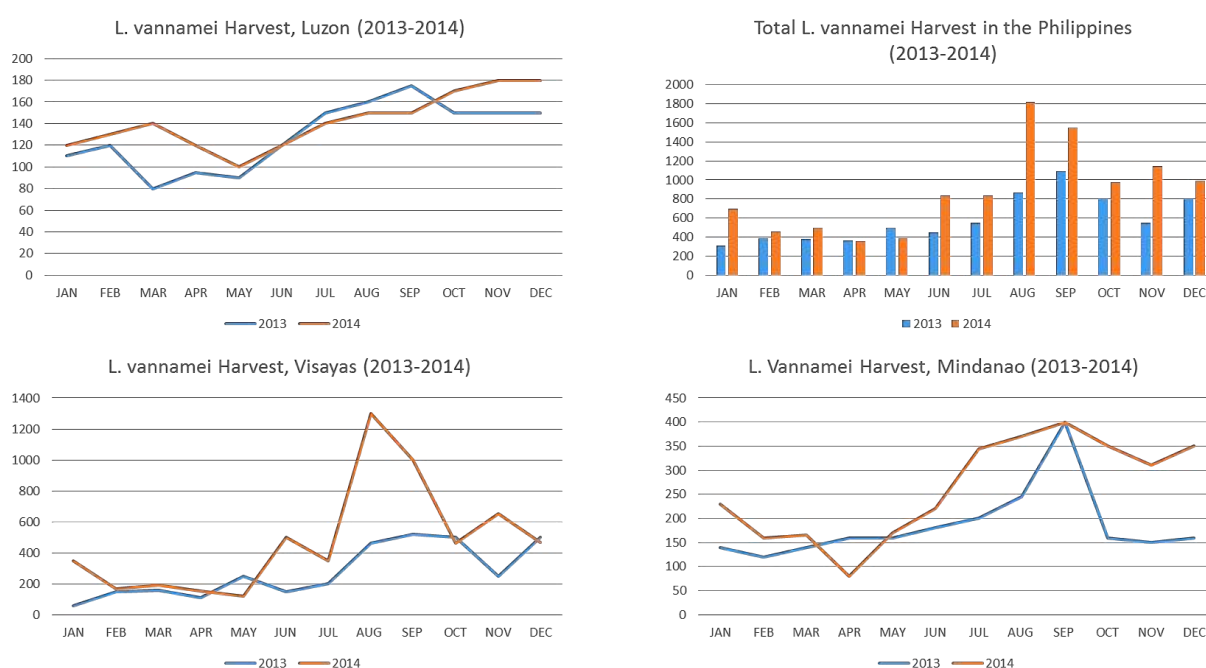


Figure 31. Production of white shrimps in 2013-2014 (Private Company, Unp. Data).

#### v. Opportunities and Threats

Increasing per capita income in the country and rising production of crustaceans and the relative decline in their prices will encourage increase in per capita utilization. At present, local market offers better prices than in export market. With imminent ASEAN integration and the diminishing global trade barriers however, local shrimp producers must find ways to improve cost efficiency in their operations and combat the disease problems that offer clear and present danger to the industry.

#### vi. Prospect for the Next Five Years

The shrimp industry will continue to focus on producing *L. vannamei* as the main cultured species. The SPF and SPR fry will be in the forefront in preventing and minimizing disease occurrence thus, certification should be made compulsory and only certified hatcheries should be promoted to growers.

Intensification should be geared towards the use of polyethylene liners to decrease production maintenance and further increase density of up to 150 pcs/m<sup>3</sup>. The decrease in production costs will enable competitiveness in the global market.

The demand for shrimp was highest in early 90's then declined to lower levels in subsequent years. Increased utilization was again reported in 2013 when per capita utilization peaked at 0.80 kg/cap. For a long time, production was more than what was consumed but recent data show deficits starting 2013 and will continue to be so until 2020 if industry's growth remains at 2.67 % (Figure 32). Even with industry target of 10%, the deficit will remain (Figure 33) and surplus will be realized and only in 2020 if alternative target of 32% is aimed (Figure 34).

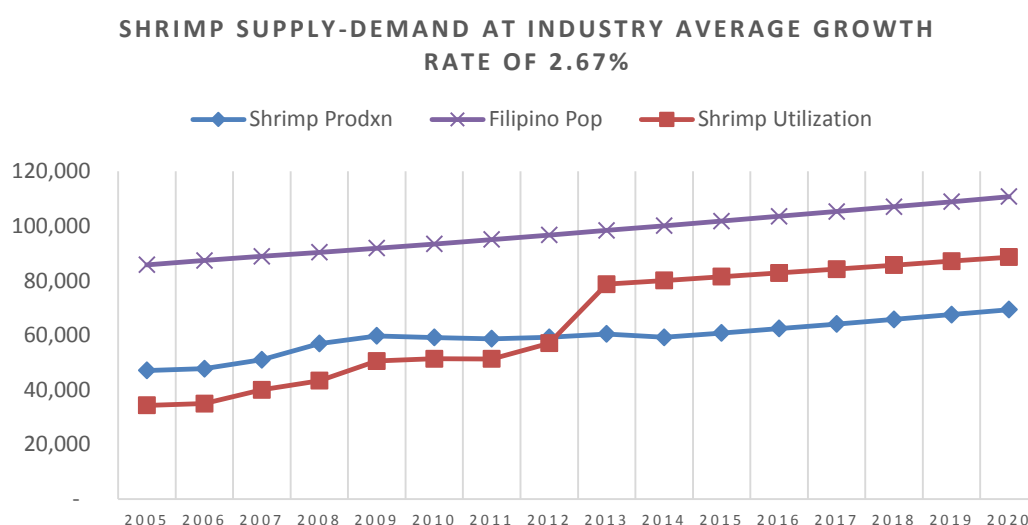


Figure 32. Population, production and demand for shrimps at 2.67% average growth.

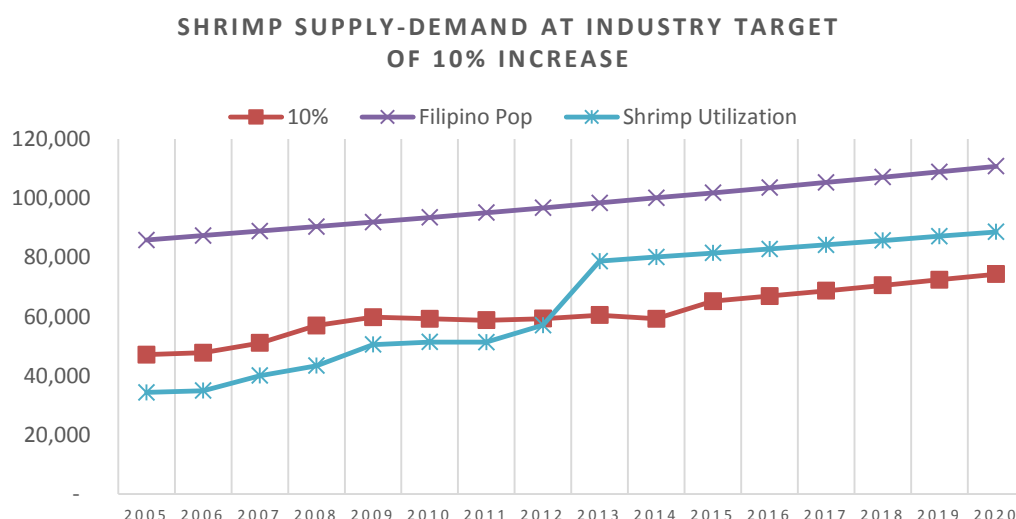


Figure 33. Population, production and demand for shrimps at 10% increase.

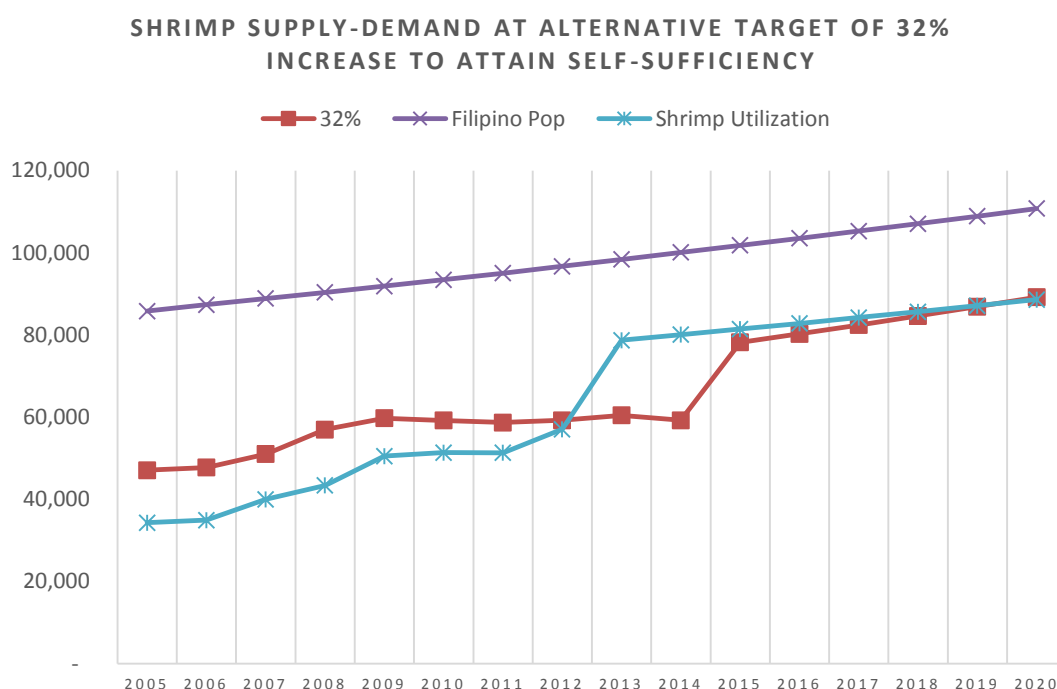


Figure 34. Population, production and demand for shrimps at 32% increase.

Different growth scenarios are also presented in Table 13 showing projections starting 2015 until 2020 using different growth targets. Although the purchasing power of Filipinos has improved and the dampening of prices of crustaceans encourage increased utilization, the demand for shrimp in the lower social strata is not expected to significantly increase. Unlike milkfish and tilapia, shrimps are still considered a luxurious item thus its utilization cannot parallel the demand for the low value finfishes. In fact, the demand for shrimps will be at the high end markets here and abroad.

The demand for shrimp in international market seems insatiable that increases in production volume will not really encounter marketing problems. Recent reports however indicate that the local shrimp industry is unable to compete with their foreign counterparts who sell shrimps at lower prices. This indicates that finding cheaper alternatives in producing shrimps is an important strategy for the expansion of the industry. With the disappearance of barriers through global market integration the competition will become even stiffer. What makes the industry expensive to sustain is its vulnerability to disease causing organisms and the requirements to combat them to increase survival. It is because of this that developing an SPR shrimp is better than producing an SPF which are vulnerable to pathogens when raised in open systems.

Table 13. Projected supply and demand for shrimps under three growth scenarios.

Shrimp Industry Growth Scenarios vs Supply Sufficiency					
Based on FNRI-DOST 2013 Report					
Year	Production	Filipino Pop	Projected	Production Deficit/	Utilization
	*(2.67% growth/yr)	(# of persons)	Demand (kg/yr)	Surplus (kg/yr)	(kg/cap)
2015	60,825	101,798	81,438	-20,613	0.80
2016	62,446	103,528	82,823	-20,376	0.80
2017	64,111	105,288	84,231	-20,120	0.80
2018	65,820	107,078	85,662	-19,842	0.80
2019	67,575	108,898	87,119	-19,544	0.80
2020	69,376	110,750	88,600	-19,223	0.80
*Based on average growth from 2005-2014					
Year	Production	Filipino Pop	Projected	Production Deficit/	Utilization
	*(10% growth/yr)	(# of persons)	Demand (kg/yr)	Surplus (kg/yr)	(kg/cap)
2015	60,825	101,798	81,438	-16,268	0.80
2016	62,446	103,528	82,823	-15,915	0.80
2017	64,111	105,288	84,231	-15,540	0.80
2018	65,820	107,078	85,662	-15,140	0.80
2019	67,575	108,898	87,119	-14,717	0.80
2020	69,376	110,750	88,600	-14,267	0.80
*Based on industry target as per CNFIDP 2015-2020					
Year	Production	Filipino Pop	Projected	Production Deficit/	Utilization
	*(32% growth/yr)	(# of persons)	Demand (kg/yr)	Surplus (kg/yr)	(kg/cap)
2015	78,203	101,798	81,438	-3,234	0.80
2016	80,288	103,528	82,823	-2,534	0.80
2017	82,429	105,288	84,231	-1,801	0.80
2018	84,626	107,078	85,662	-1,036	0.80
2019	86,882	108,898	87,119	-236	0.80
2020	89,198	110,750	88,600	599	0.80
*Alternative production target to attain self-sufficiency					

## SEAWEEDS

The seaweeds industry in the country is dominated by the cultivation of *Eucheuma*, particularly the *spinosum* and *cottonii* strains (BFAR Unp. data). Major production areas of seaweeds in the country include the ARMM, MIMAROPA and Zamboanga Peninsula (Figure 35).

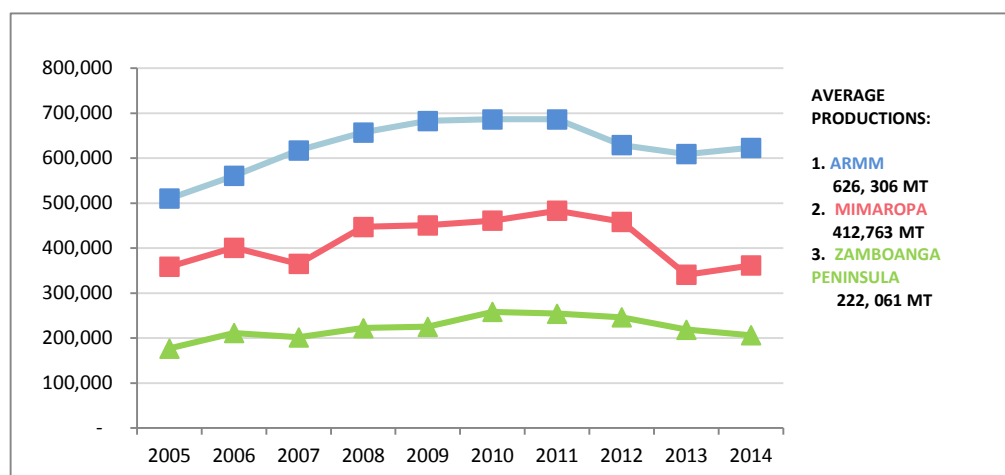


Figure 35. Seaweeds' top producing regions in the Philippines.

Continuous drop in the seaweeds production is observed from 2011 to 2014 (Figure 36), registering negative growth rates in 2012 (-11) and 2013 (-0.56). This trend can be attributed to some problems that beset the seaweed industry, namely: the infestation of *ice-ice* disease, unfavorable climate conditions, and damages caused by typhoons, marine turtles, and siganid fries.

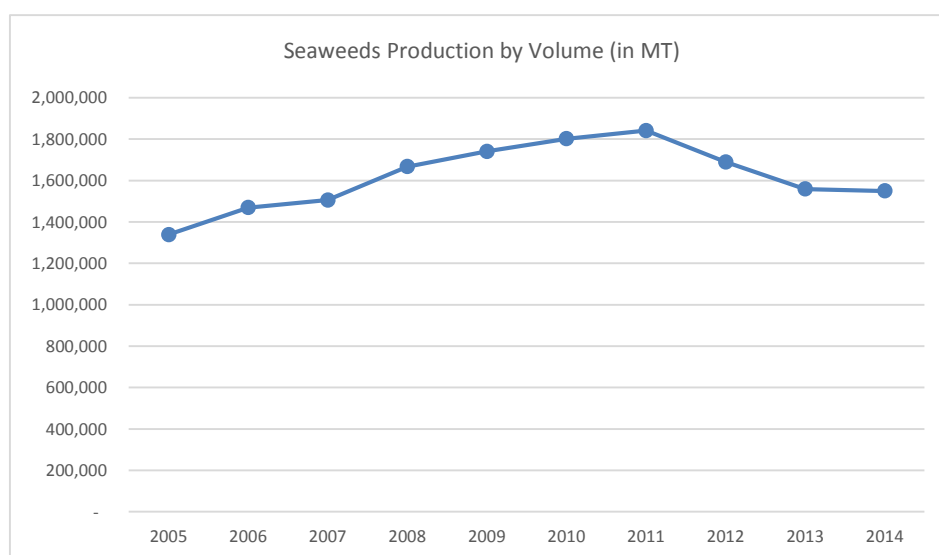


Figure 36. Seaweeds production in terms of Volume (in MT).

Seaweeds farming is done mainly by small farmers (~0.25 ha average farm size), while large-scale seaweeds farms are family-run farming units managed by commercial investors in southern part of the country. Overall, the industry generates employment to more than 200,000 workers which include processors, exporters, traders, farmers and their families (Salayo et al., 2012; BFAR Unp. Data).

The industry's goal is to increase production by 25% in the next 5 years. However, with the challenges that confront this sector, there is a need to intensify R&D efforts to address those challenges, particularly in screening high quality seaweed cultivars. Further, the industry needs to establish nurseries to supply the requirement for planting materials otherwise, imports will gradually drain the seaweeds industry.

### **HIGH VALUE AND EMERGING SPECIES**

Increased production of the high value and emerging species anchors heavily on availability of hatchery-produced seedstocks. In the interim, wild sources may suffice but long term sustainability dictates that production of seedstocks must be at will. Changes in environmental conditions do not provide safety nets that will ensure sustainability. For most species, hatchery technology is available except for eel which still rely on wild sources.

The choice of species to develop either for food security reasons or livelihood and income, will have to be evaluated within the context of changing climate, shifting preferences and growth paradigms. An efficient surveillance and monitoring system will help for timely responses to both internal and external drivers of change.



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# **STATE OF POST-HARVEST FISHERIES IN THE PHILIPPINES**

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December 2015

# STATUS OF PHILIPPINE POST-HARVEST FISHERIES

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## INTRODUCTION

Pursuant to the provisions of Republic Act 8550 (or RA 8550 - The Fisheries code of 1998), the Comprehensive National Fisheries Industry Development Plan (CNFIDP) of 2006 was formulated to provide a strategic legal framework for the management of the fisheries resources in the Philippines and to give direction to the Philippine fisheries industry from 2006 to 2025.

Chapter 2 (Overview of Philippine Fisheries) of the CNFIDP provides an in-depth assessment of the Philippine fisheries resources and the fisheries industry. Such assessment included an exhaustive report of the status and trends of the different sub-sectors of the industry (Chapter 2, section 2.5). This chapter also presents the interrelated problems that plague the entire Philippine fisheries industry, as shown in Figure 1.

Clearly, this chapter critically explains that although the Philippines is endowed with rich fisheries and aquatic resources that supply a significant amount of animal food protein to most of the Filipinos, the sector has been confronted with the following problems: (1) depleted fishery resources; (2) degraded fishery habitats; (3) strong resource use competition; (4) unrealized full potential of aquaculture; (5) post harvest losses; (6) uncompetitive fish and fishery products in the local and global markets; (7) inadequate fishery rules and regulations; and (8) limited institutional capabilities and partnerships between the private and public sectors (CNFIDP, 2006).

Two of the core problems of the industry, as shown in Figure 1, are related to post harvest fisheries – namely *post harvest losses* and *uncompetitiveness of fish and fishery products*. These two core problems are embodied in the discussion of the status and trends of Philippine Post Harvest Fisheries in Chapter 2, section 2.5.5.

As shown in Figure 2, the two core problems besetting the post harvest fisheries sub-sector are quite complicated. They are basically influenced by several factors, within the sub-sector itself and by those from other sub-sectors, namely municipal fisheries, commercial fisheries and aquaculture.

Chapter 3 of the CNFIDP provides the Fisheries Sector Development Framework which presents the integrated objective tree for Philippine fisheries (Figure 3). This specifically mentions two post harvest fisheries related objectives: to promote competitiveness of fish and fishery products and to minimize post harvest losses.

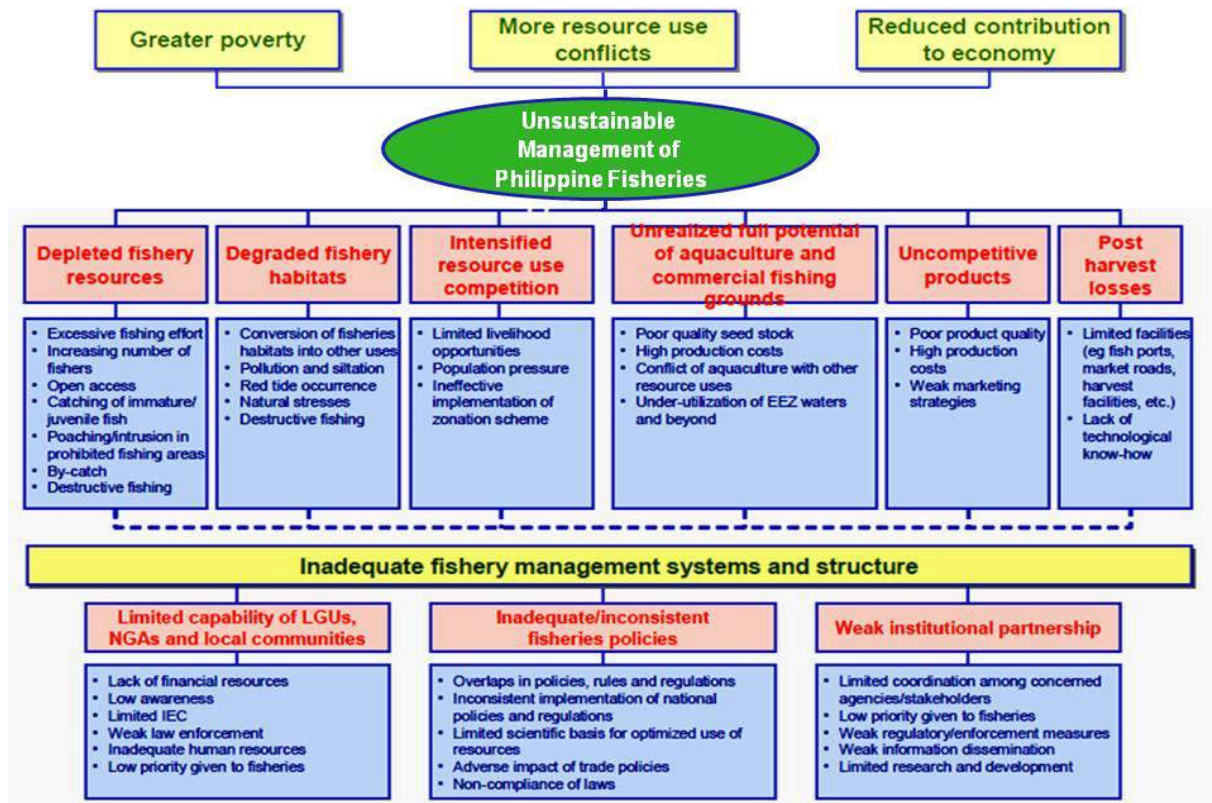


Figure 1. Integrated problem tree of Philippine fisheries (CNFIDP, 2006)

Chapter 4 of the CNFIDP of 2006 specifies the different mid-term priority plans and projects. Among other things, the post harvest component of the plan has specific projects on the following:

- Strengthening of the fish inspection system in the Philippines
- Development of National Quality Standards for fish and fishery products
- Marketing and promotion of fish and other aquatic products
- Development of new value added fishery products
- Natural marine products
- Reduction of post harvest losses
- Model Villages for Philippine Post Harvest Fisheries

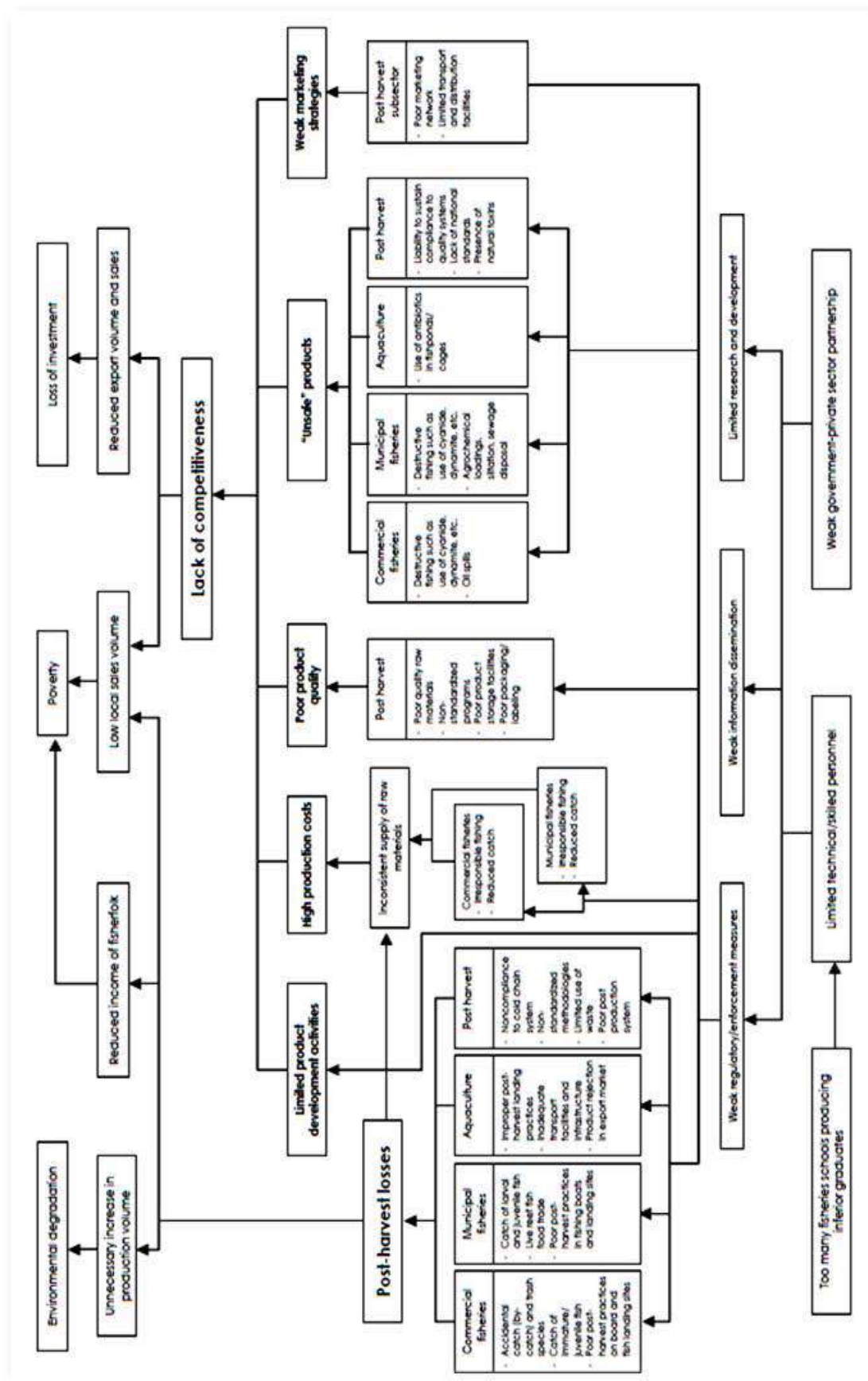


Figure 2. Key problems confronting the Philippine Post Harvest Fisheries sub-sector

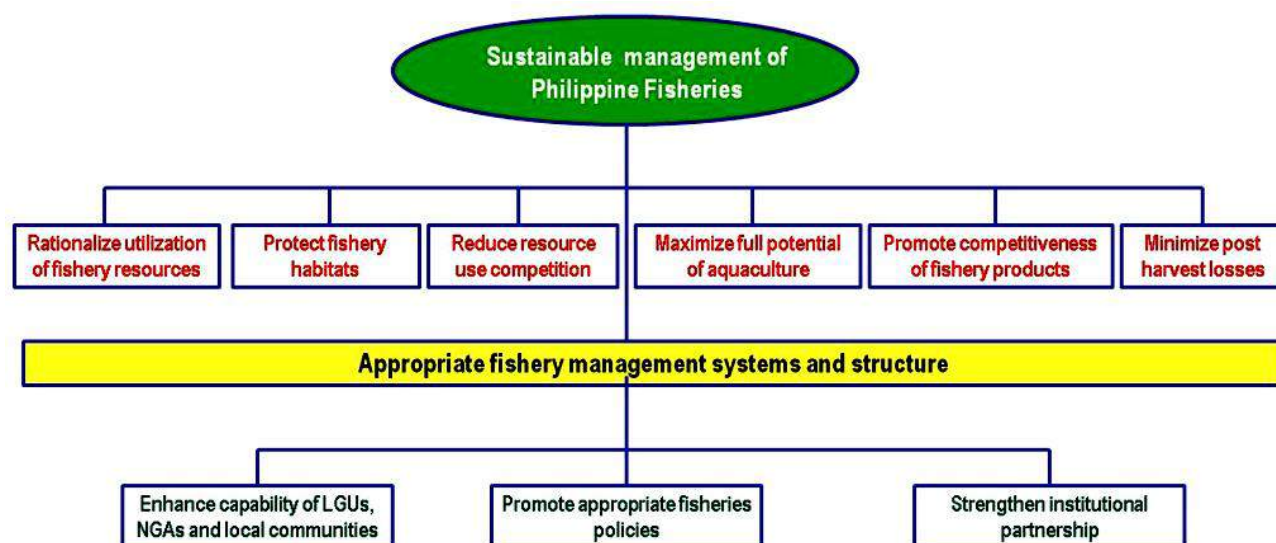


Figure 3. Integrated objective tree of Philippine fisheries (CNFIDP, 2006)

## RECENT STATUS AND TRENDS IN POST HARVEST PROCESSES IN THE PHILIPPINES

Below is a critical assessment of the status and trends in post harvest fisheries in the country ten (10) years after the release of the Comprehensive National Fisheries Industry Development Plan (CNFIDP) in 2006.

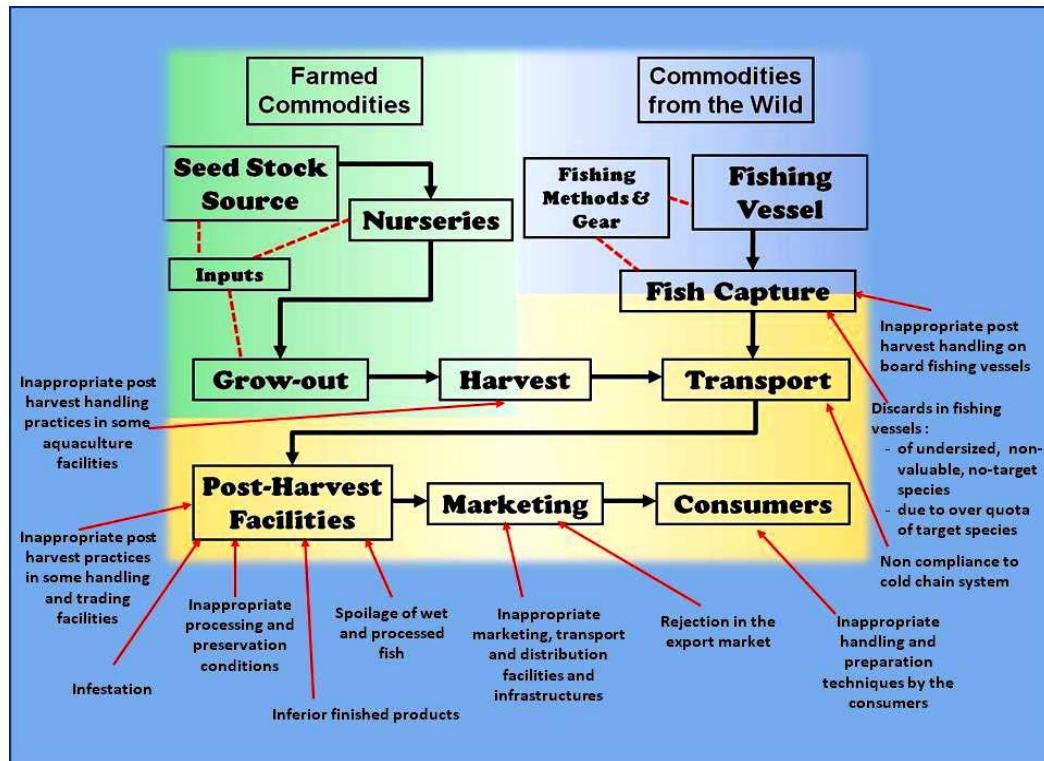
### ***Are the post harvest losses in Philippine fisheries industry minimized?***

Not all fish that is harvested or captured for human consumption actually reaches the consumers. Some of them are lost in the supply chain and these losses can aptly be categorized as follows:

1. ***actual physical or material losses***, or those losses due to improper post harvest handling practices in fish landing and trading facilities or those discarded in fishing vessels;
2. ***nutritional losses***, or those losses due to the decrease in the amount of nutrients a human body derives from eating fish that has lost its nutritional value as a result of inappropriate processing and preservation conditions ; and
3. ***losses in market value***, due to spoilage of wet and processed fish, infestation, weight loss, inferior finished products, and rejection in the export market.

In the Philippines, approximately 25% of the fish is lost in the entire supply chain of each commodity. As shown in Figure 4, the existing practices in each of the steps of any fishery supply chain both from capture fisheries and from aquaculture sub sectors can potentially contribute to losses.





From 2006 until now, there seems to be no significant reduction of post harvest losses in the country. Almost the same post harvest handling practices exist in different fish landing and trading facilities in the country. Causes of these losses in any supply chain, as shown in Figure 4, are still prevalent.

For example, the practices in the country's eight (8) regional fish ports (Figure 5) that are being managed by the Philippine Fisheries Development Authority still need improvement and constant monitoring. These ports remain functional, with the Navotas Fish Port Complex as the central fish hub in the country. However, the post harvest handling practices in most of these ports have to be given attention if we are to seriously reduce post harvest losses, with the exception of some of the fish ports that have been continuously housing several exporting fish processing establishments (*e.g.* Gen. Santos Fish Port Complex, Davao Fish Port Complex, etc.) and therefore have much improved practices.

In addition to these regional fish ports, a total of eighty six (86) municipal fish ports are presently being managed by their respective local government units (Figure 6). These fish port need improvement not only in terms of post harvest practices but also in terms of their basic infrastructures and facilities. Other fish landing facilities that need intervention include those privately owned facilities and the unaccounted traditional (near shore) areas used by municipal fishers.

**LEGEND:** 0

1. Navotas Fish Port Complex (NFPC), Metro Manila
2. Iloilo Fish Port Complex (IFPC), Iloilo City, Iloilo
3. Zamboanga Fish Port Complex (ZFPC), Sangali, Zamboanga City
4. Lucena Fish Port Complex (LFPC), Lucena City, Quezon
5. Davao Fish Port Complex (DFPC), Davao, Toril District, Davao del Sur
6. Gen. Santos Fish Port Complex (GSFPC), Tumbler, Gen. Santos City
7. Camaligan Fish Port (CFP), Naga City, Camarines, Sur
8. Sual Fish Port (SFP), Pangasinan



Figure 5. The names and location of the eight (8) Regional Fish Ports in the Philippines (PFDA, 2015)

Despite the existence of these fish ports, majority of the fishers still have limited access even to simple ice making / plant facilities. For example, only 2 out of 23 (or 8.7%) government owned ice making facilities managed by LGUs still remain operational. Only 11 out of 27 (or 41%) government-owned ice making facilities managed by the government are operational, 9 of which have been on lease to some private individuals / groups while 2 are being managed by ARMM. For ice storage facilities, only 11 out of 43 (or 26%) facilities are owned by the government are operational and these are either managed by the LGUs or on-lease to private groups/individuals. Table 1 provides a summary of all refrigeration and ice plant facilities housed at the regional fish ports and their most recent status (PFDA, 2015)



1. Alfonso, Ifugao (Bgy. Sto. Domingo)	
2. Lingayen, Pangasinan (Bgy. Poblacion)	
3. Sta. Ana, Cagayan (Bgy. San Vicente)	
4. Sto. Tomas, La Union (Brgy. Damortis)	
5. Basco, Batanes (Bgy. Poblacion)	
6. Sabtang, Batanes (Bgy. Savidug)	
7. Sabtang, Batanes (Bgy. Sumnanga)	
8. Madella, Quirino (Bgys. Lusod & Manglad)	
9. Madella, Quirino (Bgys. Villa Ylanan & Div. Norte)	
10. Nagtipunan, Quirino (Bgys. Pob. & San Ramos)	
11. Abucay, Bataan (Bgy. Wawa)	
12. Bagac, Bataan (Bgy. Pag-asa)	
13. Orani, Bataan (Bgy. Pantalan Bago)	
14. Malolos City, Bulacan (Bgy. Panasahan)	
15. Malolos City, Bulacan (Bgy. Pamarawan)	
16. Obando, Bulacan (Bgy. Paliwas)	
17. Olangapo City, Zambales (Bgy. Banicain)	
18. Masantol, Pampanga (Bgy. Bebe Anac)	
19. Baler, Aurora (Bgy. Zabali)	
20. Las, Pinaas, Metro Manila (Bgy. Pulang Lupa)	
21. Infanta, Quezon (Bgy. Dinahican)	
22. Atimonan, Quezon (Bgy. Poblacion)	
23. Guinayangan, Quezon (Bgy. Poblacion)	
24. Pitogo, Quezon (Bgy. Dulong Bayan)	
25. Mulanay, Quezon (Bgy. Poblacion)	
26. Quezon, Palawan (Bgy. Poblacion)	
27. Puerto Princesa, Palawan (Bgy. Matahimik)	
28. Cardona, Rizal (Bgy. Looc)	
29. Rosario, Cavite (Bgy. Pandawan)	
30. Calatrava, Romblon (Bgy. Poblacion)	
31. San Jose, Occidental Mindoro (Bgy. Caminawit)	
32. Bulalacao, Oriental Mindoro (Bgy. Poblacion)	
33. Torrijos, Marinduque (Bgy. Suha)	
34. Calatrava, Romblon (Brgy. Poblacion)	
35. Tabaco, Albay (Bgy. Fatima)	
36. Tabaco, Albay (Bgy. San Roque)	
37. Pilar, Sorsogon (Bgy. Poblacion)	
38. Bulan, Sorsogon (Bgy. Zone 4)	
39. Castilla, Sorsogon (Bgy. Macalaya)	
40. Castilla, Sorsogon (Bgy. Poblacion)	
41. Casiguran, Sorsogon (Bgy. Central)	
42. Mercedes, Camarines Norte	
43. Capalonga, Camarines Sur (Brgy. Catioan)	
44. Carles, Iloilo (Brgy. Bancal) - Phase 1&2	
45. Carles, Iloilo (Bgy. Poblacion)	

**LEGEND:**  
 Jointly-Managed by PFDA & LGU:  
 Infanta, Quezon (Bgy. Sto. Dinahican)  
 Turned-over to LGUs:

46. Concepcion, Iloilo (Bgy. Poblacion)
47. Guimbal, Iloilo (Bgy. Gerona)
48. South Oton, Iloilo (Bgy. Poblacion)
49. San Jose de Buenavista, Antique (brgy Zone 4)
50. Ivisan, Capiz (Bgy. Basiao-Phase1)
51. Pilar, Capiz (Bgy. Poblacion)
52. Roxas, Capiz (Bgy. Libas)
53. Sapián, Capiz (Bgy. Poblacion)
54. Himamaylan, Negros Occidental (Bgy. Aguisan)
55. Basay, Negros Oriental (Bgy. Poblacion)
56. Tacloban City, Leyte (Bgy. 37)
57. Candijay, Bohol (Bgy. Cogtong)
58. Dimiao, Bohol (Bgy. Poblacion)
59. Guindulman, Bohol (Bgy. Poblacion)
60. Jagna, Bohol (Bgy. Bunga Mar)
61. Loay, Bohol (Bgy. Poblacion)
62. Loboc, Bohol (Bgy. Villaflores)
63. Mabini, Bohol (Bgy. Baybayon)
64. Tagbilaran City, Bohol (Bgy. Manga)
65. Valencia, Bohol (Bgy. Canmanico)
66. Minglanilla, Cebu (Bgy. Tulay)
67. Daanbantayan, Cebu (Bgy. Poblacion)
68. Danao City, Cebu (Bgy. Poblacion)
69. Talisay, Cebu (Bgy. Tanke)
70. Carrigara, Leyte (Bgy. Poblacion)
71. Machoron, Southern Leyte (Bgy. Ichon)
72. Allen, Northern Samar (Bgy. Kinabranan)
73. Guiuan, Eastern Samar (Bgy. 6)
74. Daran, Western Samar (Bgy. Poblacion)
75. Dipolog, Zamboanga del Norte (Bgy. Barra)
76. Dapitan, Zamboanga del Norte (Bgy. Bagting)
77. Tukuran, Zamboanga del Sur (Bgy. Sn. Carlos)
78. Vincenzo Sagun, Zambo. del Sur (Bgy. Labatan)
79. Catarman, Camiguin (Bgy. Lawigan)
80. Jasaan, Misamis Oriental (Bgy. Kimaya)
81. Barobo, Surigao del Sur (Bgy. Wakat)
82. Maimbung, Sulu (Bgy. Poblacion)
83. Jolo, Sulu (Cerrantes St.)
84. Maluso, Basilan (Shipyard Port Holland)
85. Lamitan City, Basilan (Bgy. Kulay Bato)
86. Ganassi, Lanao del Sur (Brgy. Pamalian)



Figure 6. The names and location of the LGU-managed municipal fish ports in the Philippines (PFDA, 2015)

### ***Has the competitiveness of fish and fishery products been increased?***

Although it is difficult to quantitatively assess the competitiveness of Philippine fish and fishery products both in the local and export markets, the following assessment tries to look at this competitiveness in terms of the trends of the degree of utilization of the top eight (8) commodities, the existence of traditional and value added products in the market, the evolution of products in terms of packaging materials and methods used, and the trends in the utilization of fish processing waste in the country.

Most recent data from the Philippine Statistics Authority (PSA, 2015) reveal the degree of utilization of milkfish, tilapia, shrimps, tuna, roundscad, crabs, mussels and oyster, in terms of distribution of the gross supplies of these commodities as the amounts utilized in processing, exports, feeds/waste, and net food disposable. These data are shown in Figures 7a-7h.

Table 1. Status of refrigeration and ice plant facilities housed at the regional fish ports, including their capacities (PFDA, 2015)

FISH PORT	REFRIGERATION FACILITY				TOTAL	Ice Plant, MT/day	STATUS
	Cold Storage, MT	Contact Plate Freezer, Kg.	TOTAL	Blast Freezer			
1. Davao Fish Port Complex	80	270		-		30	still operational
		270		-			still operational
		400	940	-			still operational
2. Gen.Santos Fish Port Complex	1,500	250				60	still operational
		250					still operational
		250					still operational
		250	1,000	3,500	3,500		still operational
	1,500	400					still operational
		400					still operational
		400					still operational
		400	1,600	3,500	7,000		still operational
3. Zamboanga Fish Port Complex	250	1000				35	still operational
		1000					still operational
		1000					still operational
		1000					still operational
		1000	5,000	5,000	5,000		still operational
4. Sual Fishport Complex	210			-		15	still operational
		1000		-			not operational
		1000	2,000				not operational
5. Camaligan Fish Port Complex	65	400		-		15	still operational
		400		-			still operational
		400		-			still operational
		1000	2,200	-			still operational
6. Lucena Fish Port Complex	100	-		-		25	still operational
		-		-			still operational
		-		-			still operational
7. Iloilo Fish Port Complex	250					100	still operational
		600					not operational

Table 2 provides a summary of the average percent (%) distribution of the gross supply of the eight commodities from 2006 to 2014. Briefly, these data indicate the following: (a) mostly milkfish, roundskad and tuna which are processed as human foods; (b) tuna, shrimps, and crabs which are exported; (c) milkfish, tilapia, roundskad, oysters and mussels which are mostly consumed locally; and (d) feeds and waste only account to 1.45 – 3.00% of the gross supply of the 8 commodities. Interestingly, all other available information (including the Philippine Development Plan , PDP 2015) on the percent post harvest losses in the country give the value of 25%.

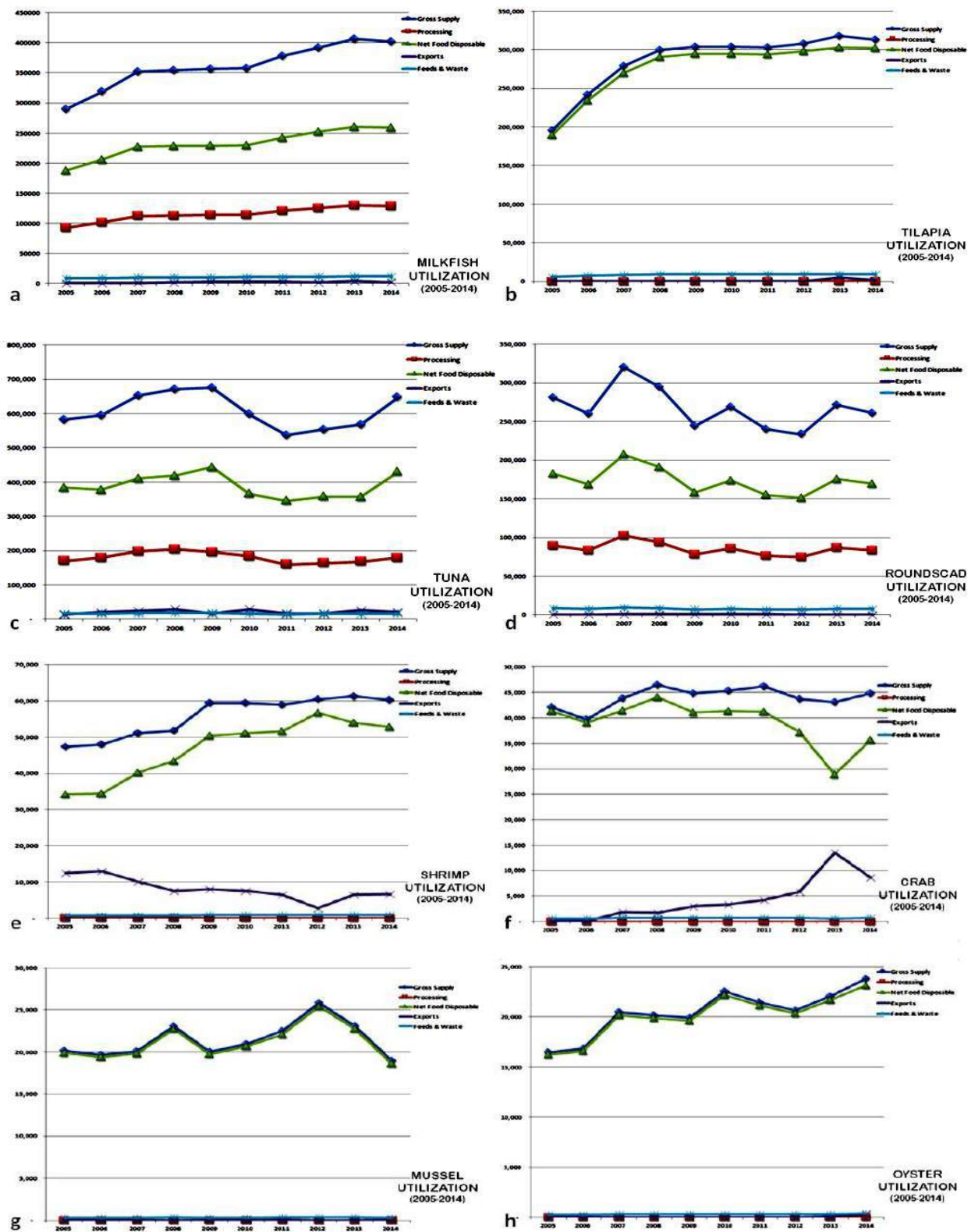


Figure 7 (a-h). Percent distribution of the gross supplies of eight (8) different commodities, from 2004 to 2014 (Data source: PSA, 2015)



Table 2. Average percent distribution of the gross supply of the eight commodities from 2005 to 2014.

COMMODITIES	Exports	Feeds & Waste	Processing	Net Food Disposable
Milkfish	0.65	3.00	31.99	64.37
Roundscad	0.20	3.00	31.97	64.83
Tilapia	0.30	3.00	0.00	97.73
Tuna	3.55	2.78	29.63	64.04
Crab	9.61	1.50	0.00	88.89
Shrimp	14.55	1.45	0.00	84.00
Mussel	0.11	1.49	0.00	98.40
Oyster	0.22	1.50	0.00	98.28

In terms of fishery products that are being produced in the Philippines, consumers have been witnessing an increasing number and variety of value added fishery products available in the market. However, there is still no comprehensive inventory of available traditional and value added fishery products available in the local market. For the export market, there is now a total of twenty (20) commodities (excluding aquatic plants), in around seventy (70) varied forms that are now being exported to other countries. However, the major fish and fishery product exports remain to be yellowfin tuna, skipjack tuna, canned tuna, shrimps and crabs.

Despite the presence of rules and regulations related to food safety in the country, some of our fish and fishery products have been experiencing export refusals and detentions (BFAR 2015). Interestingly, cases of refusal and detention of Philippine fishery products in the export market due to varied reasons have been decreasing recently (Table 3).

Table 3. Most common reasons for export refusal/detention of Philippine fish and fishery products (Data from BFAR, 2015)

YEAR	REASONS	# of cases	% (dec/inc)
2011	1. Filthy/ Decomposed substance/adulteration 2. <i>Salmonella</i>	115	
2012	1. Unsanitary manufacturing practices 2. Filthy/ Decomposed substance/ adulteration	123	6.96%
2013	1. Needs compliance to regulations of importing countries 2. Filthy/ Decomposed substance/ adulteration	75	-39.02 %
2014	1. Unsanitary manufacturing practices 2. Filthy/ Decomposed substance/ adulteration 3. Nitrofurans	59	-21.33 %
2015	1. Filthy/ Decomposed substance/ adulteration	25	-57.63%



In addition to the locally produced fishery products, Filipino consumers have recently been witnessing an influx of imported products from different countries all over the world. Although it is good for our consumers to get exposed to these products, there is now a very serious concern on the effect of the presence of these products to local manufacturers. Considering the existing strict rules and regulations in other countries for our export products and the limited control of the entry of imported products in the Philippine market, coupled with the incentives being given to these imported goods, the playing field is not at all balanced, for it puts the local players in a very disadvantageous position.

In terms of packaging of Philippine fishery products, this area requires serious attention. Although some of our products are packaged and presented well, majority of these products need further improvement in terms of packaging and labelling so as to increase their competitiveness in the market.

Another way of increasing the competitiveness of Philippine fishery products is via the production of new and varied forms of product through utilization of processing waste. This does not only increase the variety of available products in the market, it is also beneficial to the manufacturers (*i.e.* increased income via zero waste approach), and to the environment as well (*i.e.* less solid and water waste disposal to the environ). Presently, there has been an increasing trend in the utilization of fishery by-products and processing wastes in the Philippine and elsewhere. The following products now exist in the market: (a) health promoting substances that include polyunsaturated fatty acids (PUFAs) that are found in fish livers, tuna heads and eyeballs, pond-cultured milkfish eyeballs, heads and livers, and surimi processing wastes; (b) dietary supplements that include calcium from the backbones, fins, and offals of several fish species; (c) fish protein concentrates that are extracted from different fish species and are used as dietary supplements in human and animal foods; (d) shrimp flavor concentrate from shrimp heads that are dried and processed and are used as base for the commercially available shrimp flavours sold either as cubes or bouillon or as powdered additive; and (e) human foods and supplements as a source of fats and protein (*e.g.* skin cracklings from tuna and tilapia skins), calcium source from dried marinated fish bones, and antioxidant source (*e.g.* fish sauce, fish paste).

In summary, although there have been improvements in Philippine fish and fishery products, efforts must still be exerted to make majority of these products compete domestically and internationally.

## **EXISTING POLICY AND REGULATORY FRAMEWORK FOR PHILIPPINE POST HARVEST FISHERIES**

### ***National Regulations***

Table 4 presents a list of national regulations that present govern the post harvest fisheries sub sector of the Philippines, while Table 5 provides a list of Fisheries Administrative Orders issued by the Bureau of Fisheries and Aquatic Resources.

Table 4. List of Republic Acts (RA), Presidential Decrees (PD), Department of Agriculture Administrative Order (DA - AO), Department of Health Administrative Order (DOH-AO), BFAR Administrative Circular (BFAR-AC), related to Post Harvest Fisheries

RA /PD /AC	Year	Title
RA No. 8550	1998	Philippine Fisheries Code of 1998
RA No. 7394	1991	The Consumers Act of the Philippines of 1991
RA No. 10611	2013	Food Safety Act of 2013
RA No. 10654	2015	An Act to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing
PD No. 856	1946	Sanitation Code of the Philippines
DA AO No. 23	2011	Mandatory Accreditation of Cold Storage Warehouses
DOH AO No. 153	2004	Revised Guidelines on Good Manufacturing Practice in Manufacturing, Packing, Repacking or Holding Food
BFAR AC No. 251	2014	Traceability System for Fish and Fishery Products

Table 5. List of fisheries post harvest-related FISHERIES ADMINISTRATIVE ORDERS (FAO), pursuant to the provision of the Republic Act No. 8550 (or the Philippine Fisheries Code of 1998).

FAO No.	Year of Implementation	Title
FAO No. 195	1999	Rules and Regulations Governing Importation of Fresh Chilled / Frozen Fish and Fishery Aquatic Products
FAO No. 199	2000	Guidelines on Fish Transshipment
FAO No. 209	2001	Guidelines on the Production, Harvesting, Handling, and Transp. of Shellfish for Implementation of the Local Government
FAO No. 210	2001	Rules and Regulations on the Exportation of Fresh, Chilled, or Frozen Fish and Fishery/ Aquatic Products
FAO No. 211	2001	Requirements for Pre-Processing and Processing Plants the SSOP thereof and the Processing and Quality Requirements for Shellfish
FAO No. 212	2001	Guidelines on the Implementation of HACCP System
FAO No. 213	2001	Establishment and Maintenance of BFAR's Quality Control Laboratories and Collection of Fees and Charges for Examination Services
FAO No. 227	2008	Rules and Regulations Governing the Export of Fish and Aquatic Products to European Union Member Countries
FAO No. 228	2008	Rules Governing the Organization and Implementation of Official Controls on Fishery and Aquatic Products Intended for Export to the EU Market for Human Consumption

### ***Accreditation and Certification of Post Harvest Fisheries Establishments***

Department of Agriculture (DA) Administrative Order (AO) No. 23, series of 2011, requires a mandatory accreditation of all cold storage warehouses for all agricultural and fisheries products in the Philippines. Pursuant to the AO, Table 6 shows the number of accredited cold storage establishments in the Philippines (as of 31 October 2015). The geographical distribution of these establishments is as follows: Luzon has 159 out of 239 (or 66.53%) accredited establishments; Visayas has 36 (or 15.06%); and Mindanao has 44 out of 239 (or 18.41%). It must be noted here that the said AO from DA came only in 2011 or five (5) years after the release of the CNFIDP of 2006.

In terms of BFAR approved fishery establishments, Table 6 indicates that these established are geographically distributed as follows: Luzon has 45 out of 95 (or 47.36%) approved establishments; Visayas has 18 (or 18.95%); and Mindanao has 32 (or 33.68%). BFAR approval of these establishments started only recently.

Table 6. Number of accredited/recognized cold storage / fishery establishments in the Philippines, per region (as of 31 October 2015)

REGION	Number of Accredited Cold Storage Establishments	Number of BFAR Approved Establishments	Number of GMP Recognized Establishments	Number of EU Approved Establishments	Number of Halal Approved Establishments
1	8	1	0	1	1
2	1	4	1	0	nd
3	22	0	3	1	2
4a	28	32	5	14	10
4b	2	7	11	1	nd
5	6	1	5	0	nd
6	8	7	2	0	0
7	22	10	3	2	2
8	6	1	2	0	nd
9	6	17	16	11	11
10	9	1	0	1	nd
11	12	3	0	0	nd
12	14	9	12	21	3
13	3	2	0	0	nd
NCR	92	0	0	0	nd
ARMM	0	0	0	0	nd
CAR	0	0	0	0	nd
<b>TOTAL</b>	<b>239</b>	<b>95</b>	<b>60</b>	<b>52</b>	<b>29</b>

Reports on Good Manufacturing Practices (GMP) recognized fishery establishments, as of 31 October 2015 (Table 6) indicate the geographical distribution of these establishments include the following: Luzon has 25 out of 60 (or 41.67%) recognized establishments; Visayas has 17 (or 11.67%); and Mindanao has 28 (or 46.67%). Recognition of fishery establishments all over the country on their adherence to GMP provisions started after the implementation of CNFIDP in 2006.

For European Union (EU) approved establishments in the country, the total number reached 52 (Table 6), as of 31 October 2015, and these are geographically distributed in Luzon (17 out of 52 or 32.69% EU approved establishments), in Visayas (2 or 3.84%) and in Mindanao (33 or 63.46%). The inspection and approval of fishery establishments for exportation to the EU started even before the CNFIDP of 2006. On the other hand, the total number of EU Approved Fishing/Freezer Vessels in the country is 78, as of 31 October 2015.

For Halal approved establishments, the total number recently reached 29 (Table 6), as of 31 October 2015, and these are geographically distributed in Luzon (13 out of 29 or 44.83% Halal approved establishments), in Visayas (2 or 6.90%) and in Mindanao (14 or 48.28%).

BFAR now has a total of 17 Fish Inspection Units located all over the country, with 1 ISO 17020 certified regional fish inspection unit (also called the Central FIU).

### ***Philippine National Standards***

Table 7 shows the existing Philippine National Standards (PNS) for fish and fishery products in the Philippines. Quite noticeable here is the significant increase in the number of PNS from 2006, with a single PNS on “Code of Hygienic Practice for the Sale of Fresh Agriculture and Fishery Products in Markets and Authorized Outlet” to a total of eighteen (18) PNS at present.

### ***Existing Testing Laboratories***

BFAR has existing testing laboratories in different parts of the country. As shown in Figure 8, these laboratories are found in the Manila South Harbor, Quezon City, Iloilo City, Cebu City, Zamboanga City, South Cotabato and 2 in General Santos City.

These laboratories may not be enough to cater to the needs of the seafood processors of the country. Although other testing laboratories under the Department of Science and Technology and some private colleges and universities exist, their accessibility to some areas in the country might still pose a challenge.

At present, despite the presence of these testing laboratories, other strategically located testing laboratories might have to be put up. However, careful planning must be done in order to make these laboratories at par with their counterparts in other countries.

Table 7. List of Philippine National Standards for Fish and Fishery Products, as of 31 October 2015 (*Source: BAFPS 2015*)

	PNS/BAFPS Number	Description
1	PNS/BAFPS 46:2006 ICS 67.020	Code of Hygienic Practice for the Sale of Fresh Agriculture and Fishery Products in Markets and Authorized Outlet
2	PNS/BAFPS 66:2008 ICS 67.120.30	Frozen Milkfish
3	PNS/BAFPS 67:2008 ICS 67.120.30	Frozen Tilapia
4	PNS/BAFPS 68:2008 ICS 67.120.30	Dried Danggit
5	PNS/BAFPS 69:2008 ICS 67.120.30	Quick Frozen Raw Squid
6	PNS/BAFPS 70:2008 ICS 67.120.30	Quick Frozen Shrimp or Prawns
7	PNS/BAFPS 71:2008 ICS 67.120.30	Quick Frozen Finfish, Uneviscerated and Eviscerated
8	PNS/BAFPS 72:2009 ICS 67.120.30	Live, Chilled/Frozen Abalone
9	PNS/BAFPS 73:2009 ICS 67.120.30	Live, Chilled/Frozen Grouper
10	PNS/BAFPS 85:2012 ICS 67.120.30	Dried Raw Seaweed – Specification
11	PNS/BAFPS 89:2011 ICS 67.120.30	Live and Raw Bivalve Molluscs
12	PNS/BAFPS 90:2011 ICS 67.120.30	Quick Frozen Fish Fillets
13	PNS/BAFPS 91:2011 ICS 67.120.30	Quick Frozen Lobsters
14	PNS/BAFPS 101:2011 ICS 67.020	Halal Agriculture and Fishery Products
15	PNS/BAFPS 128:2013 ICS 67.120.30	Dried Sea Cucumber
16	PNS/BAFPS 136:2014 ICS 67.120.30	Fresh and Frozen Cephalopods
17	PNS/BAFPS 137:2014 ICS 67.120.30	Fresh-chilled and Fresh-frozen Tuna for Sashimi
18	PNS/BAFPS 138:2014 ICS 67.120.30	Fresh-chilled, Fresh-frozen and Treated Tuna

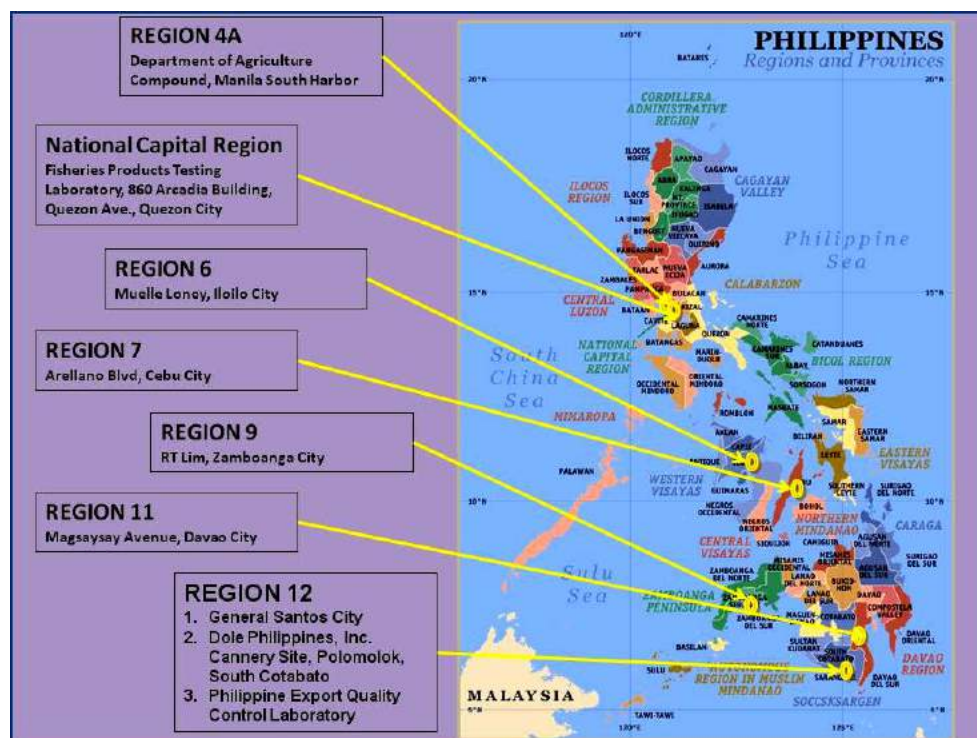


Figure 8. Locations of the BFAR Testing Laboratories in the Philippines (as of 31 October 2015)

## STATUS OF POST HARVEST FISHERIES RESEARCH

An inventory of the different post harvest research activities was conducted in 2006 (Yap 2006). Aimed at determining the trends in post harvest fisheries research in the country, a total of 216 researches were inventoried from eleven (11) research and academic institutions in the country. These researchers surveyed included those conducted from 1975 until 2005 or over a span of thirty (30) years.

Results of the survey show that ten (10) commodity groups are the main focus of researches during the period (Figure 9). The top five (5) commodities include milkfish (18%), tuna (16%), small pelagics (16%), shrimps (13%), and seaweeds (12%). The remaining commodity groups, namely mussel/oyster, tilapia, cephalopods, crabs, and carp, constitute the remaining 25% of the researches surveyed.

In terms of post harvest methodologies, 36 out of the 216 researches (or 17%) deal with raw material characterization while 24 (or 11%) are on waste utilization. Other research topics include the use of the different post harvest handling and processing techniques, value addition, and marketing (Figure 10).

The research period surveyed, when grouped into different time periods (1975 – 1979; 1980 – 1984; 1985 – 1989; 1990 – 1994; 1995 – 1999; and 2000 – 2006) indicate the increasing research activities that are related to raw material characterization, waste utilization and value addition (Figure 11). On the other hand, researches on traditional processing methodologies, such as drying, smoking, thermal processing, and marinading are on the decline.

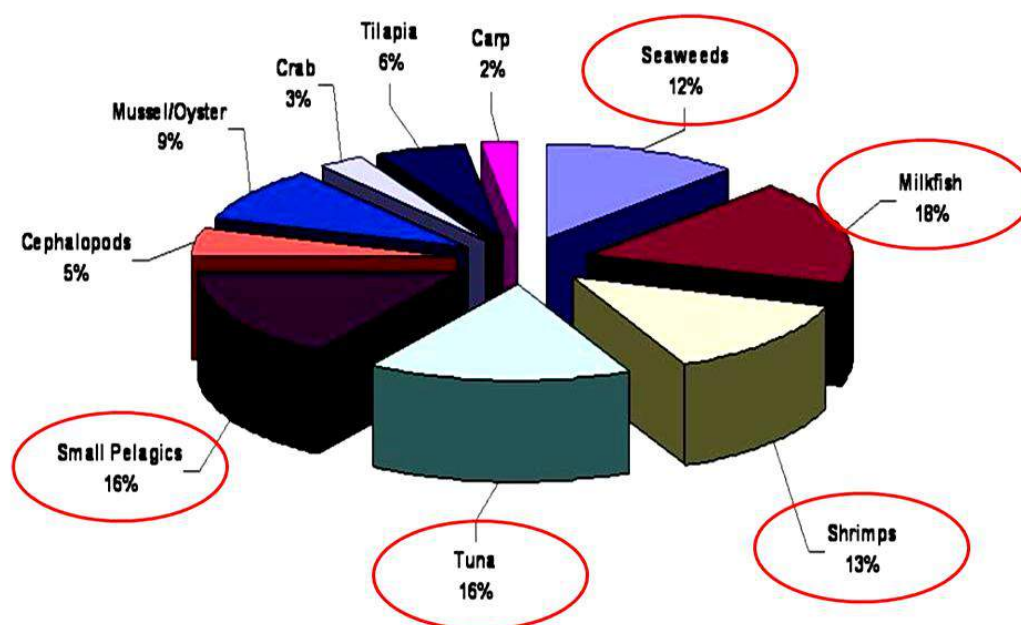


Figure 9. Researches on post harvest fisheries conducted from 1975 to 2006, using different fisheries commodities. Values expressed as percentages of the researches surveyed, n=216 (Yap, 2006)



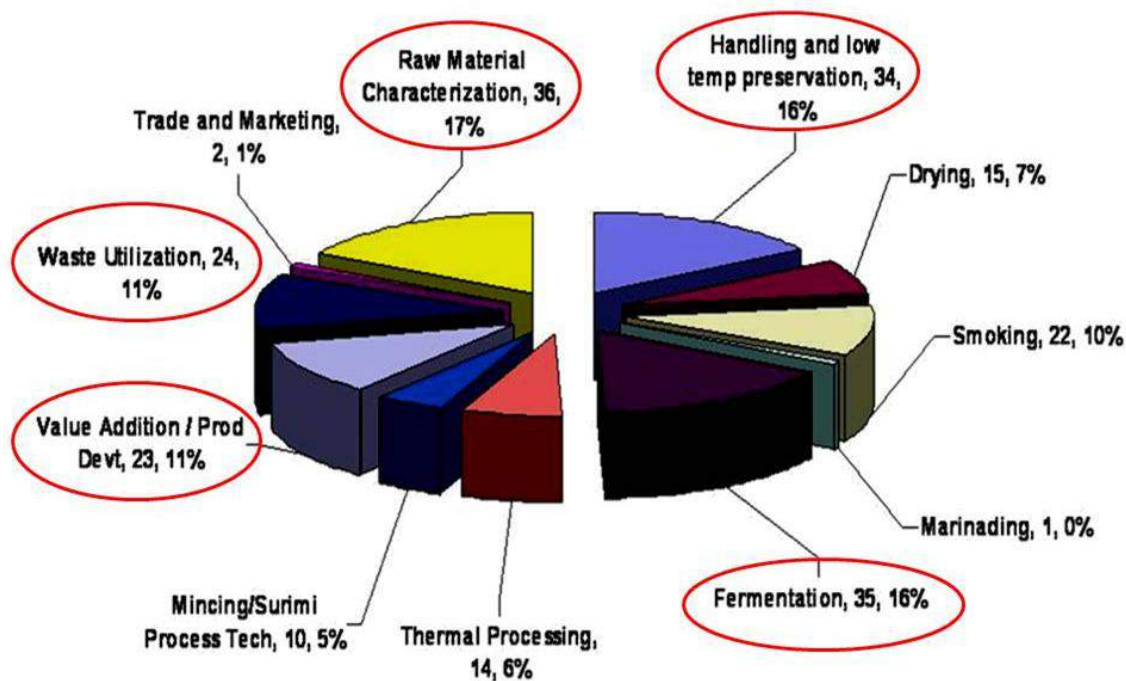


Figure 10. Researches on different postharvest handling and processing methodologies conducted from 1975 to 2006. Values expressed as percentages of the researches surveyed, n=216 (Yap, 2006)

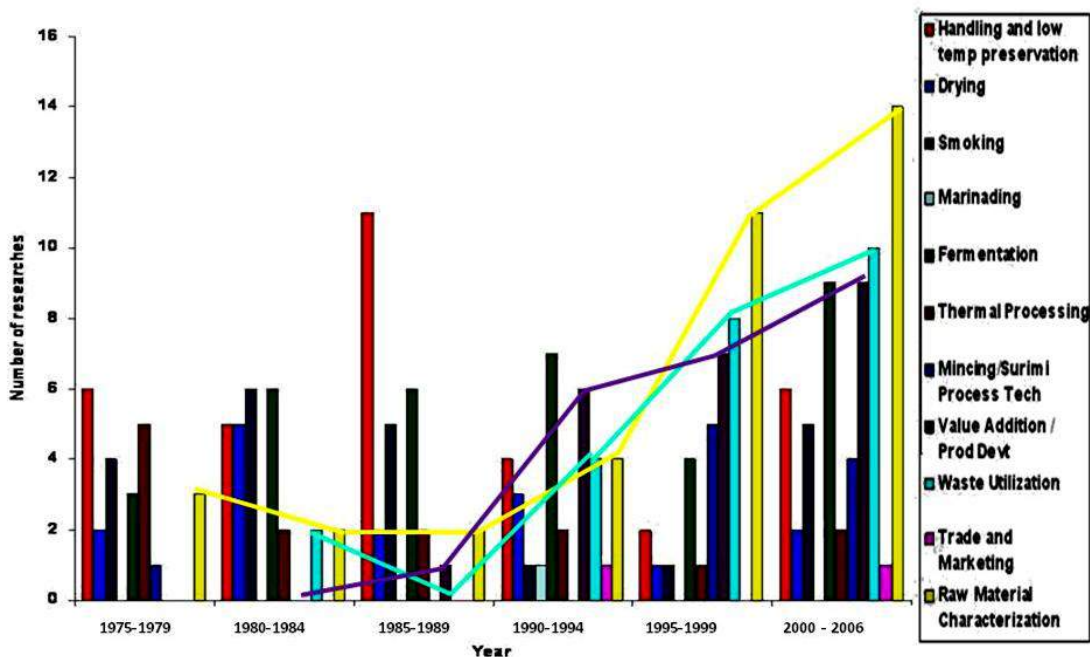


Figure 11. Researches conducted from 1975 to 2006, using different fisheries commodities, based on different time ranges. Values expressed as numbers of the researches surveyed, n=216 (Yap, 2006)

## TRAINING OF MANPOWER FOR PHILIPPINE FISHERIES

The development of the entire Philippine fisheries industry is highly dependent on the changes and development in the fisheries educational system. The industry needs a steady supply of the necessary manpower to sustain its activities. But with the current changes in the education landscape in the Philippines, there is now a need to strategize and to critically assess the status of, and trends in, the Philippine fisheries education system *vis-a-vis* the development in the entire educational system and the fisheries industry of the country.

There are two types of education in the Philippines (and elsewhere), the informal education which consists of short/long term skills training programs, demonstrations, seminars and workshops, and the formal education which includes the offering by higher education institutions (HEIs) of undergraduate and graduate degree programs.

### ***Informal Fisheries Education / Training***

The Bureau of Fisheries and Aquatic Resources, Post Harvest Fisheries Division had been consistently helping in the informal education of the stakeholders in the fisheries industry of the country, *via* the conduct of relevant meetings, skills trainings and workshops (Table 8), as well as technology demonstration activities (Table 9). Likewise, most of the state universities and colleges all over the country have been continuously conducting the same types of activities to different stakeholders.

Table 8. List of meetings, skills trainings and workshop that were conducted in 2014 by BFAR Post Harvest Fisheries Division (*Source: BFAR-PHF Division, 2015*)

Date	Topics Discussed	Place	# recipients (m/f)
January 8	Global Seafood Expo	Executive Rm., PCA Bldg.	58 (21m/37f) &
January 29			40(17m/23f)
February 13	Meeting with EU re: IUUF and Traces	BFAR Conf. Room	12(8m/4f)
February 18	Refresher Training Course Delegation on GMP and SSOP for Line Workers	Pacific Isles, Montalban, Rizal	34 (16m/18f)
March 23-29	HACCP and Food Safety Training	Bula, Camarines Sur	43 FPHD staff
April 21-22	National Workshop on Fisheries Post Harvest and Marketing Cluster 2	BFAR XI-Pinnacle Hotel, Davao City	35(5m/30f)
May 12-16	National Workshop on Fisheries Post Harvest and Marketing Cluster 1	BFAR V-Eurotel, Naga City	50(14m/36f)
June 17-20	Training on Trade Control and Expert System (TRACES)	Marco Polo Plaza, Cebu City	
July 15	Training on Trade Control and Expert System (TRACES) with Stakeholders	Ferzal Hotel	27(10m/27f)
September 23-26	Workshop on the Revision of Quality Manual System on the Certification of Fishery /Aquaculture Products and Establishments	Ferzal Hotel	30(15m/15f)
October 14	Seminar on Food Safety and Quality Assurance	BFAR Conf Rm.	55(12m/43f)

Table 9. List of technology demonstration activities conducted in 2014 by BFAR Post Harvest Fisheries Division (Source: BFAR-PHF Division, 2015)

Date	Topics Discussed	Place	No. of recipients (m/f)
February	Techno Demo on fish and seaweeds value added to On-the-Job-Training (OJT) students of Bicol University - Tabaco campus	FPHD Lab./tour HACCP certified plants	16(11m/5f)
February 10-11	Knifefish Value-Adding	Central Bay, Rizal	55(35m/20f)
Feb. 23-27	Capability Building Training on Fish Processing	Bongabong, Oriental Mindoro	56(6m/50f)
June 12	Techno-demo on post harvest fisheries 116 <sup>th</sup> Proclamation of Philippine Independence (Agri-Aqua Fair and Exhibits)	Luneta Grounds, Manila	96 (60m/36f)
September 10	Techno-demo on post harvest fisheries 207 <sup>th</sup> Tactical Helicopter Squadron –Philippine Air Force	Pasay City	17 (14M/3F)
September 25	Techno-demo on post harvest fisheries 2014 World Food Day Celebration	DA	31 (12m/19f)
October 11	Techno Demo on bottled milkfish for DA-AMA's Agrilink Fair & Exhibit	World Trade Center	63(14m/49f)

### **Formal Fisheries Education**

In terms of formal education, the Philippines has been witnessing a tremendous increase in the number of higher education institutions (HEIs), both private and public, for the past several years (Table 10), with several of them offering degree programs in fisheries and other related fields. However, the enrolment in these courses has been quite problematic in the past few years. This can be attributed to the presence of relatively high paying jobs outside the country that has led to the gravitation of students to the following five most popular disciplines in higher education, which generally represent over 75% of all enrolments: business administration and related disciplines, education and teacher training, engineering and technology, mathematics and computer science, and medical and allied disciplines. As shown in Figure 12 and Table 11, enrolments in the HEIs under the agriculture-fisheries programs are relative low (only 2.47%) as compared to other degree programs.

Table 10. Number of higher education institutions in the Philippines, both public and private, as of AY 2013-2014 (*Data Source: CHED 2015; from Yap, 2015*)

Type of Institutions	Number
<b>PUBLIC HIGHER EDUCATION INSTITUTIONS</b>	<b>224</b>
1. National university	1
2. State universities and colleges (SUCs)	112
3. CHED supervised institutions (CSIs)	1
4. Local universities and colleges (LUCs)	95
5. Other government schools (OGSs)	10
6. Special higher education institutions	5
<b>PRIVATE HIGHER EDUCATION INSTITUTIONS</b>	<b>1,699</b>
Non-sectarian	1,357
Sectarian	342
<b>TOTAL</b>	<b>1,923</b>

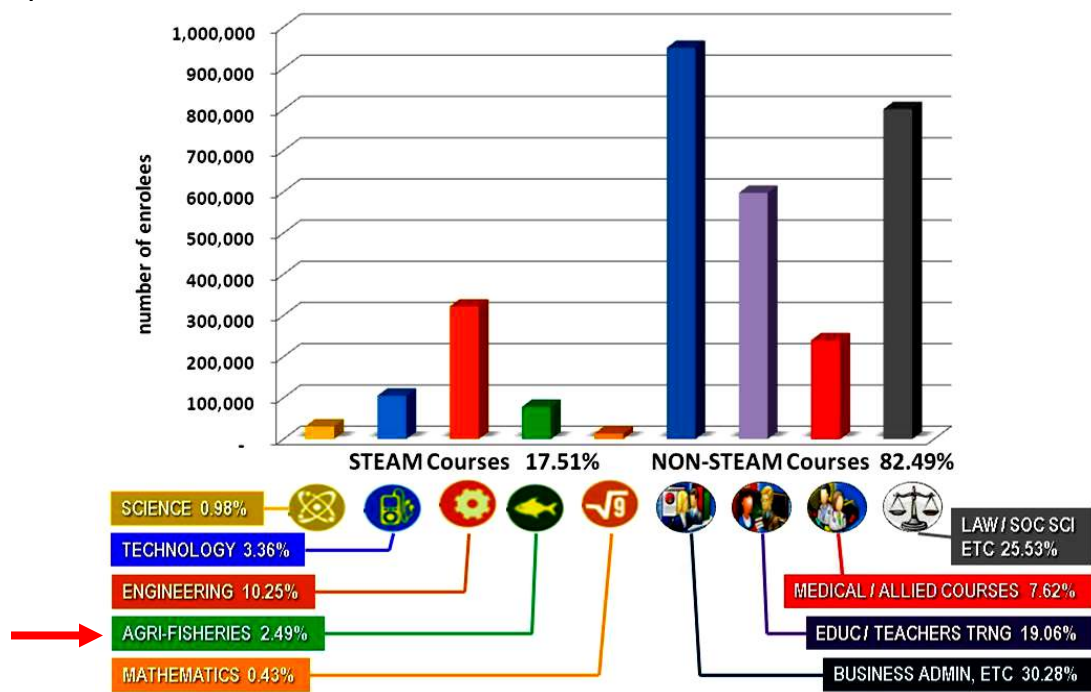


Figure 12. Number of enrollees (in percentage) in different degree courses at the different HEIs in the Philippines, as of AY 2013-2014 (*Data Source: CHED 2015; from Yap, 2015*)

Table 11. Undergraduate Student Enrolment in different degree courses at the different HEIs in the Philippines, as of AY 2013-2014 (*Data Source: CHED 2015; from Yap, 2015*)

Types of Programs	# of Students	Percent
<b>STEAM Programs</b>	<b>549,107</b>	<b>17.51%</b>
Science	30,673	0.98%
Technology	105,318	3.36%
Engineering	321,630	10.25%
<b>Agri-Fisheries</b>	<b>78,000</b>	<b>2.49%</b>
Mathematics	13,486	0.43%
<b>Non-STEAM Programs</b>	<b>2,587,217</b>	<b>82.49%</b>
Business Admin and related courses	949,545	30.28%
Education Science and Teacher Training	597,745	19.06%
Medical and Allied Courses	239,195	7.62%
Others (Law, Arts and Humanities, Social Science courses, etc)	800,732	25.53%

Enrolment in the Bachelor of Science in Fisheries degree program has been quite problematic in the last several years. Flores (2008) conducted a survey of a select number of fisheries schools in the country to determine the enrolment trends in these schools, among others. As shown in Figure 13, there has been an alarming decline in the enrolment, most likely due to the preference of students in pursuing more popular programs that have potentially have pay outside the country, such as BS Information Technology, BS Hotel and Restaurant Management, BS Nursing, and others (Flores 2008), or the inability of the fisheries industry to absorb and offer high pay to fisheries graduates.

However, more recent data reveal that the increasing number of enrollees in the BS Fish program at the College of Fisheries and Ocean Sciences, University of the Philippines Visayas (UPV-CFOS), as shown in Figure 14 (Yap 2015). Accordingly, this can be attributed to effort of UPV CFOS in encouraging students to pursue a BS Fish course, in finding employment for their graduates, and in encouraging them to pursue graduate studies.

As part of the quality assurance measures for the HEIs, accreditation and/or recognition of fisheries programs, among others, have been going on for the past several years. For example, in accordance with Section 66 of Republic Act (RA) No. 8435 otherwise known as the “Agriculture and Fisheries Modernization Act (AFMA) of 1997” that gives mandate to the Commission on Higher Education (CHED) in coordination with the Department of Agriculture (DA) and other government agencies to establish a National Agriculture and Fisheries Education System (NAFES), in 2009 onwards, CHED issued the names of the identified National Universities and Colleges of Agriculture and Fisheries (NUCAFs) and Provincial Institutes of Agriculture and Fisheries (PIAFs). These included fifteen (15) identified NUCFs and twenty seven (27) identified PIFs under NAFES (Table 12).

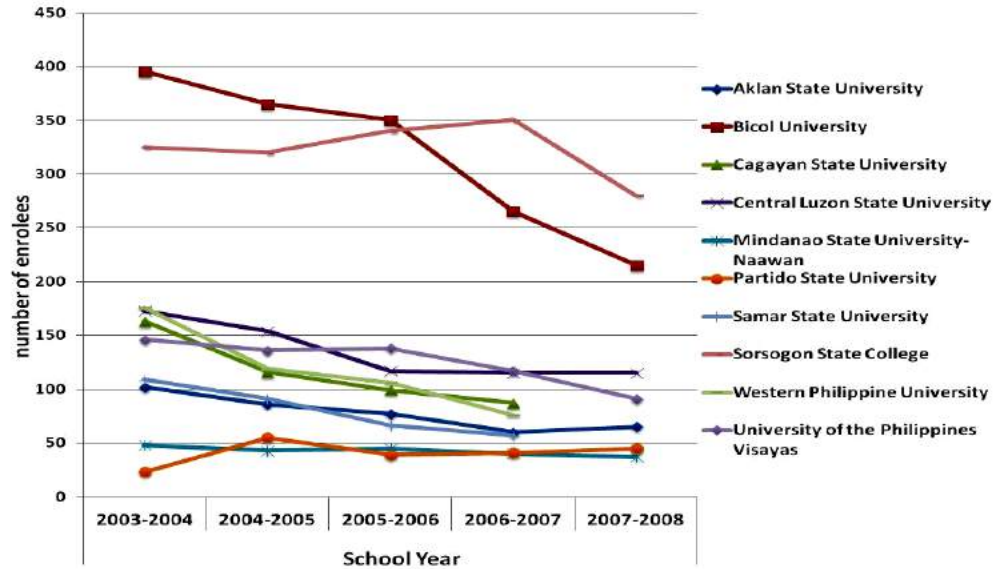


Figure 13. Enrolment trends in ten (10) select universities and colleges in the Philippines offering BS Fisheries program, from 2003 to 2008 (*Data Sources: Flores, 2008 and UPV-OUR, 2015; from Yap 2015*)

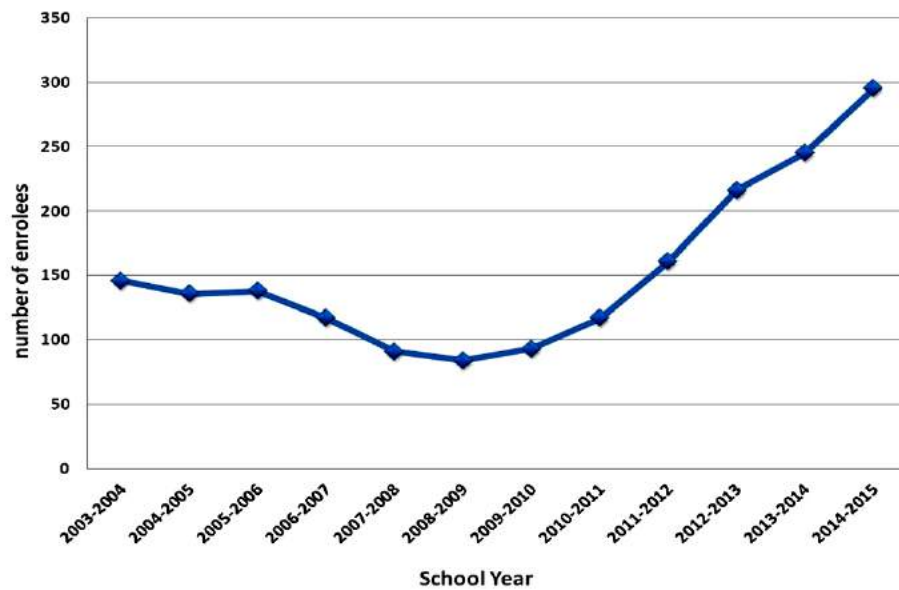


Figure 14. Enrolment in the BS Fisheries program at the University of the Philippines Visayas, from 2003 to 2014 (*Data Sources: UPV-OUR, 2015; from Yap 2015*)



Table 12. List of NAFES identified National Universities and Colleges of Fisheries (NUCFs) and Provincial Institutes of Fisheries (PIFs). (*Data Source: CHED 2015*)

Region	National Universities and Colleges of Fisheries (NUCFs)	Provincial Institutes of Fisheries (PIFs).
1	Mariano Marcos State University	Don Mariano Marcos Memorial State University Ilocos Sur Polytechnic State University Pangasinan State University - Binmaley
2	Cagayan State University - Aparri	Isabela State University – Roxas Nueva Viscaya State University
3	Central Luzon State University	
4-A	Cavite State University - Naic	Laguna State Polytechnic College Southern Luzon State University
4-B	Western Philippine University	Mindoro State College of Agriculture and Technology Romblon State College
5	Bicol University - Tabaco	Camarines Norte State College -Mercedes Partido State University - Sagnay Sorsogon State College
6	University of the Philippines Visayas	Iloilo State College of Fisheries Aklan State University Capiz State University Carlos C. Hilado Memorial School of Fisheries Polytechnic State College of Antique
7	Cebu Polytechnic University	Central Visayas State College of Agriculture, Forestry and Technology
8	Visayas State University - Tolosa	Eastern Visayas State University - Carigara Naval Institute of Technology Samar State University – Mercedes Southern Leyte State University – Bontoc University of Eastern Philippines
9	Zamboanga State College of Marine Science and Technology	
10	Mindanao State University - Naawan	
11	Davao Del Norte State College	Southern Philippines Agriculture, Business, Marine and Aquatic School of Technology
12	Mindanao State University – General Santos	University of Southern Mindanao
ARMM	Mindanao State University – Tawi-tawi	Mindanao State University - Marawi
CARAGA	Surigao Del Sur Polytechnic State College	Surigao State College of Technology

In terms of fisheries curricular programs in the different Philippine HEIs, it has been historically evolving due to the heavy influence of the changes in the fisheries industry of the country. The very first formal fisheries education that was introduced in 1927 at the UP College of Agriculture, and eventually, the Bachelor of Science in Fisheries in UP Manila in 1936 were both oriented toward fisheries management and

research and were highly influenced by US-educated scientists (see Juliano 2005 and references therein). However, when the need for increased fisheries production after World War 2 became apparent, fisheries education shifted to producing vocational, skilled manpower for the industry through the establishment in 1947 by the Bureau of Fisheries established the School of Fisheries in Navotas, Rizal which offered a two and a half year Certificate in Fisheries program with three majors – fish capture, fish culture and fish preservation. After which, other schools were established in different provinces, with the School of Fisheries in Navotas renamed as the Philippine Institute of Fisheries Technology (PIFT). Such shift to informal fisheries education necessitated the temporary freezing / suspension of the BS Fisheries program in UP in 1948 due to low enrolment.

Years after, despite this focus on informal fisheries education, the PIFT in Navotas, Rizal was transferred to UP Diliman in 1957, and hereon served as the UP College of Fisheries (now UP Visayas College of Fisheries and Ocean Sciences or UPV CFOS, located in Miagao, Iloilo) with a new BS Fisheries curricular program developed with four majors – Marine Fisheries, Inland Fisheries, Fish Processing Technology and Fisheries Education. The administration of the other PIFTs offering fisheries vocational high schools was transferred to the Department of Education.

The focus on informal fisheries education in the different provinces persisted until 1978 when more fisheries schools were established and the existing fisheries high schools were elevated into state colleges, state universities or polytechnic colleges. This development could have been due to the need for higher level fisheries training, maybe because depletion of the fisheries resources of the country at that time became evident (Juliano 2005). Such strengthening of the fisheries curricular programs included the offering in 1980 of the then President Ferdinand E. Marcos Scholarship Program in Fisheries to deserving students from the different regions of the country and the institution of more post graduate degree programs in fisheries.

In the early 2000, the UPV CFOS pioneered the shifting from a BS Fish program with majors (Marine Fisheries, Inland Fisheries, Fish Processing Technology and Fisheries Business Management) to the BS Fish without majors. This was based on the need of the industry at that time for more fisheries graduates who are generalists and also due to the focus on graduate programs that make students more specialists. This was followed by the issuance of CHED Memorandum Order (CMO) No. 43, series of 2003 that requires all BS Fisheries programs to have generalist curricular programs. In the most recent years, directives from CHED to design all curricular programs using the Outcome Based Education (OBE) system necessitated the review of all fisheries curricular programs and their transformation into their respective OBDized version.

Strengthening of the fisheries curricular program in the country became so important in view of the professionalization of fisheries graduate *via* a licensure examination. Since the first conduct of the said licensure examination in 2003, results have been quite discouraging. As shown in Table 13, except for the UPV CFOS, all other fisheries schools have an average passing percentage of less than 50%. Interestingly, in the 2015 licensure examination, three schools (with 20 or more examinees) obtained higher than 50% passing percentage (94.87% for UPV CFOS, 91.30% for Western Philippine University, and 56.00% for Central Luzon State University).

Table 13. Summary of results of the Fisheries Technologists Licensure Examination, from 2003 to 2010, of HEIs with total number of examinees of 50 graduates or more during the period. (Source: Juliano et al. 2011)

Name of HEIs	Number of Examinees	Number of Passers	Percent Passing
<b>University of the Philippines Visayas</b>	<b>164</b>	<b>150</b>	<b>91.46</b>
Central Luzon State University	186	88	47.31
Bicol University	146	20	13.10
Cagayan State University	67	17	25.37
Pangasinan State University	50	14	28.00

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# **STATE OF FISHERIES TRADE AND MARKETING IN THE PHILIPPINES**

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# **STATUS OF PHILIPPINE FISHERIES TRADE AND MARKETING**

**Encarnacion Emilia S. Yap and Amor G. Diaz**

*Post Harvest Specialists*

## **INTRODUCTION**

The Comprehensive National Fisheries Industry Development Plan (CNFIDP) of 2006 provides an in depth assessment of the condition of the Philippine fisheries resources and the fisheries industry, with a comprehensive report of the status and trends of the different sub-sectors of the industry (Chapter 2, section 2.5), as well as the interrelated core problems that plague the entire industry. One of these core problems is the uncompetitiveness of fish and fishery products both in the domestic and global markets. Accordingly, such uncompetitiveness may be attributed, among others, to the weak marketing strategies for Philippine fish and fishery products.

In Chapter 4 of the CNFIDP of 2006, the different mid-term priority plans and projects for the different sectors are specified. For the post harvest component of the plan, only one project is specifically focused on trade and marketing, *i.e.* the project on marketing and promotion of fish and other aquatic products.

Ten (10) years after the release of the CNFIDP of 2006, it is interesting to come up with an assessment, specifically of the status and trends in fisheries trade and marketing in the country, in order to highlight its importance in enhancing the competitiveness of our fishery commodities both in the domestic and global markets.

## **RECENT STATUS AND TRENDS IN FISHERIES TRADE AND MARKETING IN THE PHILIPPINES**

Trade and marketing play a critical role in the entire supply chain of all fishery commodities. These include all activities that lead to the sale of commodities at different stages – from the culture or capture of any commodity up to their sale either as raw material or as semi processed or processed goods. As shown in Figure 1, trading and marketing activities are done in almost all of the stages in any aquaculture supply chain, from the input supply to aquaculture facilities until the end processed products are distributed in the different markets, both domestically and globally. The same observation can be said with the supply chain for fishes captured from the wild (Figure 2).

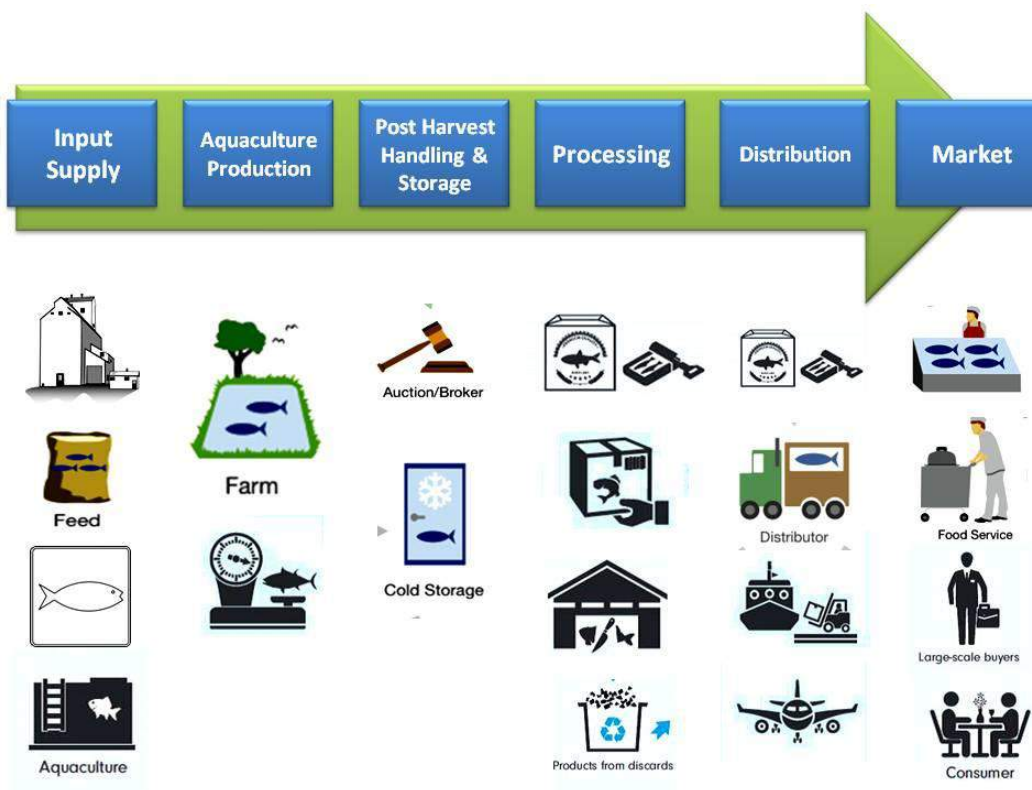


Figure 1. Supply chain of any aquaculture commodity

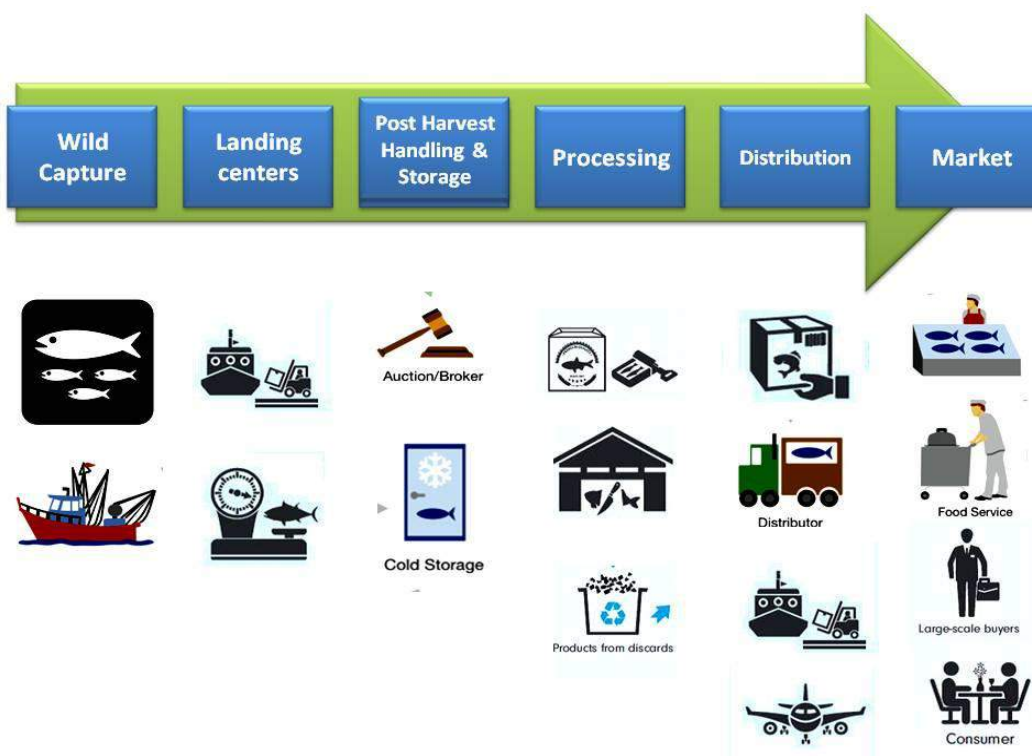


Figure 2. Supply chain of any fishery commodity from capture fisheries



### ***Number of Fishery-based Establishments in the Philippines***

The Bureau of Fisheries and Aquatic Resources maintains a database of micro, small and medium scale enterprises (MSMEs) in the country. As shown in Table 1, a total of 208 MSMEs exist, although it is quite apparent that this figure does not include the numerous MSMEs both in rural and even in urban areas that are unreported and therefore unregulated. These MSMEs, both reported and unreported, are basically involved in the trade and marketing of products in different forms (e.g. Table 2).

Table 1. Number of fishery-based micro, small and medium scale enterprises (MSMEs) in the Philippines, per region (as of 31 October 2015)

REGION	# of MSMEs
1	-
2	6
3	5
4a	-
4b	18
5	22
6	14
7	15
8	35
9	-
10	29
11	-
12	45
13	4
ARMM	12
CAR	3
<b>TOTAL</b>	<b>208</b>

Table 3 provides the number of export-ready fishery based establishments in the country. As of 31 October 31, 2015, there is a total of 52 European Union (EU) approved establishments and a total of 95 BFAR approved fishery establishments or those which can export to other countries other than the EU countries. These establishments are geographically distributed all over the country.

Table 2. Product categories and the number of fishery-based micro, small and medium scale enterprises (MSMEs) in the Philippines, per region (as of 31 October 2015)

REGIONS	PRODUCT CATEGORY	NO. OF FISHERY-BASED ENTERPRISES
CAR	Fresh/chilled tuna (loins and whole)	23
1	Fresh frozen/chilled fish and fishery aquaculture products	20
2	Other fresh frozen fishery products	29
3	Value-added fish and fishery aquaculture products	17
4A	Thermally-processed tuna, sardines and other species	11
4B	Pasteurized Canned Crab Meat	5
	Others	8

Table 3. Number of BFAR approved (non-EU approved) and EU approved fishery based establishments in the Philippines, per region (as of 31 October 2015)

REGION	Number of BFAR Approved Establishments	Number of EU Approved Establishments
1	1	1
2	4	0
3	0	1
4a	32	14
4b	7	1
5	1	0
6	7	0
7	10	2
8	1	0
9	17	11
10	1	1
11	3	0
12	9	21
13	2	0
NCR	0	0
ARMM	0	0
CAR	0	0
<b>TOTAL</b>	<b>95</b>	<b>52</b>

These export ready fishery based establishments are basically involved in the trade and marketing of products in different forms (Table 4).

Table 4. Product categories and the number of export ready fishery-based establishments in the Philippines, per region (as of 31 October 2015)

PRODUCT CATEGORY	NO. OF FISHERY-BASED ENTERPRISES
Fresh/chilled tuna (loins and whole)	23
Fresh frozen/chilled fish and fishery aquaculture products	20
Other fresh frozen fishery products	29
Value-added fish and fishery aquaculture products	17
Thermally-processed tuna, sardines and other species	11
Pasteurized Canned Crab Meat	5
Others	8

### **Export Trade**

The Philippines has been traditionally exporting different fish and fishery products all over the world. In 2014, the country's exports represented 0.51% of world's exports for fish, crustaceans, molluscs and aquatic invertebrates, giving the country a ranking of 41<sup>st</sup> among the world's exporting countries (ITC, 2015). As shown in Figure 3, in terms of volume, Philippine fishery exports have been dominated by tuna (in different product forms, such as fresh/chilled, loins/whole tuna, and as canned tuna) for the last ten (10) years (from 2004 to 2014) and most likely in the years to come. Exports of seaweeds (as phycocolloids in different grades and as dried seaweeds) follow next. Shrimps/Prawns (in different product forms) showed good export figures from 2004 up to 2007 but it was followed by a big drop in the succeeding years. In 2013, there appears to be a noticeable increase in the export of crab/crab fats, but such increase was not sustained in 2014. On the same year, there has been an increase in the export volume of grouper and squid/cuttlefish. The volumes of exports of the different commodities are presented in details in Table 5.

In terms of value, tuna exports have been consistently showing the highest figures from 2004 until 2014 (Figure 4). From 2004 until 2006, shrimps/prawns posted the second highest values, followed by seaweeds. But in 2007, the value of seaweeds exports had overtaken that of shrimps/prawns and the same trend was observed in the next couple of years. Interestingly, the values of crab/crab fat exports have been showing a steady increase from 2004 until 2012 when their values have already overtaken that of shrimps/prawns. Since then until 2014, crab/crab fats already ranked 3<sup>rd</sup>, in terms of value, among the country's export products. Other promising commodities include grouper, octopus, and squid/cuttlefish. Details of the export values of these commodities are presented in Table 6.

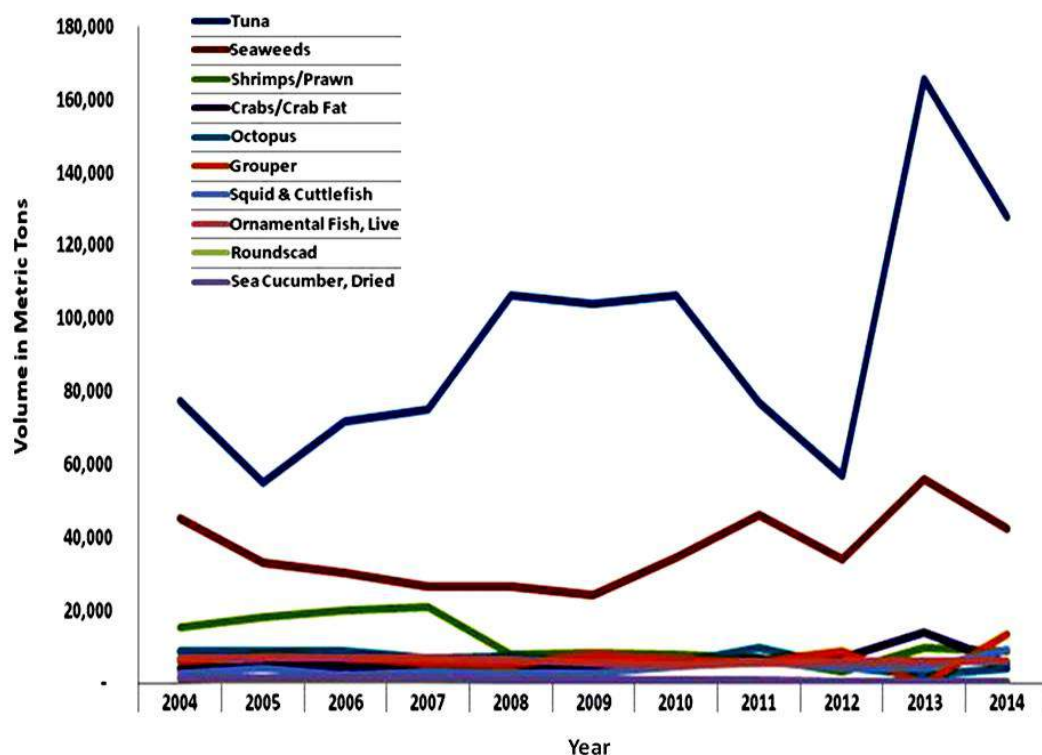


Figure 3. Graph showing the volume of exports of the Top 10 fishery commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

Table 5. Amount of exports (in metric tons) of the Top 10 fishery commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

SPECIES	VOLUME (in metric tons)										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tuna	77,356	54,708	71,645	75,148	106,179	103,947	106,449	76,888	56,708	165,757	127,730
Seaweeds	45,105	32,884	30,215	26,204	26,248	24,202	34,504	46,252	34,128	55,810	42,445
Shrimps/Prawn	15,343	18,101	19,679	20,824	7,622	8,249	7,662	6,715	2,985	9,563	8,917
Crabs/Crab Fat	3,961	4,430	4,590	3,990	3,587	4,357	5,795	6,164	6,915	13,886	5,372
Octopus	8,724	8,825	8,793	6,910	7,282	5,647	5,584	9,577	4,586	1,946	4,132
Grouper	5,958	7,088	6,760	5,358	4,898	7,801	6,472	6,023	8,709	11	13,441
Squid & Cuttlefish	2,828	4,057	2,354	3,237	2,769	2,439	4,649	5,704	4,131	3,999	9,085
Ornamental Fish, Live	6,941	6,698	6,660	6,766	6,441	5,556	5,166	5,503	6,049	5,895	5,988
Roundscad	1,040	401	872	872	921	850	909	753	461	191	191
Sea Cucumber, Dried	1,079	1,291	1,162	1,155	875	708	805	730	435	149	171

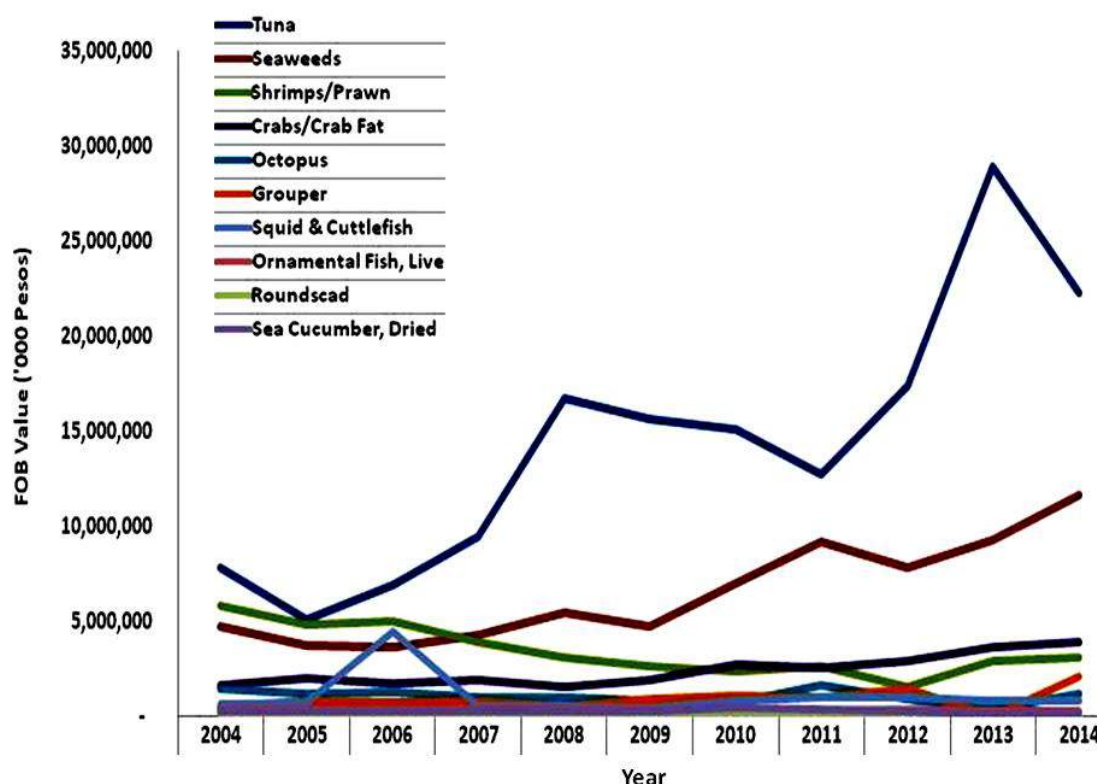


Figure 4. Graph showing the value of exports of the Top 10 fishery commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

Table 6. Value of exports (in '000 PhP pesos) of the Top 10 fishery commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

SPECIES	VALUE ('000 Pesos)										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tuna	7,801,00	5,079,23	6,929,69	9,411,51	16,716,7	15,575,4	15,116,3	12,670,4	17,370,1	28,914,2	22,293,3
Seaweeds	4,662,71	3,738,44	3,648,31	4,220,67	5,397,40	4,703,39	6,964,94	9,138,32	7,781,98	9,275,22	11,643,8
Shrimps/Prawn	5,812,85	4,838,00	5,018,65	3,907,44	3,042,15	2,604,69	2,327,85	2,606,22	1,566,12	2,863,18	3,041,48
Crabs/Crab Fat	1,646,03	1,946,83	1,729,41	1,876,74	1,538,91	1,852,78	2,704,50	2,508,47	2,890,30	3,646,22	3,926,75
Octopus	1,475,09	1,150,35	1,205,96	948,502	997,682	775,685	678,092	1,589,75	902,102	356,231	1,119,92
Grouper	421,401	766,607	735,624	763,821	559,531	893,358	1,029,38	937,052	1,395,66	1,611	2,051,37
Squid & Cuttlefish	620,175	696,044	4,423,04	564,171	528,131	454,201	755,313	991,542	980,353	759,671	839,675
Ornamental Fish, Live	380,052	368,912	371,136	339,961	325,012	306,626	270,238	286,476	299,958	260,950	265,934
Roundscad	114,843	33,315	45,482	86,069	99,302	112,568	99,399	84,174	61,366	33,523	13,155
Sea Cucumber, Dried	254,948	246,696	255,207	276,385	257,405	237,811	392,351	354,471	238,289	78,444	116,656



The Philippine fish and fishery products are exported worldwide (Figure 5), in almost all of the continents around the globe. Of all these countries, the top ten (10) major destinations of Philippine fishery exports (in terms of volume) are Japan, United States of America (USA), HongKong (China), China (Mainland), Taipei (China), South Korea, Italy, Singapore, Spain and Macao (China). As shown in Figure 6, in 2004 until 2005, the major destination of the country's fishery exports was in the Japan, but in 2006 until 2012, highest volumes of these fishery exports went to the USA. Interestingly, there was a sudden tremendous increase in the export volume to Japan in 2013, but it was not sustained in 2014. On the same year, there was a sudden increase in the export volume of the country's fishery products in China (Mainland), but again, it was not sustained in 2014.

In terms of value, the same countries of destination dominate (Figure 7). From 2004 until 2014, Japan posted the highest export value, followed by the USA, except in 2007, 2011, and 2012, when USA gave relatively higher export values as compared to Japan. From 2004 onwards, HongKong (China) has been showing a steady increase in the country's export, in terms of value. Quite interestingly, the values of the exports in the other countries have shown significant increase from 2010 onwards.



Figure 5. Countries of destination for Philippine fishery exports



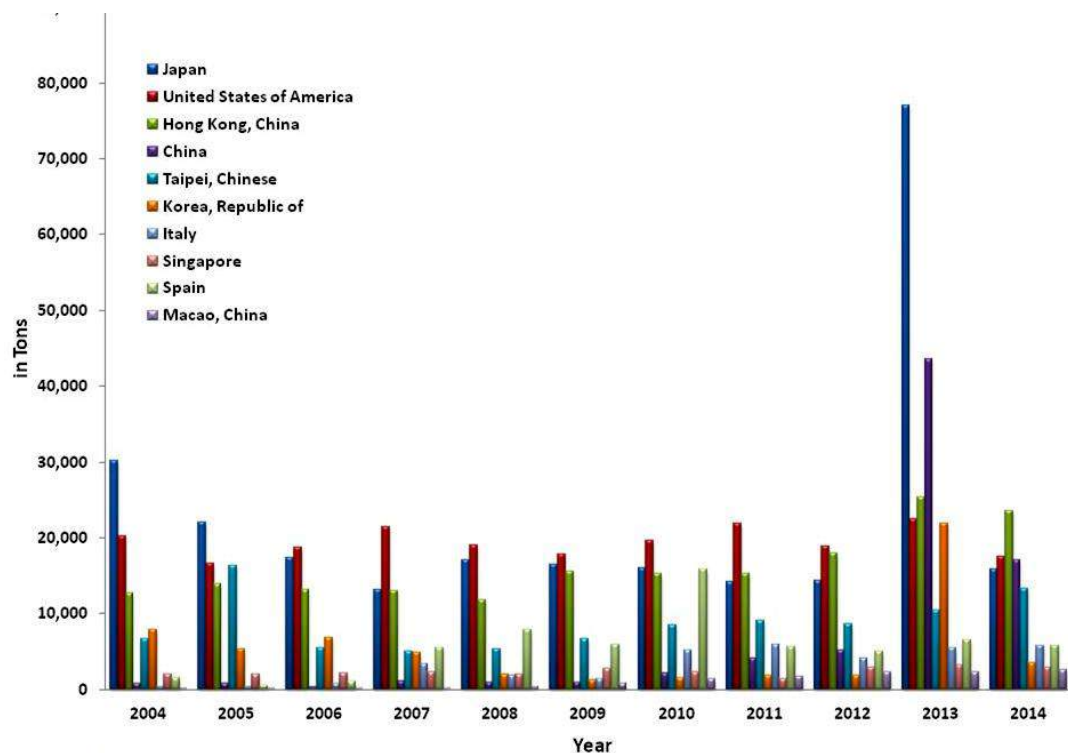


Figure 6. Graph showing the volume of Philippine exports in the Top 10 major destinations around the globe, from 2004 to 2014 (Source: [www.intracen.org](http://www.intracen.org), International Trade Center)

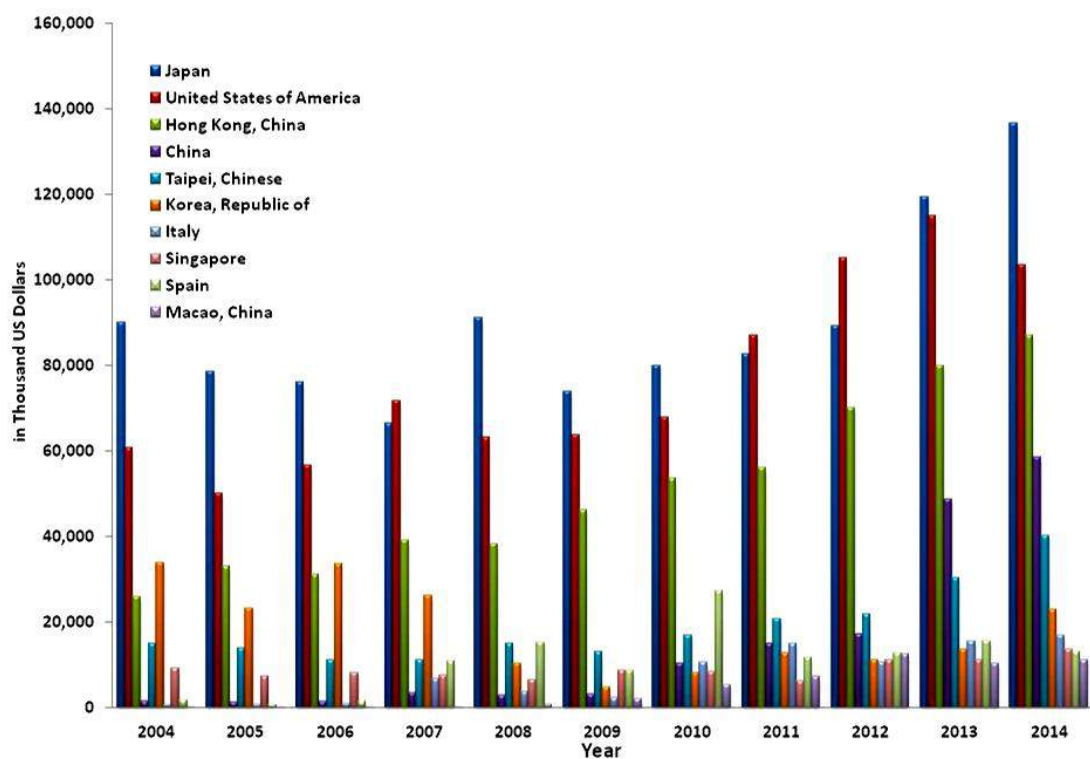


Figure 7. Graph showing the value of Philippine exports in the Top 10 major destinations around the globe, from 2004 to 2014 (Source: [www.intracen.org](http://www.intracen.org), International Trade Center)

## ***Import Trade***

The Philippines also imports from other countries, although as of 2014, Philippines' imports represent only 0.23% of total world imports (ITC, 2015). This placed the country to its present ranking of 44<sup>th</sup> in the world in terms of importation (ITC, 2015).

In particular, importations of the following products/commodities to the Philippines have been reported: fish meal, prawn feeds, tuna, mackerel, sardines and squid/cuttlefish. In 2004, fish meal comprised the largest import volume in the country, but the succeeding years showed a dramatic decline in fish meal imports in the country (Figure 8), most likely due to the use of locally available fish meal ingredients. The same trend can be observed with the importation of prawn meals. With these declines in the fish and prawn meal imports are the significant increases in the importations of mackerel and tuna, which have been dominating the Philippine importation figures since 2005 up to 2014. This trend is expected to persist for quite awhile most probably due to the dependence of domestic canneries on imports as a result of the continuous depletion of the country's fishery resources. The details of the import volumes of the top six (6) products/commodities are shown in Table 7.

In terms of import values, prawn and fish meals dominated the list in 2004, but this was followed by a steady decrease in the succeeding years (Figure 9). From 2006 until 2014, the values of tuna imports were the highest among the top fishery imports in the country. Mackerel imports were likewise high, consistently ranking 2<sup>nd</sup> next to tuna, during the same period. Quite interestingly, there has been a recent gradual but steady increase in the import values for squid and cuttlefish. Table 8 provides the detailed list of the import values of the top six (6) products/commodities from 2004 to 2014.

Philippine imports originated from different countries all over the world, but mostly from the neighbouring Asian countries. Topping the list is China (Mainland) which has been consistently the largest and the most significant importer of fishery products to the Philippines since 2004 onwards (Figure 10). Other importing countries include Vietnam, Taipei (China), Papua New Guinea, Japan, United States of America, Norway, Chile, South Korea and Indonesia. One important observation here is the presence on the list of some importing countries such as Vietnam, Papua New Guinea, Norway, Chile and Indonesia that do not belong to the list of countries that receive most of the Philippine exports. Among these countries, Vietnam noticeably is becoming the largest source of imports in the country – from a very small import volume in 2004, the rise has been significant in the succeeding years until Vietnam became the second highest source of imports in the Philippines in 2014. This explains the increasing supply of frozen fillets of *Pangasius* sp from Vietnam in the domestic markets that offer relatively cheaper prices as compared to domestically produced commodities.

In terms of import values, the same importing countries dominate the list from 2004 until 2014 (Figure 11). China has always been on top of the list, except in 2005, 2007, and 2008 when Papua New Guinea topped the list of the major importing countries to the Philippines. The import values of fishery products from Vietnam have been continuously increasing from relatively small amount in 2004 to a noticeable increase in 2011, until it gave the second highest import value in 2014.

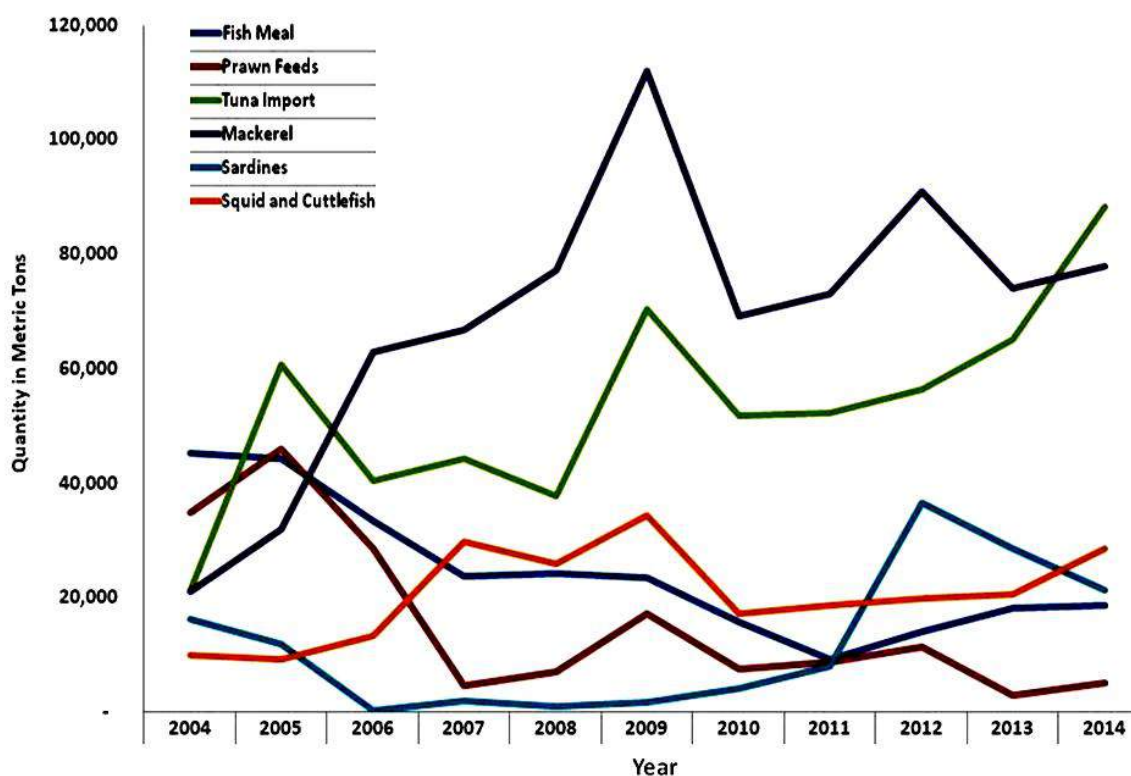


Figure 8. Graph showing the volume of imports of the Top 10 fishery commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

Table 7. Amount of imports (in metric tons) of the Top 6 fishery products/commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

PRODUCTS	VOLUME (in metric tons)										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Fish Meal	45,340	44,281	33,431	23,641	24,083	23,503	15,670	9,077	13,970	18,214	18,718
Prawn Feeds	34,890	45,937	28,556	4,691	7,130	17,145	7,464	8,657	11,408	3,016	5,083
Tuna Import	21,256	60,783	40,348	44,358	37,765	70,377	51,883	52,325	56,478	64,987	88,387
Mackerel	20,948	32,054	62,903	66,768	77,245	112,098	69,259	73,053	90,869	73,980	77,946
Sardines	16,188	11,943	250	2,014	955	1,736	4,033	7,873	36,547	28,591	21,411
Squid and Cuttlefish	9,893	9,160	13,393	29,783	25,915	34,380	17,263	18,554	19,865	20,511	28,667

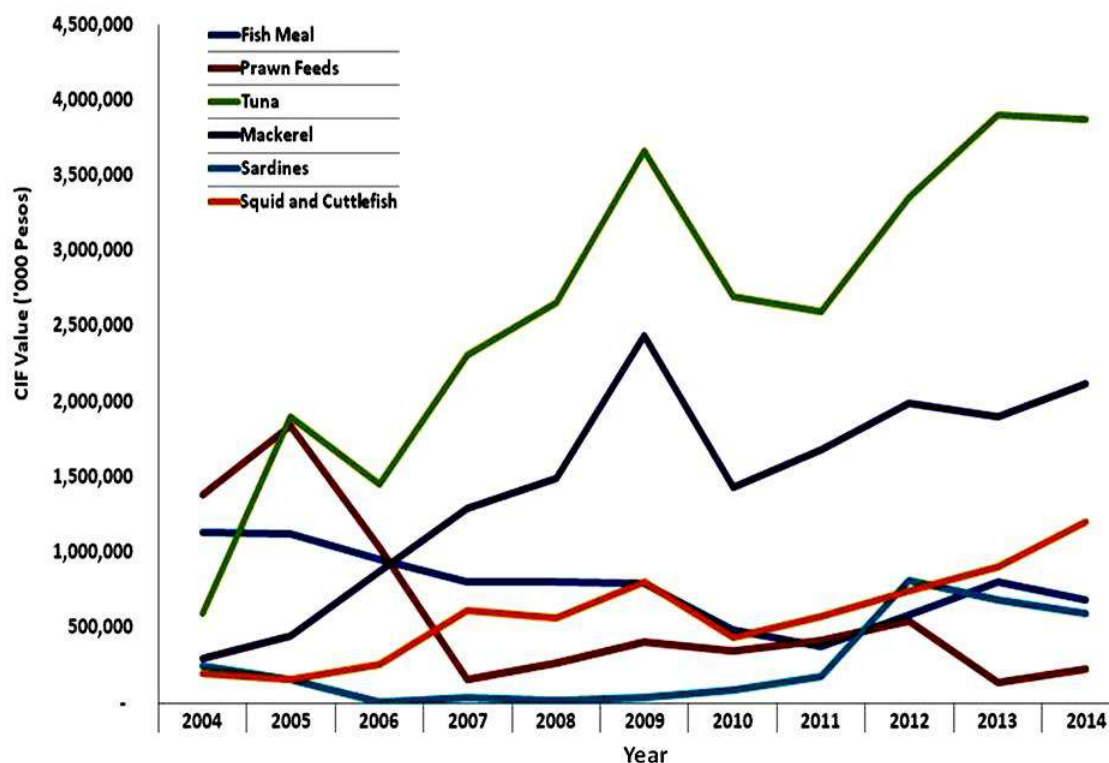


Figure 9. Graph showing the value of imports of the Top 10 fishery commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

Table 8. Value of imports (in '000 PhP pesos) of the Top 6 fishery products/commodities from the Philippines, from 2004 to 2014 (Source: Philippine Fisheries Profile from 2004 to 2014, BFAR)

PRODUCTS	VALUE ('000 Pesos)										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Fish Meal	1,137,10	1,124,69	952,846	803,982	804,307	795,709	482,802	375,197	581,318	805,996	686,371
Prawn Feeds	1,378,94	1,840,45	1,036,36	160,673	268,349	402,971	342,865	413,122	548,654	139,086	231,560
Tuna	596,788	1,894,60	1,450,05	2,307,15	2,658,47	3,661,24	2,691,46	2,599,72	3,350,82	3,895,24	3,868,22
Mackerel	296,267	448,486	873,421	1,287,71	1,487,66	2,432,23	1,427,63	1,682,94	1,986,47	1,900,10	2,120,80
Sardines	241,674	160,721	5,680	39,450	18,531	35,730	87,493	176,745	813,175	688,492	594,992
Squid and Cuttlefish	195,146	153,082	259,960	612,289	563,417	806,900	440,289	573,665	746,427	905,441	1,205,31

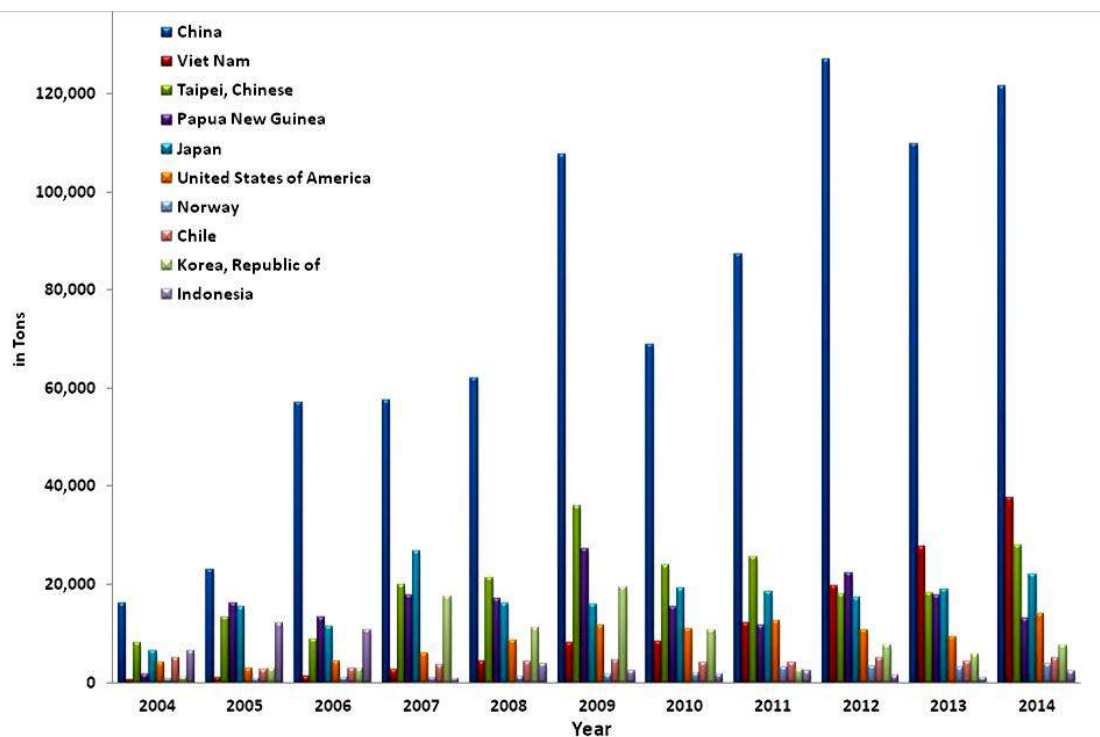


Figure 10. Graph showing the volume of Philippine imports in the Top 10 major destinations around the globe, from 2004 to 2014 (Source: [www.intracen.org](http://www.intracen.org), International Trade Center)

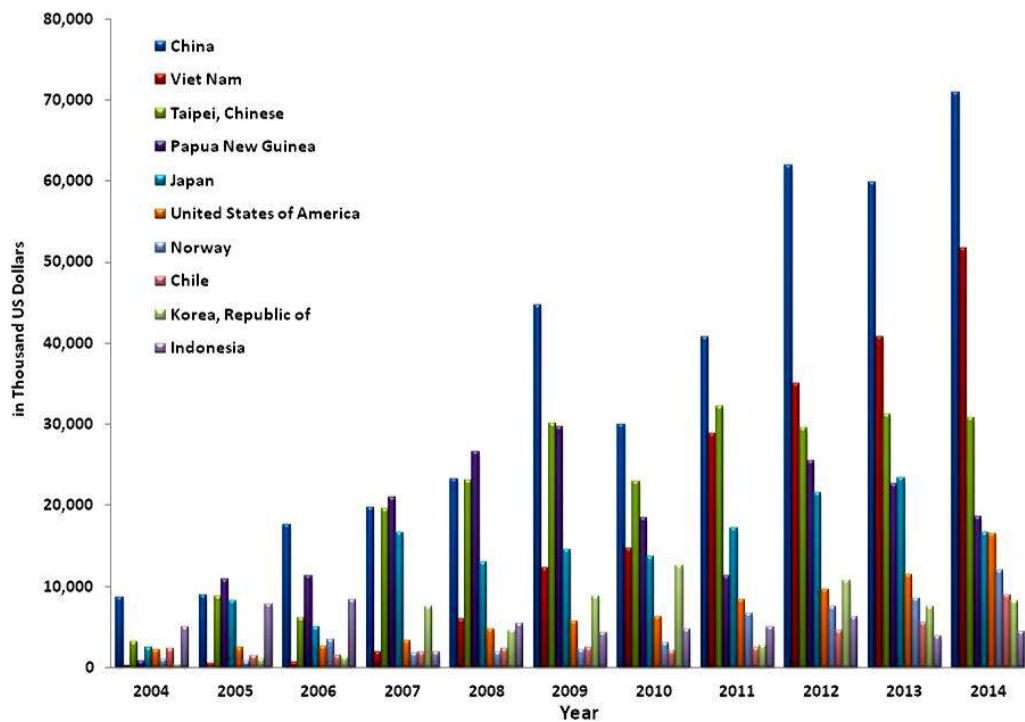


Figure 11. Graph showing the value of Philippine imports in the Top 10 major destinations around the globe, from 2004 to 2014 (Source: [www.intracen.org](http://www.intracen.org), International Trade Center)



## Balance of Trade

Table 9 shows significant trade indicators, including the exported values (in USD thousand) in 2014 from the top ten (10) countries of destinations of Philippine fishery exports, as well as the respective trade balance (in USD thousand), per country, on the same year, the percent share of these countries from the total Philippine exports and the percentages (%) of exported growth in value, per annum, between 2010-2014 in these countries. Table 10 shows the same trade indicators for imported values, the computed trade balance, and the percent import share of the top ten (10) importing countries, including the percentages (%) of imported growth in value, per annum, between 2010-2014.

Clearly, there is a trade surplus in almost all of the 10 countries where Philippine fishery products are being exported, except for China where the country has a trade deficit of US\$ 12,353,000 in 2014 (see also Table 10). On the other hand, six (6) out of the top ten (10) countries that supply fishery products in the Philippines show trade deficits in 2014. These countries include China, Vietnam, Papua New Guinea (PNG), Norway, Chile and Indonesia.

In the case of China, this can be explained by the fact that only 10.3% of the total Philippine fishery exports (in terms of value) go to China (ranked 4<sup>th</sup> among the top ten countries of destination of the country's exports), while 27.3% of Philippine imports (in terms of value) are from this country. In the case of Vietnam, it ranked 13<sup>th</sup> among the countries of destination of Philippine exports, but has been the source of a sizeable amount of Philippine imports (valued at US\$51,677,000), thus providing a trade deficit of US\$ 46,379,000. PNG, Norway, Chile and Indonesia posted trade deficit in 2014 of US\$18,520,000, US\$10,691,000, US\$8,873,000, and US\$3,925,000, respectively. Clearly, these figures must be carefully evaluated so that to minimize said trade deficit in the years to come.

Table 9. Top ten (10) countries of destination of Philippine fishery exports, including data on trade indicators for 2014 and the percentages (%) of exported growth in value, per annum, between 2010-2014 (Source: ITC 2015)

COUNTRIES OF DESTINATION OF PHILIPPINE FISHERY EXPORTS	Exported value 2014 (USD thousand)	Trade balance 2014 (USD thousand)	Share in Philippines's exports (%)	Exported growth in value between 2010-2014 (% p.a.)
Japan	136,503	119,946	24.1	15
United States of America	103,509	87,014	18.3	12
Hong Kong, China	86,898	86,841	15.3	14
China	58,539	-12,353	10.3	59
Taipei, Chinese	40,148	9,382	7.1	23
Korea, Republic of	22,791	14,604	4.0	24
Italy	16,989	16,952	3.0	10
Singapore	13,593	11,902	2.4	16
Spain	13,079	12,805	2.3	-11
Macao, China	11,045	11,045	1.9	20



Table 10. Top ten (10) countries as sources of imported fishery products in the Philippines, including data on trade indicators for 2014 and the percentages (%) of imported growth in value, per annum, between 2010-2014 (Source: ITC 2015)

SOURCES OF IMPORTED FISHERY PRODUCTS	Imported value 2014 (USD thousand)	Trade balance 2014 (USD thousand)	Share in Philippines's imports (%)	Imported growth in value between 2010-2014 (% , p.a.)
China	70,892	-12,353	27.3	23
Viet Nam	51,677	-46,379	19.9	33
Taipei, Chinese	30,766	9,382	11.9	6
Papua New Guinea	18,520	-18,520	7.1	7
Japan	16,557	119,946	6.4	7
United States of America	16,495	87,014	6.4	25
Norway	11,921	-10,691	4.6	35
Chile	8,873	-8,873	3.4	45
Korea, Republic of	8,187	14,604	3.2	1
Indonesia	4,422	-3,925	1.7	-4

In terms of fishery product categories (**NB:** *this product categorization is the one being used in the reporting of data for international trade and slightly differs from the fishery product/commodity listing/categories, as reported in Figures 8 and 9 and Tables 7 and 8 above*), the seven (7) fishery product categories in the Philippines posted a total exported value in 2014 of US\$ 566,701,000, with crustaceans on top of the list (Table 11). Except for the Fish (frozen, whole) category that showed a trade deficit of US\$ 75,279,000, all the other fishery exports posted trade surpluses. The same product category (fish, frozen, whole) and the mollusc group gave negative % annual growth, both in value and quantity between 2010-2014, with the rest experiencing positive % growth between the same period. The Live Fish group obtained the highest percentage (4.7%) in terms of its share in world export, placing this commodity on the 3<sup>rd</sup> place in ranking in world exports.

Table 12 gives the details of the export and import values and the balance of trade in 2014 for each specific fishery product / product form, under each of the product categories.

### **Problems and Constraints**

The domestic markets for fish and fishery products are facing the perennial problem of limited marketing networks to enable distribution of the products from highly productive areas to food-fish deficient areas. Limited infrastructure facilities for proper trade and marketing of these products are quite apparent and therefore need proper attention. In particular, most of the fish trading facilities in the country, including some of the regional fish ports, the municipal fish ports, and the wet markets need improvement, not only with their infrastructures, but with their facilities for proper post harvest handling and storage, prior to trading of any fishery commodities.

Table 11. Performance of seven (7) fishery product categories in the Philippines, in terms of the exported value and trade balance in 2014, % annual growth in value and quantity, % share in the world exports, and rankings in world exports (Source: ITC 2015)

PRODUCT CATEGORIES	Exported value 2014 (USD '000)	Trade balance 2014 (USD '000)	Annual growth in value between 2010-2014 (% p.a.)	Annual growth in quantity between 2010-2014 (% p.a.)	Annual growth in value between 2013-2014 (% p.a.)	Annual growth of world imports between 2010-2014 (% p.a.)	Share in world exports (%)	Ranking in world exports
Crustaceans	159,276	140,629	21	33	-23	10	0.6	29
Fish fillets and pieces, fresh, chilled or frozen	115,740	76,891	53	29	10	5	0.5	33
Fish, frozen, whole	97,203	-75,279	-4	-8	19	2	0.4	44
Live fish	91,024	91,000	33	33	14	1	4.7	3
Molluscs	63,773	35,057	-4	-11	59	4	0.5	32
Fish, fresh, whole	21,476	21,476	25	28	-17	7	0.1	54
Fish, cured or smoked and fish meal fit for human consumption	18,209	17,518	11	5	2	3	0.3	37

In the export market, problems and constraints are usually related to export rejection at the border of the importing countries and the existence of trade measures. Reported reasons for export rejection at the borders of importing countries include, but not limited to, the following: (a) **food quality issue**, such as presence of filth and substandard end products; (b) **food safety issues** such as the presence of microbial contaminants (e.g. *Salmonella* sp, *Escherichia coli*, *Listeria monocytogenes*, etc.), and chemical contaminants (both naturally occurring or those acquired from the environment), such as heavy metals, industrial contaminants, histamine, ciguatera, etc.); and (c) **non-compliance to regulatory requirements** (e.g. non registration as Low Acid Canned Food or acidified manufacturer with USFDA (i.e., FCE pursuant to 21 CFR 108.25 (c)1, etc.). Table 13 provides the number of cases of border rejections by the US Food and Drug Administration (USFDA) of Philippine fishery products from 2012 until September 2015. Reported causes of these rejections are stipulated in Table 14. For Philippine fishery products exported to the European Union, cases that received EU-Rapid Alert System for Food and Feeds (EU-RASFF) notifications are reported in Table 15.

Included in the trade measures are the following: (a) technical barriers to trade; (b) sanitary and phytosanitary measures; (c) trade related intellectual property rights issues law; (d) complicated export/import procedures; (e) stringent regulatory frameworks of importing/exporting countries; and (f) unstable market prices.

Table 12. List of Philippine fishery products under each of the product categories, their export and import values in 2014 (in US\$ '000), and the trade balance in 2014 (in US\$ '000) (Source: ITC calculations based on UN COMTRADE statistics, as reported by ITC, 2015)

Product label	Exported value 2014 (USD '000)	Imported value 2014 (USD '000)	Trade balance 2014 (USD '000)
<b>Fish, Crustaceans, Molluscs, Aquatic Invertebrates</b>			
<b>Molluscs</b>	<b>63,773</b>	<b>28,716</b>	<b>35,057</b>
Snails,(excl sea snails) shelled or not, live, fresh, chilled, frozen, dried, salted or in brine	78	16	62
Scallops, including queen scallops, shelled or not, live, fresh or chilled	4	3	1
Scallops, including queen scallops, shelled or not, frozen, dried, salted or in brine	6,477	250	6,227
Oysters, shelled or not, live, fresh, chilled, frozen, dried, salted or in brine	1,669	2	1,667
Octopus, frozen, dried, salted or in brine	26,091	287	25,804
Mussels, shelled or not, live, fresh or chilled	9		9
Mussels, shelled or not, frozen, dried, salted or in brine	601	1,004	-403
Molluscs nes, shelled/not, and aquatic invertebrates nes, live, frozen/chilled	7,578		7,578
Molluscs nes, shelled or not & aquatic invertebrates nes, frozen, dried, salted or in brine	4,233	355	3,878
Cuttlefish and squid, shelled or not, frozen, dried, salted or in brine	16,539	26,800	-10,261
Cuttlefish and squid, shelled or not, live, fresh or chilled	495		495
<b>Fish, cured or smoked and fish meal fit for human consumption</b>	<b>18,209</b>	<b>691</b>	<b>17,518</b>
Salmon, Pacific, Atlantic and Danube, smoked including fillets	4,878	197	4,681
Livers and roes, dried, smoked, salted or in brine	7,126	29	7,097
Herrings smoked, including fillets	163		163
Fish nes, smoked including fillets	4,062	9	4,053
Fish nes, salted and in brine, but not dried or smoked	69	119	-50
Fish nes, dried, whether or not salted but not smoked	1,551	200	1,351
Fish meal fit for human consumption	0	104	-104
Fish fillets, dried, salted or in brine but not smoked	360	28	332
Cod, salted and in brine, but not dried or smoked	0	4	-4
<b>Fish, frozen, whole</b>	<b>97,203</b>	<b>172,482</b>	<b>-75,279</b>
Tunas, albacore or long finned, frozen, excl heading No 03.04,livers & roes	0	3	-3
Tunas, yellowfin, frozen excluding heading No 03.04, livers and roes	75,508	33,124	42,384
Tunas nes, frozen, excluding heading No 03.04, livers and roes	1,674	3,889	-2,215
Trout, frozen, excluding heading No 03.04, livers and roes	0	151	-151
Skipjack or stripe-bellied bonito, frozen excluding heading No 03.04,livers&roes	487	44,355	-43,868
Sea bass, frozen, excluding heading No 03.04, livers and roes	0	398	-398
Sardines - <i>Sardinella</i> , brislq or sprats, frozen excluding heading No 03.04,livers&roes	0	13,171	-13,171
<i>Salmonidae</i> , nes, frozen, excluding heading No 03.04, livers and roes	531	1,636	-1,105
Salmon Atlantic, frozen, excluding heading No 03.04, livers and roes	0	8,869	-8,869
Mackerel, frozen, excluding heading No 03.04, livers and roes	509	47,186	-46,677
Livers and roes, frozen	0	52	-52
Halibut, frozen, excluding heading No 03.04, livers and roes	0	58	-58
Haddock, frozen, excluding heading No 03.04, livers and roes	0	24	-24
Frozen Pacific salmon - <i>Oncorhynchus gorbuscha</i> , <i>O. keta</i>	366	13,673	-13,307
Frozen herrings - <i>Clupea harengus</i> , <i>Clupea pallasii</i>	0	257	-257

Frozen bigeye tunas - <i>Thunnus obesus</i>	7	2,869	-2,862
Flatfish nes, frozen, excluding heading No 03.04, livers and roes	0	465	-465
Fish nes, frozen, excluding heading No 03.04, livers and roes	17,925	1,796	16,129
Eels, frozen, excluding heading No 03.04, livers and roes	196		196
Dogfish and other sharks, frozen, excluding heading No 03.04, livers and roes	0	30	-30
Cod - <i>Gadus morhua</i> , <i>Gadus ogac</i> , <i>Gadus macrocephalus</i>	0	440	-440
Coalfish, frozen, excluding heading No 03.04, livers and roes	0	37	-37
<b>Fish, fresh, whole</b>	<b>21,476</b>		<b>21,476</b>
Tunas, yellowfin, fresh or chilled, excluding heading No 03.04, livers and roes	12,136		12,136
Tunas nes, fresh or chilled, excluding heading No 03.04, livers and roes	2		2
Skipjack o stripe-bellied bonito, frozen or chilled, excluding heading No 03.04, livers & roes	1		1
Sardines - <i>Sardinella</i> , brislg or sprats, frozen/chilled, excl. heading No 03.04, livers & roes	256		256
Salmon Pacific, Atlantic & Danube, frozen or chilled excl heading No 03.04, livers & roes	2		2
Mackerel, fresh or chilled, excluding heading No 03.04, livers and roes	496		496
Fresh or chilled bigeye tunas - <i>Thunnus obesus</i>	2		2
Flatfish nes, fresh or chilled excluding heading No 03.04, livers & roes	1		1
Fish nes, fresh or chilled excl heading No 03.04, livers and roes	8,581		8,581
<b>Fish fillets and pieces, fresh, chilled or frozen</b>	<b>115,740</b>	<b>38,849</b>	<b>76,891</b>
Frozen meat whether or not minced of toothfish - <i>Dissostichus</i> spp.	163	4,885	-4,722
Frozen meat whether or not minced of swordfish - <i>Xiphias gladius</i>	163	4,885	-4,722
Frozen fish meat whether or not minced (excl. swordfish, toothfish)	163	4,885	-4,722
Frozen fish fillets (excl. swordfish and toothfish)	36,112	7,928	28,184
Frozen fillets of toothfish - <i>Dissostichus</i> spp.	36,112	7,928	28,184
Frozen fillets of swordfish - <i>Xiphias gladius</i>	36,112	7,928	28,184
Fresh or chilled fillets and other meat whether or not minced of swordfish	1,920	8	1,912
Fresh or chilled fillets and other meat whether or not minced (excluding sword and toothfish)	1,920	8	1,912
Fresh or chilled fillets and other meat whether or not minced of toothfish	1,920	8	1,912
<b>Crustaceans</b>	<b>159,276</b>	<b>18,647</b>	<b>140,629</b>
Shrimps and prawns, frozen, in shell or not, including boiled in shell	63,053	16,236	46,817
Shrimps & prawns, not frozen, in shell or not, including boiled in shell	4,466	302	4,164
Rock lobster & other sea crawfish, frozen in shell/not, including boiled in shell	462		462
Rock lobster & other sea crawfish not frozen, in shell/not, including boiled in shell	67	49	18
Lobsters nes, not frozen, in shell or not, including boiled in shell	17,562	1	17,561
Lobsters nes, frozen, in shell or not, including boiled in shell	131	589	-458
Crustaceans nes, not frozen, in shell or not, including boiled in shell	1,296	173	1,123
Crustaceans nes, frozen, in shell or not including boiled in shell	474	908	-434
Crabs, not frozen, in shell or not, including boiled in shell	60,144	1	60,143
Crabs frozen, in shell or not, including boiled in shell	11,623	388	11,235
<b>Live fish</b>	<b>91,024</b>	<b>24</b>	<b>91,000</b>
Ornamental fish, live	5,962	1	5,961
Fish live, nes	50,049	23	50,026
Eels, live	35,013		35,013
Carp, live	1		1

nes = not elsewhere specified

Table 13. Number of cases of US border rejections by the US Food and Drug Administration (USFDA) of Philippine fishery products, from January 2012 until September 2015 (*Source: USFDA Import Refusal Report 2015; <http://www.accessdata.fda.gov>*)

MONTH/YEAR	2012	2013	2014	2015
January	41	33	20	20
February	35	47	15	23
March	13	50	16	16
April	45	34	10	22
May	20	25	18	6
June	27	24	18	5
July	63	32	11	29
August	22	42	13	4
September	21	30	28	3
October	11	46	19	
November	45	22	18	
December	53	15	17	
<b>TOTAL</b>	<b>396</b>	<b>400</b>	<b>203</b>	<b>128</b>

Table 14. Reported reason for rejection at the US borders by the US Food and Drug Administration (USFDA) of Philippine fishery products. (*Source: USFDA Import Refusal Report 2015; <http://www.accessdata.fda.gov>*)

DATE	PRODUCTS	CAUSES FOR BORDER REFUSAL
Feb 2013	Anchovy	Filthy (adulteration)
Mar 2013	Anchovy	Filthy (adulteration)
	Sardines	No FCE (not registered as low acid canned food or acidified manufacturer)
Jan 2014	Shrimps/Prawns	Nitrofurans, vet drugs (adulteration)
	Squid & other aquatic species	Filthy (adulteration)
Feb 2014	Tuna (albacore, yellowfin, bluefin)	Filthy (adulteration)
	Milkfish	<i>Salmonella</i>
Sep 2014		Unsanitary manufacturing, processing & packing

Table 15. Number of cases for the Philippine fishery products exported to the European Union (EU) that received EU-Rapid Alert System for Food and Feeds (EU-RASFF) notifications

YEAR	No. of Rapid Alert Notifications
2006	41
2007	13
2008	23
2009	7
2010	8
2011	12
2012	12
2013	5 (distribution) 2 (origin)
2014	8
<b>TOTAL</b>	<b>131</b>

## STATUS OF WORLD SUPPLY, DEMAND AND TRADE OF FISH AND FISHERY PRODUCTS

In coming up with marketing strategies for Philippine fish and fishery products, the following salient observations on the world supply, demand and trade must be carefully considered:

1. In the Philippine and elsewhere, aquaculture is perceived as the answer to problems on food security. Records show that if the recent production trend in aquaculture persists, together with the continued interest to look for more cultivable species, it is more likely that aquaculture would overtake wild capture fisheries by 2018.
2. China has been and will be continuously playing a big role in the trade and marketing of fish and fishery products in the world. It is presently the world's biggest exporting country and the 3rd biggest importer of fishery products, with a per capita consumption that has currently reached 35.1kg and is still steadily increasing (FAO, 2104).
3. The United States of America (USA) and Japan remain as the largest single importers of fish and fishery products in the world (see FAO, 2104). In general, American and Japanese consumers are highly dependent on imports for fish consumption, with their imports posting about 60 % and 54 %, respectively, of their total fish supply from different countries all over the world (FAO, 2104). Quite interestingly, the per capita consumption of fish in the USA is presently at 24kg and has been steadily increasing in the last few years. Although Japan has per capita consumption of fish 57kg, it has been decreasing for the last few years.



4. The European Union (Member Organization) is considered as the largest single market for imported fish and fishery products, posting an aggregate imports valued at US\$47.0 billion in 2012 (see FAO, 2104). This represents 36% of total world imports. Incidentally, the EU28 is known as a first world market, with an expected long-term growth of fish markets, given a per capita consumption of 23kg and some import figures that show their increasing dependence on imports for the last several years.
5. Brazil, Mexico, the Russian Federation, and Egypt are the emerging countries in the world that are increasingly becoming important to the world's exporters of fish and fishery products (FAO, 2104).
6. There has been an increasing strategic importance of cheap small pelagics as a food source in developing countries.
7. There has been an increasing share of developing countries in fisheries trade worldwide, with a corresponding decline in the share of the developed economies.

In terms of fishery exports and imports from the Philippines, the bubble graphs, as shown in Figures 12 and 13, clearly indicate the performance of the different fishery product categories from the Philippines in the international markets (see also Table 11). Based on the growth figures of national supply and international demand for Philippine exports (Figure 12), those considered as “*winners in growing sectors*” (i.e. with annual growth rates of more than 5% between 2010-2014) are crustaceans and fish (fresh, whole) while those “*winners in declining sector*” (i.e. with annual growth rates of less than 5% between 2010-2014) include fish (cured or smoked) and fish meal for human consumption, as well as live fish. In between the 2 sectors is the product category of fish fillet and pieces (fresh, chilled or frozen), with an annual growth rate of 5% between 2010-2014. Those belonging to “*losers in declining sector*” are molluscs and fish (frozen, whole).

Based on the growth figures of national demand and international supply for Philippine imports (Figure 13), the Philippines imports of crustaceans, molluscs, fish (frozen, whole), fish fillets and pieces (fresh, chilled or frozen), and fish (cured or smoked) and fish meal for human consumption have all increased more rapidly than world exports. On the other hand, the country's imports of live fish have increased less rapidly as compared to world export.

The same figure also indicates that the Philippines is a *net importer* of fish (frozen, whole), shown as a yellow bubble, and the country is a *net exporter* of the other fish product categories (namely crustaceans, molluscs, fish fillets and pieces (fresh, chilled or frozen), fish (fresh, whole), fish cured or smoked and fish meal for human consumption, and live fish (shown as blue bubbles)).

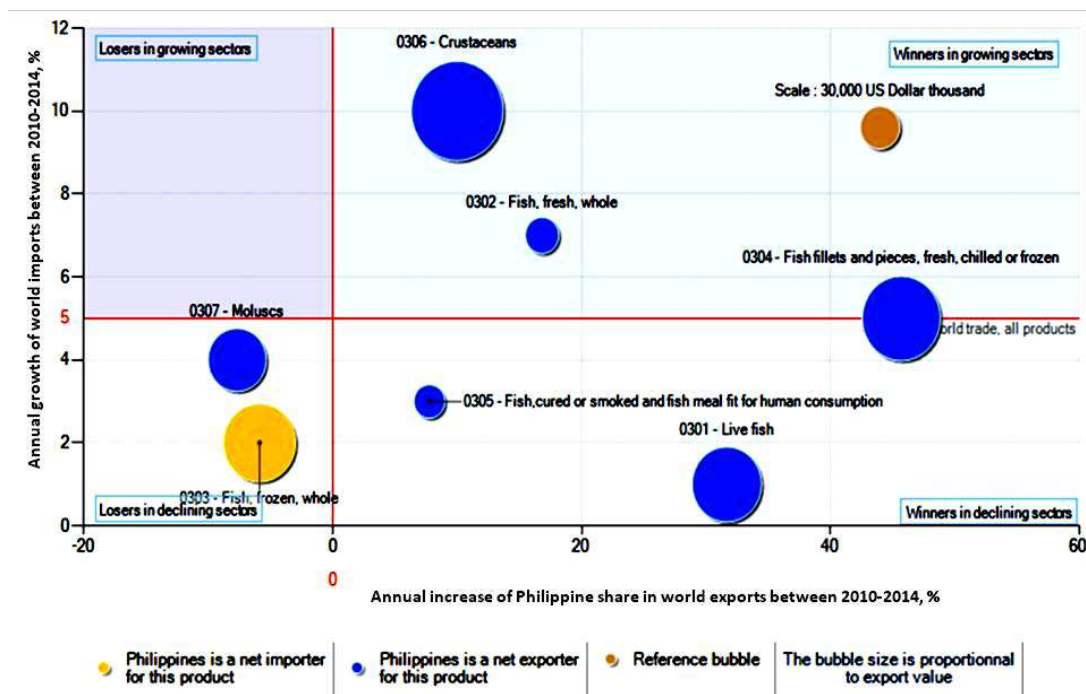


Figure 12. Growth of national supply and international demand for products exported by the Philippines in 2014 (Source: ITC, 2015)

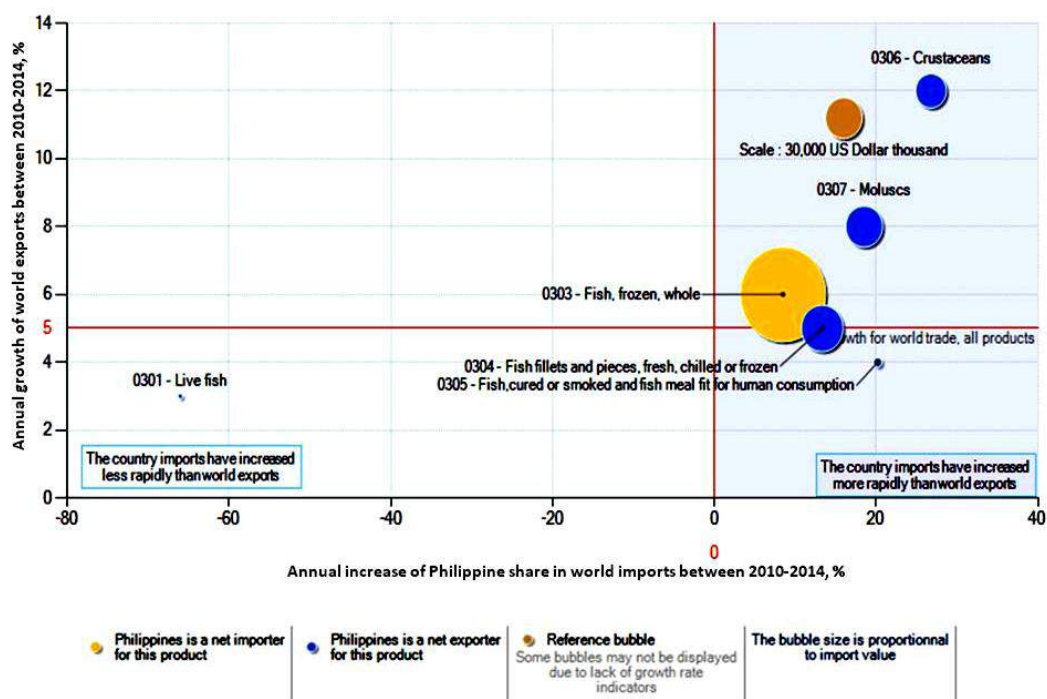


Figure 13. Growth of national demand and international supply for products imported by the Philippines in 2014 (Source: ITC, 2015)

## STATUS OF FISHERIES TRADE AND MARKETING RESEARCH

The inventory of the different post harvest research activities that was conducted in 2006 (Yap 2006) revealed the following: (a) ten (10) commodity groups are the main focus of researches during the period, with the top five (5) commodities included milkfish (18%), tuna (16%), small pelagics (16%), shrimps (13%), and seaweeds (12%), with the remaining commodity groups, namely mussel/oyster, tilapia, cephalopods, crabs, and carp, constituting the remaining 25% of the researches surveyed; and (b) majority of the researchers dealt with raw material characterization, fermentation, value addition, and others with only 2 out of 216 researches (~1%) dealt with trade and marketing. As shown in Figure 14, when the researches surveyed were grouped into different time periods (1975 – 1979; 1980 – 1984; 1985 – 1989; 1990 – 1994; 1995 – 1999; and 2000 – 2006), a good number of research topics shows increasing trends while trade and marketing data appear to be neglected.

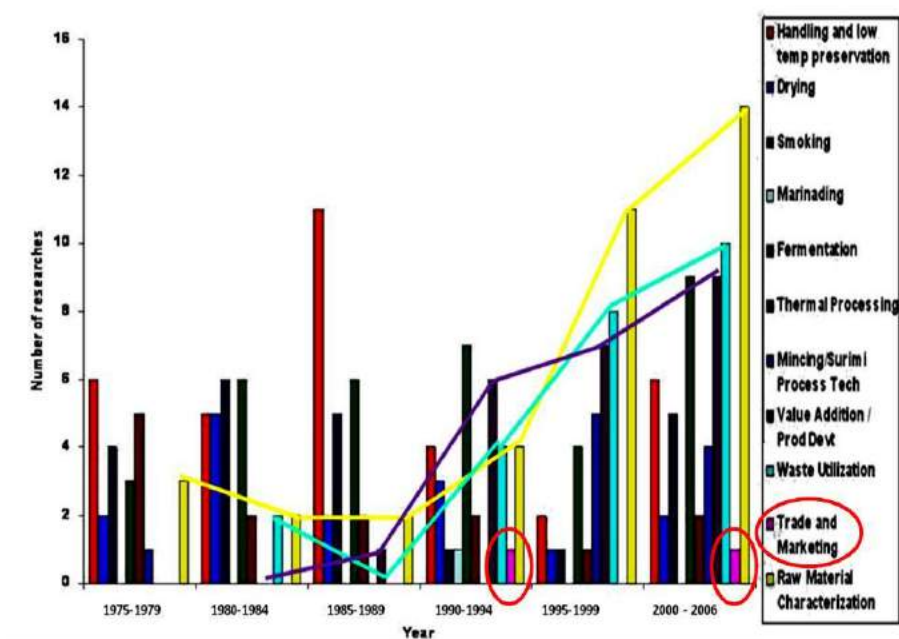


Figure 14. Researches conducted from 1975 to 2006, using different fisheries commodities and different processing methodologies, based on different time ranges. Values expressed as numbers of the researches surveyed, n=216. Bars encircled with red are the researches on Fisheries Trade and Marketing (Yap, 2006)

## GOVERNMENT INITIATIVES RELATED TO FISHERIES TRADE AND MARKETING

The Bureau of Fisheries and Aquatic Resources - Fisheries Industry Development Support Division had been consistently helping the different stakeholders in the fisheries industry of the country, *via* the conduct of the following activities:

- ✓ Business/ Market-Matching
- ✓ Trade Fairs/ Seafood Shows/ Exhibitions (Local & International)
- ✓ Industry Business Forum
- ✓ Capacity-Building
- ✓ Technical Assistance
- ✓ Market Research & Benchmarking
- ✓ Market Access Expansion
- ✓ Credit Facilitation (support services)
- ✓ Infrastructure support (Community Fish Landing Centers)
- ✓ Provision of post harvest facilities (ice making facilities, airblast freezers, fish stalls, fish stalls with live fish aquaria)

In particular, the division had been busy helping the stakeholders get exposed to different product expositions, trade fairs and other activities, in the country and abroad. Some of these activities are enumerated in Table 16.

Table 16. List of product expositions, exhibitions, trade fairs and other similar activities that were participated in by the different stakeholders, as organized and coordinated by BFAR Fisheries Industry Development Support Division (*Source: BFAR-FIDS Division, 2015*)

2014	2015
Seafood Expo Global April 2014, Brussels, Belgium	Seafood Expo North America March 15-17, 2015, Boston, MA., USA
Japan International Seafood & Technology Expo, August 2015, Tokyo, Japan	Seafood Expo Global April 21-23, 2015, Brussels, Belgium
Dubai Seafood Show September 2014, Dubai, UAE	Japan International Seafood & Technology Expo, August 19-21, 2015, Tokyo, Japan
Locally Held International Trade Fairs	Seafood Expo Asia, September 8-10, 2015, Wanchai, Hong Kong
SIAL	Locally Held International Trade Fairs
Agrilink/Foodlink/Aqualink October 2014, World Trade Center	SIAL
Local Trade Fairs	Agrilink/Foodlink/Aqualink October 15-17, 2015, World Trade Center
BFAR 67 <sup>th</sup> Anniversary	Local Trade Fairs
FishCon Week	BFAR 68 <sup>th</sup> Anniversary

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- <http://www.bfar.da.gov.ph>
- <http://www.accessdata.fda.gov>
- <http://www.intracen.org>
- <http://www.trademap.org>

## LIST OF CNFIDP 2016-2020 PARTICIPANTS

### Private Sector

A. Tung Chingco Manufacturing Corporation  
Alliance of High-Value Group  
Alliance of Philippine Fishing Federation Incorporated  
Anjo Farms Incorporated  
APL-Sentro  
Arko Foods Phils Incorporated  
BAFOR Incorporated, Cebu  
Barrio Fiesta Manufacturing Corporation  
Bonanza Fishing  
Bulacan HJR International Corporation  
Camarines Bigfin Seafoods Trading  
Celebes Canning Corporation  
CHL Fishing  
Citra Mina Group of Companies  
Coron Aqua  
D&L Seafoods  
ECA Cold Store Plus  
EMB Trading  
Feed Mill Corporation  
Feedmix Specialist Incorporated  
Finfish Hatcheries  
Frabelle Fishing Corporation  
Fresh Frozen Seafood Association of the Philippines  
FRI Seafood Trading  
Gems Food International Incorporated  
Gladery Fishing Incorporated  
Globest Feeds Philippines  
HJR Group of Company  
HocPo Feeds  
Integrated Growers and Traders



IRMA Fishing  
ISDA Incorporated  
Jagnee Fishing Corporation  
Jam Seafoods Incorporated  
Jess Aquamarine Trader Incorporated  
JN Mercado Seafood Supply  
Jumbo Fishing Corporation  
Kai -Anya Food Incorporated  
Mega Sardines  
Meliomar Incorporated  
Millennium Ocean Star Corporation  
Mofels Food International Corporation  
NH Agro Industrial Corporation  
Nuevo Fresco Marine Trading Corporation  
Ocean Aquamarine  
Ocean Canning Corporation  
Orient Cold Storage Incorporated  
Oversea Feeds Corporation  
Ozean 8 Trading Corporation  
Palawan Aquaculture Corporation  
Philbest Canning Corporation  
Philippine Association of Crab Producer Incorporated  
Philippine Association of Fish Producers Incorporated  
Philippine Association of Fish Producers Incorporated -  
Trident  
Philippine Milkfish Industry Group  
Philippine Tropical Fish Exporters Association  
Philippine Association of Crab Processors Incorporated  
Phil-Union Frozen Foods Incorporated  
Polar Bear Freezing and Storage Corporation  
RD Fishing Industry Incorporated  
Rell and Renn Fishing  
Roel Fishing  
Royal Pacific Rim Fishing Corporation

Rugela Fishing  
 Sagip Likas Yamang Dagat ng Bataan  
 San Andres Aquaculture Corporation  
 San Andres Fishing Industries Incorporated  
 San Lorenzo Ruiz Fishing  
 Santeh Aquaculture Science and Technology Foundation  
 Santeh Fish Feeds Corporation  
 SAS Shipyard  
 Seaglory International Corporation  
 Seaweeds Industry Association of the Philippines  
 SOCCSKSARGEN Federation of Fishing and Allied Industry  
 Sta. Cruz Seafoods Incorporated  
 Starcki Venture Corporation  
 Thunnidae Venture Corporation  
 Trinity Homes Industrial Corporation  
 Umbrella Fish Landing Association  
 Vitarich Corporation

**Fisherfolk Representatives/Council/Association  
 (Provincial)**

Abra  
 Antique  
 Artisanal Fisherfolk Sectoral Council – NAPC  
 Banilan Pakil, Laguna  
 Bohol, Bohol  
 Bulacan  
 Cagayan de Oro  
 Cagayan Valley  
 Cagayan Valley Fish Farmers MPC  
 Calumpit, Laguna  
 Cebu  
 Central Luzon Registered Tilapia Hatchery Organization MPC  
 Isabela City  
 Kalinga  
 Laguna de Bay

Lanao del Sur  
Manobay, Southern Leyte  
Marawi City  
Marinduque  
Naic, Cavite  
National Fisheries and Aquatic Resources Management  
Council  
Navotas City  
North Cotabato  
Pantukan, Compostella Valley  
Philippine Councilors League  
Romblon  
Sarangani Province  
South Cotabato  
Sta. Cruz, Laguna  
Tacloban Fisherfolk Urban Association  
Tangos, Navotas City  
Tubigon, Bohol  
Tucdao Kawayan, Biliran  
Wawa Maliban, Biñan City, Laguna  
Zamboanga

**LGU - Provincial/Municipal Planning Development Office**

Aparri  
Balanga City  
Baler, Aurora  
Baliguian, Zamboanga del Norte  
Bani, Pangasinan  
Basilan  
Bataan  
Bongao, Tawi-Tawi  
Bukidnon  
Camiguin  
Catanduanes  
Cavite

Claveria  
Concepcion, Iloilo  
Concepcion, Tarlac  
Dapa, Surigao del Norte  
Datu Odin Sinsuat, Maguindanao  
Davao del Norte  
Dolores, Eastern Samar  
Don Marcelino, Davao del Sur  
Ilocos Norte  
Iloilo City  
Ipil, Zamboanga Sibugay  
Kabasalan, Zamboanga Sibugay  
Kalamansig, South Cotabato  
La Union  
Laguna  
Lanao del Norte  
Marawi City  
Masantol  
Matnog, Sorsogon  
Pampanga  
Parang  
Quezon Province  
Rizal Province  
Romblon  
San Jose, Occidental Mindoro  
San Luis, Aurora  
Santa Rita, Samar  
Sindangan, Zamboanga del Norte  
Siocon, Zamboanga del Norte  
Sual, Pangasinan  
Sulu  
Tubod, Lanao del Norte  
Tukuran, Zamboanga del Sur  
Zamboanga City

## Zamboanga del Norte

### NGOs/CSOs/Other Partners

Bayang Pinoy Organization Incorporated  
Conservation International  
Ecosystems Improved for Sustainable Fisheries (ECOFISH) Project  
Greenpeace  
Integrated Rural Development Foundation  
LandBank of the Philippines  
Macajalar Bay Development Alliance  
MSC Philippines  
NGOs for Fisheries Reform  
OCEANA Philippines  
Pambansang Kilusan ng mga Samahang Magsasaka  
Partners for Resilience Philippines  
Tambuyog Development Center  
Tanggol Kalikasan Incorporated  
World Wildlife Fund Philippines  
Zoological Society of London

### Research Institution

Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development  
Philippine Institute for Development Studies  
Southeast Asian Fisheries Development Center – Aquaculture Department  
Southeast Asian Regional Center for Graduate Study and Research in Agriculture  
Worldfish Center Philippines

### State Colleges and Universities

Bohol Island State University  
Cagayan State University-Aparri Campus  
Carlos Hilado Memorial State College  
Central Luzon State University  
Iloilo State University of Science and Technology - Main Campus  
Isabela State University  
Marinduque State College

Mindanao State University - General Santos Campus  
Mindanao State University - Maguindanao Campus  
Mindanao State University - Naawan Campus  
Palawan State University  
Partido State University, Sagnay Campus  
Romblon State University - Santa Fe Campus  
Southern Luzon State University  
University of Antique – TLMC  
University of San Carlos  
University of the Philippines Los Baños  
University of the Philippines in the Visayas

#### **National Government Agencies and Councils**

BANGSAMORO Development Agency  
Bureau of Fisheries and Aquatic Resources  
BFAR-National Fisheries Research and Development Institute  
Climate Change Commission  
Commission on Higher Education  
DA-Agricultural Credit and Policy Council  
DA-Bureau of Agriculture and Fisheries Product Standards  
Department of Agriculture  
Department of Environment and Natural Resources-  
Environmental  
Department of Foreign Affairs  
Department of Health  
Department of Interior and Local Government  
Department of Labor and Employment  
Department of National Defense – Office of the Civil Defense  
Department of Science and Technology  
Department of Social Welfare and Development  
Department of Trade and Industry  
Department of Trade and Industry – Export Marketing Bureau  
DFA-Maritime and Ocean Affairs  
Maritime Industry Authority  
National Anti-Poverty Commission



National Coast Watch Council  
National Commission on Indigenous People  
National Council on Disability Affairs  
National Economic and Development Authority  
National Food Authority – Food Development Center  
National Mapping and Resource Information Authority  
Office of the Presidential Adviser on the Peace Process  
Philippine Agriculture and Fisheries Council  
Philippine Atmospheric, Geophysical and Astronomical  
Services Administration  
Philippine Coast Guard  
Philippine Council for Agriculture and Natural Resources  
Research and Development  
Philippine Crop Insurance Corporation  
Philippine Fisheries Development Authority  
Philippine National Police – Maritime Group  
Philippine Reclamation Authority  
Philippine Statistics Authority – Bureau of Agricultural  
Statistics  
Professional Regulation Commission  
Senate Committee on Agriculture and Food  
Technical Education and Skills Development Authority  
Committee on Agriculture and Food

Note: Our sincere gratitude to the more than 500 stakeholders and partners who had actively participated in the crafting of the Medium Term (2016-2020) CNFIDP. Efforts had been undertaken to ensure completeness of the names of organizations or affiliations represented and our apologies to those we had inadvertently missed out or who had failed to register their names.





# COMPREHENSIVE NATIONAL FISHERIES INDUSTRY DEVELOPMENT PLAN

## MEDIUM-TERM 2016-2020

REPUBLIC OF THE PHILIPPINES  
DEPARTMENT OF AGRICULTURE  
BUREAU OF FISHERIES AND AQUATIC RESOURCES

PCA BUILDING, ELLIPTICAL ROAD,  
DILIMAN, QUEZON CITY

[www.bfar.da.gov.ph](http://www.bfar.da.gov.ph)  
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COMPREHENSIVE NATIONAL FISHERIES INDUSTRY DEVELOPMENT PLAN MEDIUM-TERM UPDATE 2016-2020