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National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in Philippines

National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in

The Philippines

Bay of Bengal Programme Inter-Governmental Organisation

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Report Preparation

Dr. P. Krishnan, *Director, BOBP-IGO, Chennai*
Mr. Rajdeep Mukherjee, *Policy Analyst, BOBP-IGO, Chennai*
Dr Ahana Lakshmi, Senior Consultant, BOBP-IGO, Chennai

Background Research

Dr. T. Velumani, Project Scientist, *BOBP-IGO, Chennai*
Dr. K. Nirmala, Consultant, *BOBP-IGO, Chennai*
Dr. Anisha Shafni John, Research Associate, *BOBP-IGO, Chennai*
Ms Afifat Khanam Ritika, BIMReN Fellow, *BOBP-IGO, Chennai*
Ms Bhoomika Kosambi, Intern, *BOBP-IGO, Chennai*
Mr Nihal Kumar, Intern, *BOBP-IGO, Chennai*

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National Report on Strengthening Sustainable Aquatic Food Value Chains for Enhanced Food Security and Nutrition in The Philippines

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1. Introduction and Context

1.1. A short overview of the country's demographic and economic profile.

The Philippines, located in Southeast Asia between Taiwan to the northwest and Borneo to the south, is an archipelago of 7,641 islands spanning more than 300,000 square km of territory[1] with over 116.8 million people (as of recent estimates[2]). It is divided into three island groups Luzon, Visayas, and Mindanao, where the population is largely concentrated; with rapid growth contributing to increased demand for resources and services.

The population is predominantly young, with a high proportion under 30 years of age. Urbanisation is increasing, particularly around Metro Manila, Cebu, and Davao, while rural areas face challenges of poverty and limited access to basic services. Approximately 49% of the population resides in urban areas, while rural communities, particularly in disaster-prone zones, face higher vulnerability.

Farming and fishing households face high levels of food insecurity due to frequent natural disasters such as typhoons, earthquakes and floods, as well as decades of conflict in the Autonomous Region of Muslim Mindanao, the country's poorest region. These factors have displaced agriculture-dependent families and limited their sources of income and food. Although the Philippines is one of the most disaster-prone countries in the world, it is also a leader in moving from reactive emergency response to proactive disaster risk reduction. The Department of Agriculture, working with FAO technical experts, is implementing a national disaster risk reduction strategy for agriculture and fisheries[3]. In 2024, the government of the Philippines, through the Bureau of Fisheries and Aquatic Resources (BFAR) under the Department of Agriculture (DA).

Agriculture, including crops, livestock, poultry, and fisheries, remains a major source of livelihood, engaging around 22% of the labour force. Agricultural GDP from fisheries is 12.74% and GDP from fisheries is 1.19%[4]. A total of 2.3 million fisher folk engaged in diverse fishing and aquaculture activities were registered in the BFAR Fisher folk Registration System (FishR) in 2023[5]; Figure 1.1 gives the distribution by fisheries livelihood.

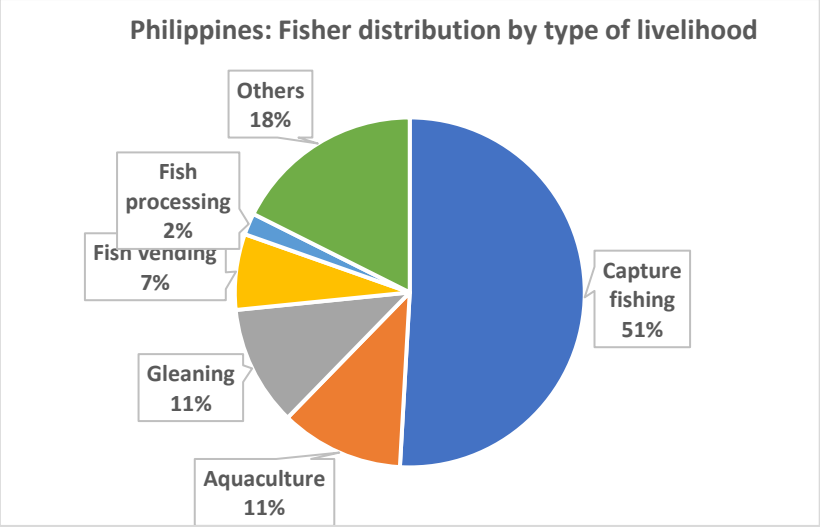

Figure 1.1: Fisher distribution by type of livelihood

There are 355 large-scale (>150 GT), 2224 medium-scale (20.1-150 GT) and 1981 small-scale (3.1-20 GT) vessels. The number of registered municipal fishing vessels was 407215 in 2023[6].

Philippines, with support from FAO, has launched the country's first National Plan of Action for Small-Scale Fisheries (NPOA-SSF)[7].

In the Philippines, 16.6% of the population lived below the national poverty threshold in 2018, with the poorest communities primarily residing in disaster-prone areas. Food insecurity remains a major challenge, with 59 million Filipinos experiencing moderate to severe lack of consistent access to food between 2017 and 2019, up from 44.9 million in 2014–2016. Rapid population growth, limited resources, and recurring natural disasters continue to impede efforts toward poverty reduction and hunger eradication. In response, the government enacted RA 11291, the "Magna Carta for the Poor", in 2019, which formally recognizes rights to adequate food, decent work, housing, health, and quality legislation; however, the country still lacks a comprehensive national legal framework on food security and nutrition[8].

1.2. Key nutrition challenges (e.g., under nutrition, micronutrient deficiencies, overweight/obesity).

UNICEF Philippines reports highlight the coexistence of under nutrition, micronutrient deficiencies, and rising obesity rates among children, emphasising the need for integrated nutrition interventions. The Philippine Statistics Authority's SDG Indicators 2024 provide updated statistics on stunting, wasting, and micronutrient deficiencies among children under five, illustrating the persistence of under nutrition[9]. The World Bank's analysis on under nutrition offers insights into its scale, scope, and policy implications, while the National Nutrition Council draws attention to the increasing prevalence of overweight and obesity and its health consequences. Together, these sources underscore the urgent need for policies and programmes that address the triple burden of malnutrition and promote equitable access to nutritious diets across the population.[10]

In order to address the problem of malnutrition in the country, the Philippine Plan of Action for Nutrition (PPAN) wasformulated under the leadership of the National Nutrition Council (NNC). The PPAN is a policy and planning document and serves as a six-year strategic and directional plan that guides stakeholders toward achieving target nutrition outcomes. The PPAN 2023–2028, the 11th in a series of plans released since 1974, is aligned with AmBisyon Natin 2040, the Philippine Development Plan (PDP) 2023–2028, and other relevant national and international commitments. The plan highlights that Filipinos continue to experience the triple burden of malnutrition, where undernutrition, overnutrition, and micronutrient deficiencies affect a significant proportion of the population. Undernutrition in the form of stunting, wasting, and underweight remains prevalent among children under five, preschoolers, school-age children, and adolescents. Many pregnant women, particularly adolescents, are nutritionally at-risk (NAR) of delivering low birth weight babies, while adults and older persons suffer from chronic energy deficiency (CED). Overnutrition in the form of overweight and obesity is steadily increasing across all population groups, while micronutrient deficiencies, especially in vitamin A, iron, and iodine, continue to persist among vulnerable groups. Although notable improvements in reducing child undernutrition and micronutrient deficiencies have been achieved over the past decades, progress remains slower compared to other countries. Along with malnutrition, food insecurity affects 33.4% of households, with three in every ten experiencing moderate or severe food insecurity.
(source: Philippine Plan of Action for Nutrition 2023–2028)

Filipinos face multifaceted nutrition challenges, ranging from stunting, wasting, and micronutrient deficiencies to the growing concerns of overweight and obesity. Addressing malnutrition early is crucial due to its short- and long-term consequences on growth, health, and the country's overall development. In the short term, NAR pregnancies increase the likelihood of complications for both mother and child, with specific micronutrient deficiencies leading to birth defects and higher risk of low birth weight. Undernourished children are more vulnerable to infections such as diarrhea, measles, and pneumonia, which exacerbate malnutrition and hinder early learning outcomes. In the long term, malnutrition elevates the risk of non-communicable diseases (NCDs) such as cardiovascular diseases and diabetes, the leading cause of death globally (GBD, 2019). Obesity can also affect mental health among adolescents and young adults. Poor nutrition is associated with lower earning potential, reduced labor productivity, increased poverty, higher healthcare costs, and decreased educational investment efficacy. These issues necessitate a holistic, multi-sectoral approach involving government, civil society, the private sector, and individuals.
(source: Philippine Plan of Action for Nutrition 2023–2028)

Good nutrition continues to evade a significant portion of the population across all age groups. Undernutrition in the form of stunting, wasting, and being underweight affects preschoolers, school-age children, and adolescents, while adults and older persons experience CED. Overnutrition is increasing across all population groups, and micronutrient deficiencies in vitamin A, iron, and iodine persist. These three forms constitute the triple burden of malnutrition, with slow progress over recent decades due to multifactorial causes including genetic, cultural, social, economic, and environmental factors.

(source: Philippine Plan of Action for Nutrition 2023–2028)

Nutrition during pregnancy is important for both the mother and baby. The prevalence of nutritionally at-risk (NAR) pregnant women, which increases the risk of giving birth to low birth weight (LBW) babies, has shown a downward trend since 1998 and significantly decreased from 25% in 2015 to 16% in 2021, with a higher prevalence among teens (DOST-FNRI, 2022). Unlike NAR pregnant women, lactating women with chronic energy deficiency (CED), though declining, decreased slowly to a single-digit prevalence of 8% in 2021, while overweight and obesity among lactating women increased from 13.6% in 1998 to 30.6% in 2021. The prevalence of anemia among pregnant and lactating women is 23%, a moderate public health concern, while vitamin A deficiency is of mild public health significance at 3.0% among pregnant women and 2.2% among lactating women; inadequate consumption of sufficient and high-quality food remains a major contributor to malnutrition as nine (9) out of ten (10) fail to meet recommended energy and protein intakes with high inadequacies of vitamin A, vitamin C, iron, calcium, and B vitamins (DOST-FNRI, 2021). *(source: Philippine Plan of Action for Nutrition 2023–2028)*

Stunting prevalence among children 0–23 months remains of high public health significance, affecting one (1) in five (5) or 21.6% of children under two years old and increasing as the child advances in age, with a prevalence of 28.6% among children aged 12–23 months compared with only 8.9% among infants aged 0–5 months (DOST-FNRI, 2022). Underweight (12.3%) and wasting (7.2%) are both of medium public health significance among children under two years, with wasting being highest in this age group compared to children under five years overall. Anemia among children aged 6–11 months is of severe public health concern (DOST-FNRI, 2021). Poor infant and young child feeding practices remain a major challenge, as while 60.1% of children under six months are exclusively breastfed, this declines to 32.1% at five months and only 41.8% continue breastfeeding up to two years. Complementary feeding practices are also poor, with only 13.3% of children 6–23 months meeting the minimum acceptable diet (MAD), including only 2.6% among those aged 6–11 months, and MAD prevalence not significantly different across wealth quintiles. Moreover, 34.6% of children aged 6–23 months consume sweetened beverages and 45.7% consume foods considered unhealthy (DOST-FNRI, 2021). *(source: Philippine Plan of Action for Nutrition 2023–2028)*

Children 2–5 years old show high stunting prevalence at 26.6%, with stunting decreasing by age, slightly higher among girls, and significantly higher among those living in rural areas (29%) and in poor (29.3%) and poorest (42.2%) households (DOST-FNRI, 2022). Underweight affects 19.7% and overweight 5.9%, both of medium public health significance, while wasting has remained of medium public health significance over the last three decades with minor fluctuations. Overweight and obesity among children under five have gradually increased over the past 30 years but remain of low public health significance, with a brief increase into medium significance by 0.1 percentage point in 2013 before returning to low in 2015. Stunting among children under five has historically been of very high public health significance in the Philippines since 1989, dipping to the border of high and medium in 2008 and returning to very high in 2011, and has gradually decreased over the past six years while remaining high. Vitamin A deficiency among

children aged six months to five years is 15.5%, of moderate public health significance (DOST-FNRI, 2021).

Among school-age children (5–9 years), stunting was of very high public health significance in 2003 but has declined to the border of high and medium, while wasting has remained of medium public health significance over the past 20 years, with gradual increases from 2005 to 2013 and very gradual declines from 2015 to 2021. Overweight and obesity have been increasing, breaching the high public health significance category in 2018, with a steep increase apparent in this age group. In 2021, stunting is comparable across age groups, sex, and place of residence but significantly higher among poor (23.2%) and poorest (32.7%) households; wasting is significantly higher among males (7.8% vs 6%) and comparable across age, wealth, and residence; overweight prevalence is similar in both sexes, increases with age, and is significantly higher in urban areas (17.3%) and among rich (22.0%) and richest (34.6%) households (DOST-FNRI, 2022). *(source: Philippine Plan of Action for Nutrition 2023–2028)*

Among adolescents (10–18 years), stunting decreased to high public health significance, while wasting remains at the border of high and medium, being significantly higher among females. Overweight and obesity prevalence is 13%, highest among 10–12 years, urban residents (16.2%), and rich (17.6%) and richest (25.6%) households, related to poor diets, physical inactivity, and sedentary behaviors, with 70.2% of adolescents not sufficiently active. Adolescent anemia is mild at 7.0%, and over 90% have inadequate intake of calcium, iron, and vitamin C. About 38% of 13–15-year-olds drink at least one carbonated beverage daily, 74% consume fewer than three servings of vegetables, and only 47% of schools have access to safe drinking water. Poor lifestyle behaviors are also observed, with 2.3% of adolescents being current smokers and 13.2% current alcohol drinkers (DOST-FNRI, 2022). *(source: Philippine Plan of Action for Nutrition 2023–2028)*

Among adults (19–59 years), the proportion of those suffering from overweight and obesity nearly doubled over almost three decades, from 17% in 1993 to 40.2% in 2021, with two out of five adults being overweight or obese, and is more common among females and urban residents. High waist circumference (abdominal obesity) and waist-to-hip ratio are also more prevalent among females and those in urban areas (DOST-FNRI, 2022). Chronic energy deficiency (CED) declined from 14% in 1993 to 7.2% in 2021, with the highest prevalence noted among early adults (20–29 years). Anemia also declined, particularly among female adults (DOST-FNRI, 2021). Elevated blood pressure significantly declined, while high fasting blood sugar continues to increase, and impaired fasting glucose (110–125 mg/dL) or pre-diabetes increased more than three-fold over the past decade (DOST-FNRI, 2022). The increasing rate of overnutrition across life stages could be attributed to physical inactivity and poor diets due to increased access to processed foods high in sugar, unhealthy fats, and calories. More than half of current drinkers are binge drinkers, physical inactivity has slightly decreased, and smoking has declined steadily, with these patterns most evident among male adults and those in rural areas (DOST-FNRI, 2021). *(source: Philippine Plan of Action for Nutrition 2023–2028)*

Among older adults (60 years and above), chronic energy deficiency (CED) is classified as a medium public health problem. Three out of ten (31.6%) older persons are overweight

or obese, more common among females and those in urban areas. High waist circumference is significantly higher among females (30.2%) than males (5.4%) of the same age group (DOST-FNRI, 2022). Anemia slightly decreased in 2018–2019 (DOST-FNRI, 2021). Elevated blood pressure significantly decreased, with one in three (33.4%) older adults affected. Physical inactivity has slightly reduced, and the proportion of current smokers and binge drinkers among current drinkers has slightly declined, particularly among females (DOST-FNRI, 2021).

1.3. Summary of the importance of aquatic foods in national diets and livelihoods

The Philippine fisheries industry comprises marine fisheries, inland fisheries, and aquaculture. Marine fisheries can be further divided into municipal fisheries and commercial fisheries. Recreational fisheries have not developed in the country. Municipal marine fisheries operate in coastal waters within 15 km from the coastline ("municipal marine waters"), using vessels ≤3 GRT, as well as fishing without the use of vessels. Commercial fisheries operate outside municipal waters, using vessels >3 GRT. Inland fisheries operate in inland waters such as lakes, reservoirs and rivers, including estuaries. Aquaculture involves aquatic organisms in fresh, brackish and marine waters[11].

The total area of marine resources of the country, including the exclusive economic zone (EEZ), covers 2.2 million km², 200 nautical miles from its shores, and the coastal total area is about 266,000 km² with a coastline length of 36,289 km. Inland waters constitute 863014 km^2.

Aquatic foods are of critical importance to the Philippines, serving as a primary source of animal protein for the national diet and providing livelihoods for over two million people. Fish available is 26.2 kg/capita[12]. The sector is a cornerstone of the country's food security and a significant contributor to the national economy. Fish is consumed as fresh, fermented, dried, smoked or canned. However, data on the disposition of catch in the Philippines are incomplete. Around 70 percent of the total catch is consumed fresh or chilled, while 30 percent is processed into cured, canned, or frozen products, or disposed of live. The bulk of cured fish and fishery products are consumed locally, while only a small quantity is exported as ethnic products. Canned products, particularly tuna, are consumed locally in small quantities, and most of the frozen products are for export.

Traditional products, such as salted, dried, smoked and fermented fish, are common. These products are mainly manufactured where there is a guaranteed supply of raw material. The processors are generally small-scale, family establishments that have limited capital. The processing methods they employ vary considerably, resulting in inconsistent quality and limited shelf-life of finished products. The majority of catches from the municipal fisheries subsector is marketed, mostly in retail quantities, directly in traditional landing sites. There are middlepersons who buy fish from fishers. It is mostly women who vend fish caught in small volumes that are sold house-to-house in the village or surrounding communities. They then either sell these products in the local wet market or process them into dried, smoked or fermented products. Traditional processed fish products (e.g. smoked, dried, salted, fermented and marinated/pickled) are sold in wet markets throughout the country. Some

products are sold in supermarkets, including canned/bottled fish, deboned milkfish, and specialty products (e.g. pasteurized fish paste, crab fat) [13].

On the part of the National Nutrition Council (NNC), the importance of aquatic foods in the national diet is being advocated through the conduct of nutrition education classes using various information, education, and communication (IEC) materials such as Pinggang Pinoy (Filipino Food Plate), the 10 Kumainments (local version of the Nutritional Guidelines for Filipinos), and the Food Pyramid.

Likewise, the NNC is implementing the Tutok Kainan Dietary Supplementation Program in PPAN priority areas, targeting nutritionally at-risk pregnant women and undernourished children aged 6–23 months. This program aims to prevent stunting among preschool children and to augment the income of fisherfolk and farmers. Under this Dietary Supplementation Program, standard recipes developed by DOST-FNRI are used, which include aquatic foods. The duration of feeding is 90 days for pregnant women and 180 days for undernourished children.

There are also policies that support this program, such as Republic Act (RA) 11148, also known as the Kalusugan at Nutrisyon ng Mag-Nanay Act (Mother and Child Health and Nutrition Act). This Philippine law, enacted in 2018, strengthens integrated health and nutrition programs for the first 1,000 days of a child's life (from conception to age two), focusing on pregnant and lactating mothers, infants, young children, and adolescent girls to combat malnutrition and improve maternal and child health outcomes. This landmark law aims to scale up interventions during the first 1,000 days of life and provides an enabling environment for stakeholders to deliver critical early childhood care and development (ECCD) interventions from pre-pregnancy, pregnancy, and the first two (2) years of a child's life to support optimal nutrition and development and prevent childhood stunting.

Another policy is RA 11037, or the Masustansyang Pagkain para sa Batang Pilipino Act of 2017, an act institutionalizing a National Feeding Program for undernourished children in public day care centers, kindergartens, and elementary schools to combat hunger and undernutrition among Filipino children. This law provides for a national feeding program starting with children aged three (3) years old. However, it does not include a feeding program specifically targeting the first 1,000 days of life, including nutritionally at-risk pregnant women and children aged 6–23 months, which is the most critical period for preventing childhood stunting.

2. Country Snapshot Table

Table 2.1: Country Snapshot Table

Indicator	Year	Value	Source
Population (millions)	2023	114 891 199 (114.89 million)	UNFPA
GDP per capita (USD)	2024	USD 3,300	Globefish
Fish production – capture	2023	1,876,970.21 MT (commercial: 822,427.47, municipal: 1,054,542.74)	BFAR, 2023
Fish production aquaculture	2023	2,384,023.39 MT	BFAR, 2023
Municipal fisheries Inland vs. marine share (%)	2023	16.6% inland, 83.4% marine	BFAR, 2023
Top 3 capture species	2023	Tuna, Big-eyed scad Sardine	BFAR, 2023
Top 3 aquaculture species	2023	Seaweed Milkfish Tilapia	BFAR, 2023
Employment in fisheries & aquaculture ('000, men/women)	2023	2,299,127 (30% female)	BFAR, 2023
Exports (value, USD million)	2023	1,144,199	BFAR, 2023
Imports (value, USD million)	2023	938,286	BFAR, 2023
Per capita fish consumption (kg/year)	2018-19	34.3	BFAR, 2023
% of animal protein from fish	2021	42%	14
Estimated fish loss & waste (%)		17.25% in of landed catch in tuna 40% (by volume)	15 16
Women's participation in post-harvest (%)	2023	71% (32016/45260)	BFAR, 2023
Key compliance measures (traceability, HACCP, CDS, PSMA)		Implemented National Seafood Traceability System, HACCP for food safety, and alignment with the Port State Measures	17

Indicator	Year	Value	Source
		Agreement (PSMA) to combat IUU fishing	
Major climate/ environment risks		Rising sea temperatures, ocean acidification, stronger typhoons, sea-level rise, and habitat degradation, which threaten fish stocks, aquaculture, and coastal livelihoods.	18

3. Aquatic Food Production and Utilization

3.1. Trends in capture fisheries (inland and marine) and aquaculture.

The 2023 Philippine Fisheries Profile shows that capture fisheries (commercial and municipal, both marine and inland) have experienced a generally fluctuating but slightly declining trend in production volume over the past decade. In 2023, capture fisheries accounted for about 44% of total fisheries production, with municipal fisheries contributing 24.7% and commercial fisheries 19.3%. While volumes for commercial fisheries reached one of their lowest levels in ten years (around 822,000 MT), their value rose to a ten-year high due to stronger market prices. Marine municipal fisheries production posted a modest increase in 2023, but inland municipal fisheries showed a slight dip. Tuna remained the leading species in both municipal and commercial fisheries, and BARMM led inland municipal production.

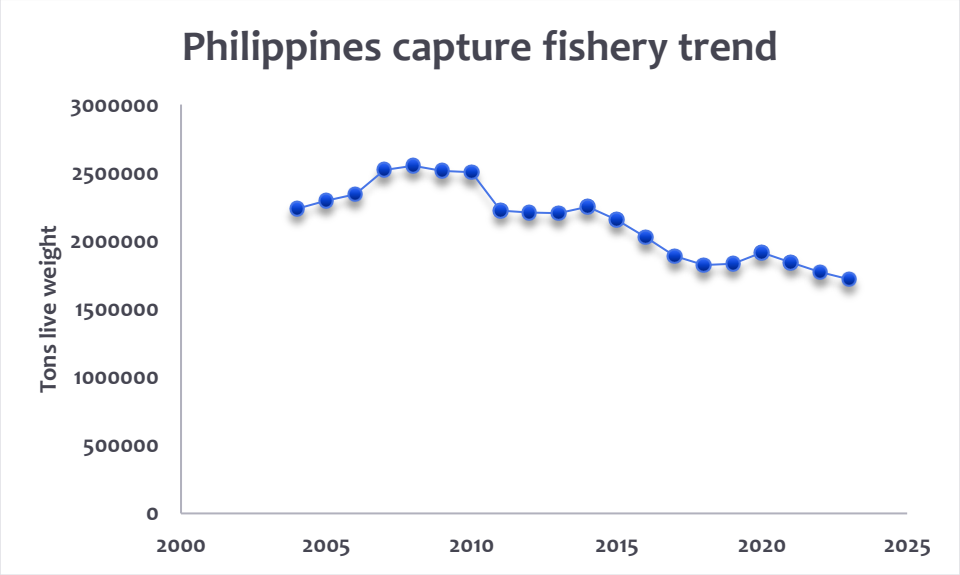

Figure 3.1: Twenty-year trend in capture fisheries
Data source FishstatJ

By contrast, aquaculture has become the dominant sub-sector, contributing about 56% of total fisheries production in 2023 with a 1.5% growth over the previous year. Total aquaculture production reached 2.38 million MT valued at PhP 124.02 billion, largely driven by seaweed farming which made up more than two-thirds of output. BARMM remained the

country's top aquaculture producer, accounting for nearly half of the total. This reflects a gradual shift from wild-caught to farmed production in the Philippines, with aquaculture steadily expanding while capture fisheries remain relatively stagnant.

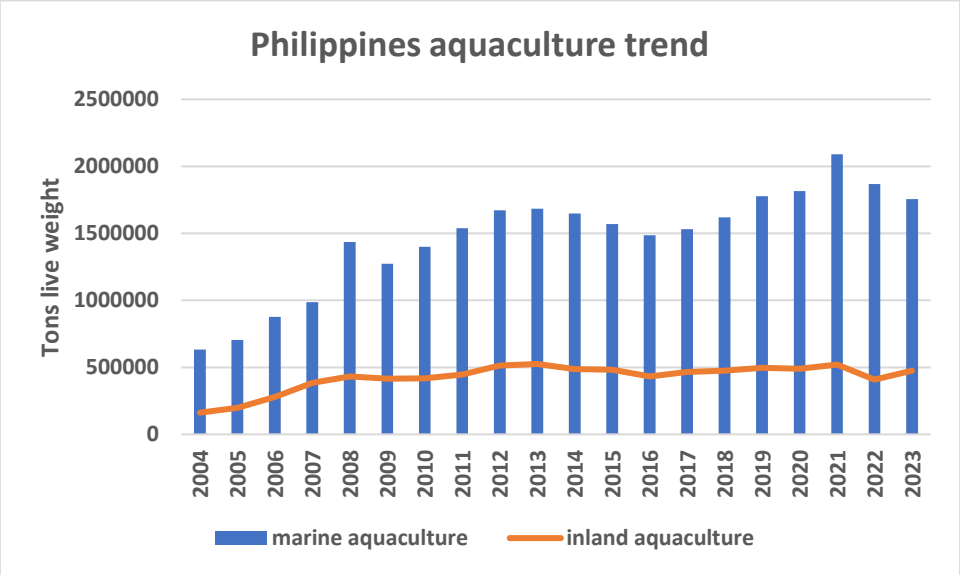

Figure 3.2: Twenty-year trend in culture fisheries

Data source: FishstatJ

3.2. Main species and product forms.

In capture fisheries, major species include tuna (notably yellow fin and bigeye), roundscad, anchovies (dilis), squid, and various shellfish such as oysters and mussels. These are harvested through municipal (small-scale) and commercial (large-scale) fishing operations. Aquaculture plays a significant role, with milkfish (bangus), tilapia, shrimp, and seaweed (particularly Eucheuma species) being the primary farmed species. Product forms vary widely, including fresh, dried, salted, fermented[19] (e.g., bagoong), canned, and processed products like fish paste and shrimp paste. These products are consumed locally and exported to countries such as the United States, Japan, and China[20].

Table 3.1: Top Ten Commodities in National Fisheries, 2023

	Commodity	Volume (MT)	Value ('000 PhP)
1	Seaweed	1,626,245.11	12,714,307.79
2	Tuna	409,797.17	51,075,836.56
3	Milkfish	355,425.87	45,859,221.39
4	Sardines	314,147.31	13,819,054.34
5	Tilapia	307,878.28	29,393,853.81
6	Roundscad	191,073.77	19,038,780.47
7	Big-eyed scad	120,204.91	14,365,724.41
8	Shrimp	88,673.80	30,451,634.13
9	Mackerel	77,795.53	11,360,558.78
10	Anchovies	52,030.71	3,972,008.11
11	Others	717,721.16	96,689,260.91

Source: BFAR, 2023

Table 3.2: Top ten commodities (production volume, MT)

	Aquaculture	Capture fisheries	Municipal fisheries
1	Seaweed	Tuna	Tuna
2	Milkfish	Sardines	Big eyed squad
3	Tilapia	Roundscad	Sardines
4	Shrimp	Big-eyed scad	Mackerel
5	Shellfish	Mackerel	Tilapia
6	Mudcrab	Tilapia	Squid
7	Catfish	Anchovies	Roundscad
8	Carp	Squid	Anchovies
9	Grouper	Slipmouth	Crab
10	Mudfish	Threadfin breams	Shrimp

Source: BFAR, 2023

3.3. Major production zones and seasonal characteristics.

The Philippines has divided its marine waters into 12 Fisheries Management Areas (FMAs) under Fisheries Administrative Order (FAO) No. 263, series of 2019. Each FMA is managed by a multi-stakeholder body that includes government agencies, local communities, and scientific advisors, aiming to promote sustainable fisheries and marine conservation[21].

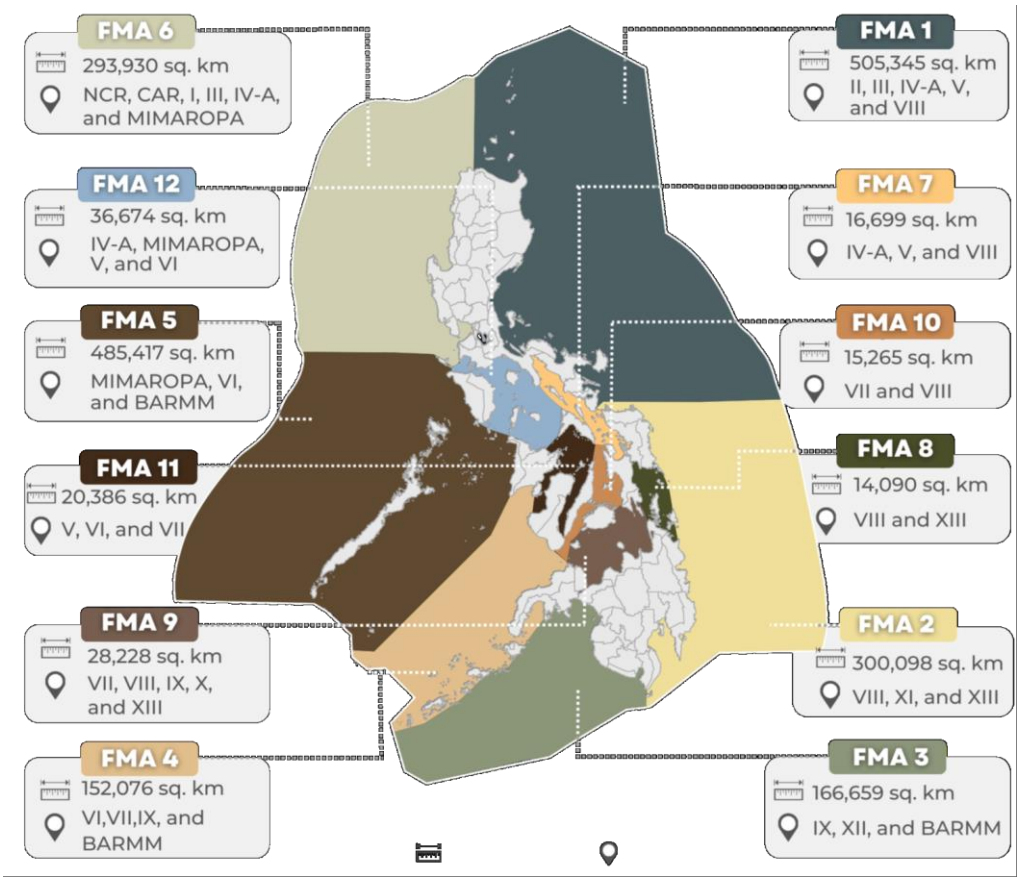

Figure 3.3: Fishery Management Areas (FMAs) in Philippines
(BFAR, 2023)

Among the landing centres, PFDA fish ports recorded the highest volume of commercial fisheries in 2023, where it registered a total volume of commercial fish catch at 316,604.12 MT, sharing 38.5% of the total volume of commercial capture fisheries. Furthermore, Region IX acquired the highest share of 26.2%, amounting to 215,562.75 MT of the total volume of commercial fisheries by landing center, and followed by Region XII (25.6%), NCR (8.8%), and Region VI (8.7%).

Key fisheries resources include sardines, mainly from the Visayan Sea and Zamboanga Peninsula; milkfish (Bangus), cultivated in Central Luzon and Western Visayas; tilapia, farmed extensively in freshwater ponds with Cagayan Valley as a major producer; and tuna, commercially caught especially in the Davao Region for both domestic consumption and export[22].

In the Philippines, seasonal characteristics strongly influence fisheries production. Closed seasons are implemented to protect spawning stocks (see Figure 3.4). The southwest monsoon from June to September brings heavy rains that affect fishing activities, while the northeast monsoon from October to February is cooler and drier, influencing fish distribution and availability. Certain species, such as sardines, have defined spawning periods, which typically coincide with closed seasons to ensure recruitment of young fish.

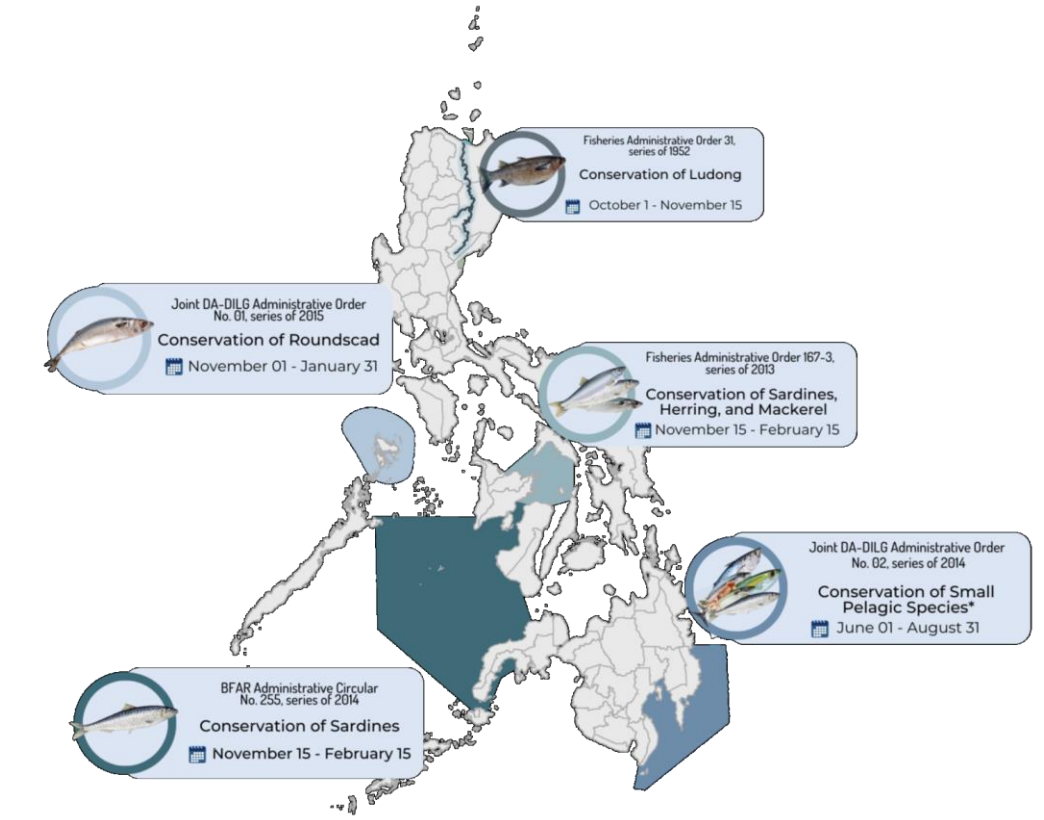

Figure 3.4: Schedule and Location of the closed fishing seasons
Source BFAR, 2023

3.4. Describe processing, preservation and domestic consumption practices.

In the Philippines, food processing, preservation, and domestic consumption practices are deeply rooted in both traditional methods and modern innovations, reflecting the country's rich culinary heritage and adaptive strategies.

Processing and Preservation Methods**:** Traditional Filipino food preservation techniques include fermentation, salting, smoking, and pickling. For instance, *burong isda* (fermented fish with rice) and *balao-balao* (fermented fish and rice mixture) are staples in Filipino cuisine, often used as condiments or main dishes. These methods not only extend shelf life but also enhance the flavours of the food[23].

Smoking, known locally as *tinapa*, is another prevalent method, especially for fish and meat. This technique imparts a distinct smoky flavour and is commonly used for preserving fish like bangus (milkfish) and tilapia. Historically, this practice dates back to the ancient Kingdom of Tondo. In modern times, the Philippines has seen a rise in the processed food industry, with products like canned goods, instant noodles, and snacks becoming integral to daily life. Despite the growth of ultra-processed foods, traditional preservation methods continue to be practiced, particularly in rural areas and among indigenous communities[24].

Domestic Consumption Practices: Food consumption in Filipino households often revolves around rice as the staple, accompanied by a variety of side dishes. The use of *sawsawan* (dipping sauces) such as *suka* (vinegar), *toyo* (soy sauce), *patis* (fish sauce), and *calamansi* (Philippine lime) is prevalent, adding depth and variety to meal[25]. Community-based food practices, such as communal eating and sharing meals during gatherings and festivals, are integral to Filipino culture. These practices not only foster social bonds but also ensure the efficient consumption of preserved foods. In summary, the Philippines showcases a harmonious blend of traditional and modern food processing and preservation methods, reflecting the nation's adaptability and rich culinary traditions.

4. Trade and Market Dynamics

4.1. Provide an overview of fish exports (species, value, markets).

From the total volume of exported fish and fishery/aquatic products, tuna registered the highest volume with 88,970 MT which indicates a 34.8% share to the total volume. This was followed by seaweeds and carrageenan with 15.0% share or equivalent to 38,380 MT, eel with 9.0% (23,019 MT), and grouper with 17,778 MT or 7.0% share to the total fisheries exports.

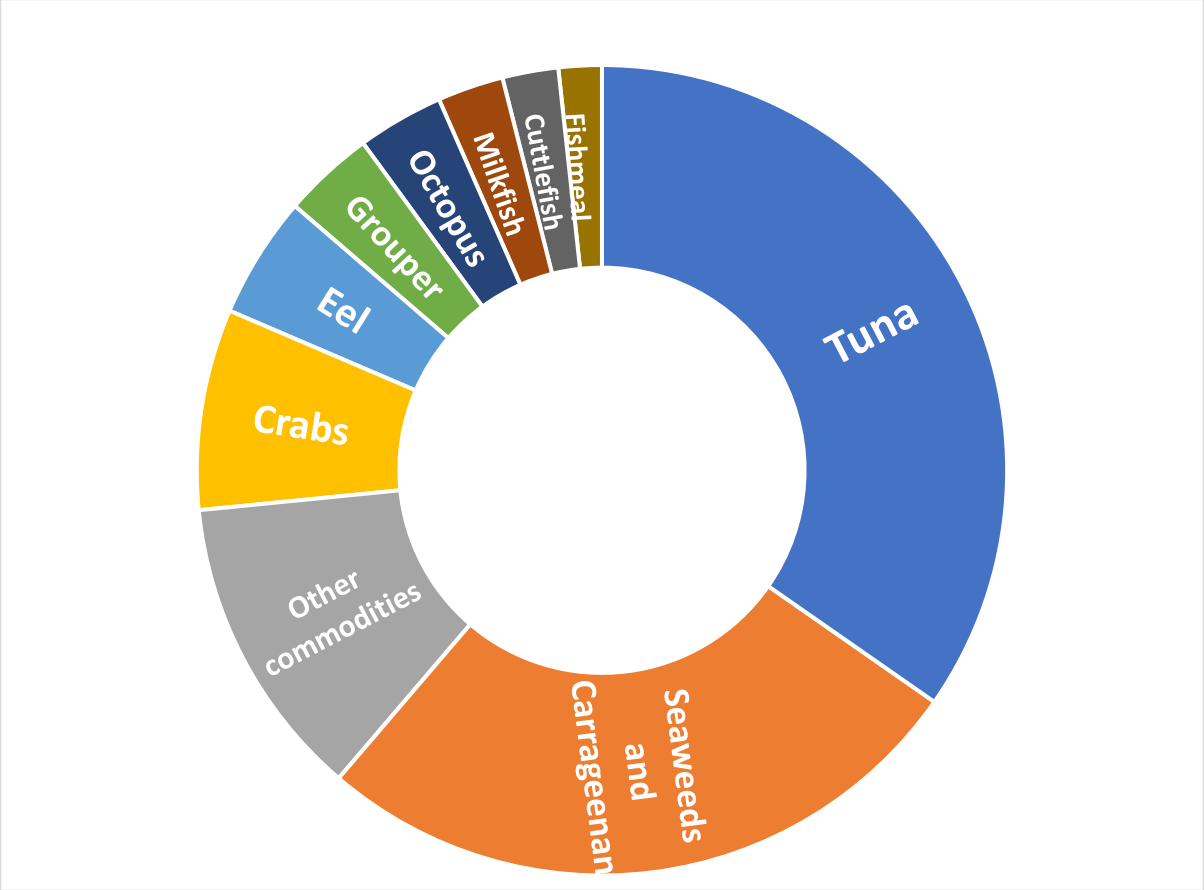

Figure 4.1: Major Fisheries Exports in Terms of Volume, 2023

Redrawn from BFAR, 2023

In 2023, tuna also ranked first in export value, accounting for 34.2% of the total value, which equates to PhP 21.80 billion. It was followed by seaweeds and carrageenan, which registered 26.2% of the total, amounting to PhP 16.68 billion. Crab came next with an export value of PhP 5.06 billion, representing 7.9% of the total, while eel had a 4.8% share, totalling PhP 3.03 billion[26]. The markets for species varies: the major market for Tuna and shrimp is Japan; crab, octopus and milk fish is USA;, Eel and Grouper is China and Cuttle fish is Taiwan.

In terms of major trading partners, the United States of America (USA) was the leading destination for the country's exported fish and fishery/aquatic products in 2023 with PhP 11.33 billion, contributing 17.8% to the total fisheries export value. Other countries with substantial shares in the country's total value of fisheries exports during 2023 were Japan with PhP 6.89 billion (10.8%), China with PhP 6.78 billion (10.7%), Germany with PhP 4.10 billion (6.5%), and Spain with PhP 3.95 billion (6.2%).

4.2. Key import flows and their drivers.

The Philippines imports a substantial volume of fish and seafood to meet domestic demand, particularly tuna (fresh, chilled and frozen), small pelagic species such as mackerel and sardines, and squid/cuttlefish.

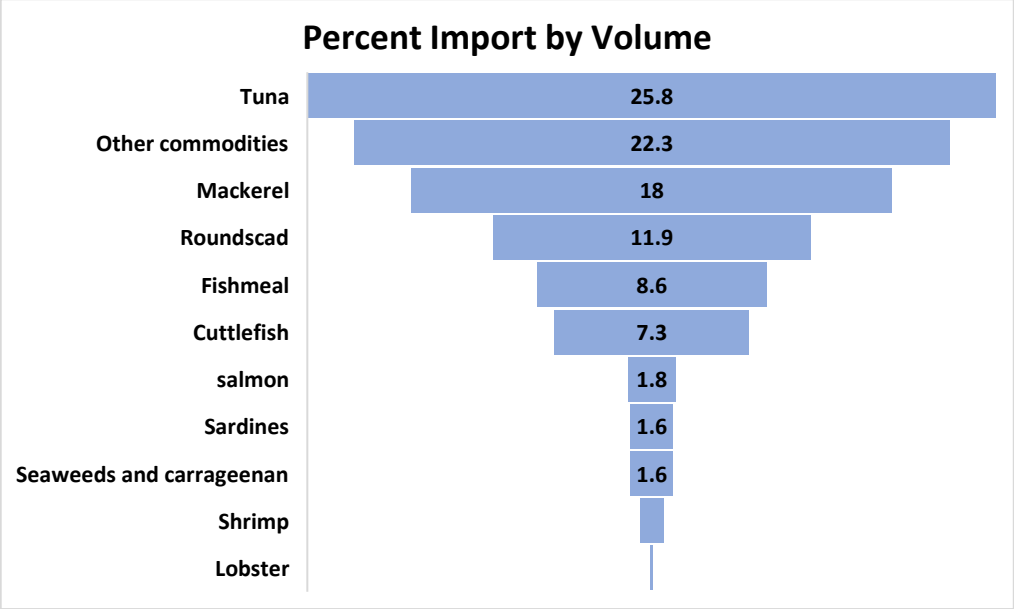

Figure 4.2: Major Fisheries Imports in Terms of Volume, 2023
Source: BFAR, 2023

Of the total imported fish and fishery/aquatic products, tuna had the highest imported volume with 141,273 MT, wherein, the 33.0% of the imported tuna came from Papua New Guinea. Other commodities with significant import volumes included mackerel, roundscad, and cuttlefish with 98,515 MT, 65,180 MT, and 40,045 MT, respectively.

These imports come mainly from Papua New Guinea, China and Vietnam and are destined for wet markets, food service industries and canning plants. The Bureau of Fisheries and Aquatic Resources (BFAR) issues Certificates of Necessity to Import (CNI) to allow bulk imports of frozen fish, recent approvals ranged from 25,000 MT to 55,000 MT to stabilize supply and prices during lean seasons and to supplement local catch for processing[27].

These flows are driven mainly by domestic supply gaps, government policy and changing demand. Overfishing, typhoons and closed seasons limit local production, while rising urban incomes and diversified consumer preferences increase demand for high-value or non-local species. Imports also supply the tuna-canning sector with raw material that cannot be fully met domestically and are used by the government to curb inflation in fish prices and ensure food security. BFAR's modernization plan seeks to reduce import dependence by strengthening aquaculture and post-harvest systems, but at present imports remain essential to bridge seasonal and structural shortages[28,29].

The following figures indicate food balance (last five years) sheets for aquatic foods.

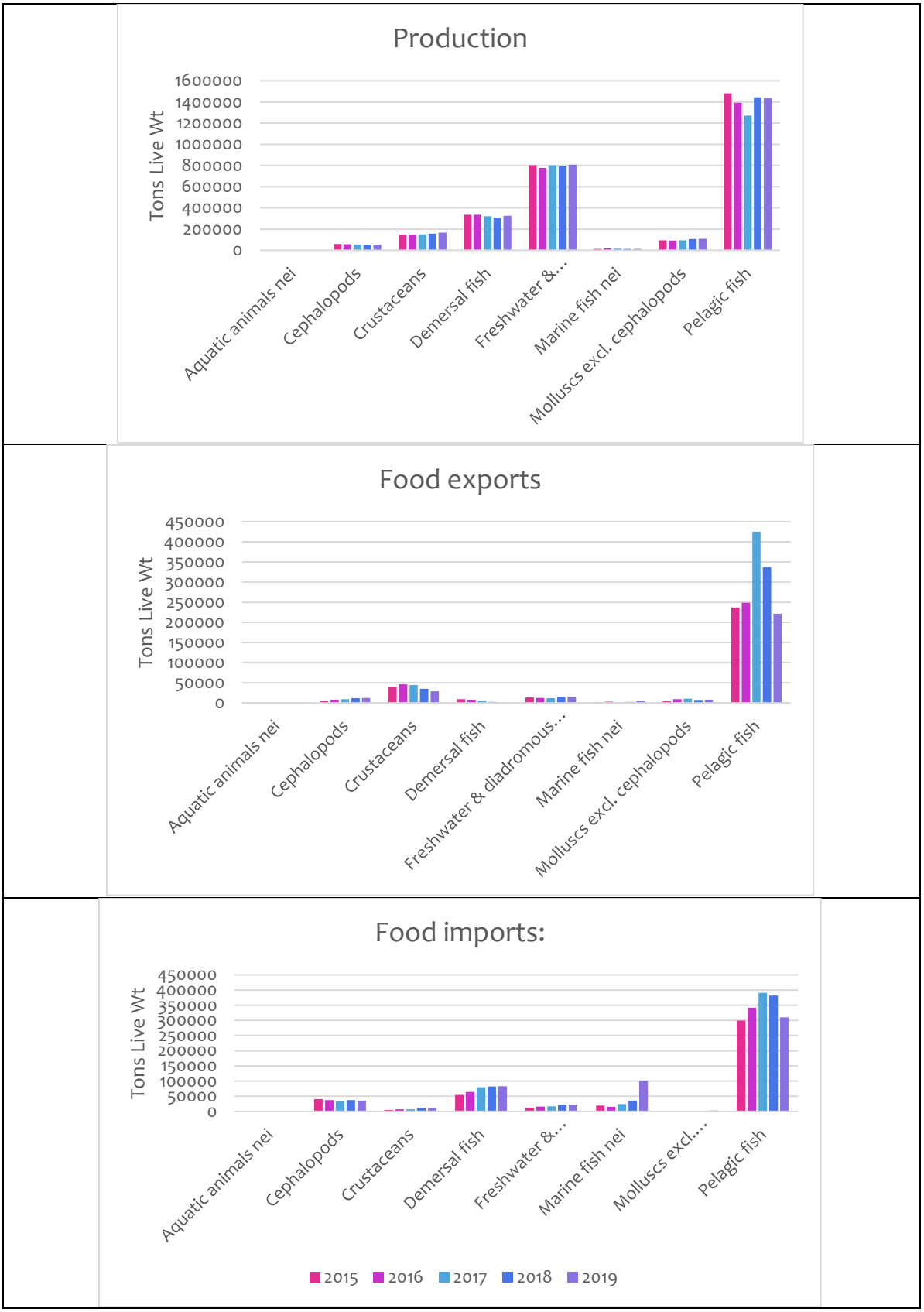

Figure 4.3 Aquatic Food Balance Sheet
Data from FishstatJ

4.3. Highlight role of domestic markets in providing affordable fish to households

In many public wet markets and primary retail outlets, commonly consumed freshwater fish like tilapia and bangus (milkfish) are sold at price levels much lower than more premium or imported varieties. For example, medium-sized tilapia in the NCR have been recorded at about ₱120 per kilo, and medium-sized bangus at about ₱180/kg, when sourced from nearby farm production. These species are locally farmed or produced relatively close to demand centres, meaning lower transport and distribution costs, which helps keep prices within reach for many households. Fresh local small pelagic species like galunggong (round scad) also fill supply gaps especially when saltwater catches are low or during closed fishing seasons. When galunggong supply rebounds (e.g., after fishing bans lift in important source areas), prices in local markets tend to moderate[30]. However, affordability has limits and is subject to shocks. Retail prices of these staples rise substantially in response to supply disruptions (weather events, closed seasons), logistical challenges, or trader mark-ups. E.g. in Metro Manila, reported retail price hikes of ₱30-₱80/kg for galunggong, tilapia, and bangus following shortages[31]. Even when farm gate prices (what fisher folk or farmers get) remain low, retail prices may increase disproportionately, due to middlemen and distribution inefficiencies[32]. Thus, while domestic markets and local production are key to keeping fish affordable for many households, full affordability depends on consistent supply, good transport/cold chain infrastructure, and regulatory oversight to limit excessive mark-ups.

4.4. Identify barriers and opportunities (tariffs, non-tariff measures, certification, and traceability).

The Philippine fisheries sector faces several barriers related to tariffs, non-tariff measures (NTMs), certification, and traceability. Imports of fish and seafood require a Certificate of Necessity to Import (CNI), and some species are subject to quotas, which can delay or limit market access. Complex tariff and fiscal incentives, tied to multiple certifications, add to administrative hurdles. Export markets increasingly demand sustainability certifications and compliance with environmental standards, such as in the tuna sector, while traceability and labelling gaps including mislabelling or incomplete documentation-can hinder market credibility. Regulatory uncertainty and overlapping jurisdiction further exacerbate these challenges, especially when court rulings or policy changes affect fishing operations in municipal waters.[33] [34] [35]

At the same time, there are significant opportunities for improving competitiveness and sustainability. Expanding sustainability certifications, such as MSC for tuna fisheries, can unlock premium export markets. Strengthening traceability systems through digital catch documentation and improved labelling builds buyer confidence. Reforming NTMs to be more predictable, simplifying licensing procedures, and leveraging tariff and fiscal incentives for modernization of vessels, gear, and cold chain infrastructure can enhance productivity and reduce post-harvest losses. Additionally, policies that support the distribution of low-value fish to domestic markets help maintain affordability while balancing export goals.[36] [37]

5. Nutritional Contribution of Fish

5.1. Quantify fish's share in total protein intake.

In the Philippines, fish plays a significant role in the national diet, providing 18.3% of total protein intake and 42.2% of animal-sourced protein. This underscores its importance as a primary source of protein for many Filipinos, especially in coastal regions where fish consumption is higher[38]. However, fish consumption has been declining over the years. From 1993 to 2018–2019, per capita fish consumption dropped from 36 kg to 14.32 kg annually. Factors contributing to this decline include rising fish prices, overfishing, and environmental challenges. Despite this trend, fish remains a staple in Filipino cuisine, with 71% of families consuming seafood, particularly sardines, at least five times a month.

5.2. Highlight key micronutrients supplied (Ca, Fe, Zn, I, Se, Vitamin A, Vitamin B12, DHA/EPA).

Fish is a vital source of essential micronutrients in the Filipino diet, supplying key vitamins and minerals that support various bodily functions. Notably, fish provides significant amounts of vitamin B12, crucial for nerve function and red blood cell formation, and vitamin A, which supports vision and immune health. Additionally, fish contributes to the intake of calcium, iron, zinc, iodine, and selenium, minerals important for bone health, oxygen transport, immune function, and thyroid regulation. Omega-3 fatty acids, specifically DHA and EPA, found abundantly in fatty fish like sardines and mackerel, are essential for heart and brain health. Small-scale fisheries, which are prevalent in the Philippines, play a substantial role in providing these nutrients to coastal communities, often supplying a significant portion of the population's daily requirements[39]. The nutritional profile of fish varies among species. For instance, small fish consumed whole, such as dried anchovies or sardines, are particularly rich in calcium and vitamin B12. Shellfish like clams and oysters are excellent sources of iron and zinc. Fatty fish, including mackerel and sardines, are high in omega-3 fatty acids (DHA and EPA), which are beneficial for cardiovascular health. These nutrient-rich fish are often more affordable and accessible to Filipino households, especially in rural and coastal areas, making them a crucial component of the local diet[40].

5.3. Note the role of small fish species consumed whole.

In the Philippines, small fish species such as sardines (*Sardinella lemuru*, *S. gibbosa*, and *S. tawilis*), anchovies (*Stolephorus spp.* or *dilis*), round scad (*Decapterus macrosoma* or *galunggong*), mackerel (*Rastrelliger brachysoma*), and slipmouths (*Leiognathus spp.* or *sapsap*) are commonly consumed whole, including bones, head, and viscera. These small pelagic species are affordable and widely available, forming a vital part of the Filipino diet, particularly among low-income and coastal households. Because they are eaten whole, they provide essential micronutrients such as calcium, iron, zinc, and vitamin A, which contribute significantly to nutritional security and dietary diversity. Their consumption supports both household nutrition and the livelihoods of small-scale fishers who depend on their catch for income and food[41].

5.4. Summarize evidence from national nutrition surveys or literature.

National Nutrition Surveys conducted by the Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI) provide critical evidence on dietary intake patterns and nutrient adequacy among Filipinos. The National Nutrition Survey (NNS) consistently shows widespread inadequacies in micronutrient and protein intakes across different population groups in the Philippines, highlighting the important nutritional role of fish in the Filipino diet.

Inadequate Micronutrient Intakes in Young Children (2013 NNS): From the National Nutrition Survey 2013, children aged 6–59.9 months show very high prevalence of inadequacy for iron, calcium, vitamin C, and zinc; 60-90% of children have intakes below the Estimated Average Requirement (EAR) for these nutrients[42].; Fish was identified among the top food sources for protein, calcium, iron, zinc, and vitamin A in toddlers and young children[43].

In the 2018-2019 ENNS, the average total food intake of infants and preschool children was 287 grams/day (~800 kcal). Rice remained the most commonly consumed food item (69 grams), while eggs were the most commonly consumed protein-rich food (28.7%). Fish consumption contributed to dietary protein, calcium, and iron intake, especially among poorer households. Only 18.4% of this age group met the daily Recommended Energy Intake (REI), while 70.8% met the EAR for protein.

Adults also show large gaps: Among Filipino adults (2013 survey), there is high prevalence (> 50%) of inadequate intakes of iron, vitamin C, calcium, riboflavin, folate, thiamine, and vitamin A. Diets are heavily rice-dominant; vegetable, fruit, and dairy consumption is low. Fish ranks among top sources for some nutrients (e.g., calcium) in adult diets[44]. For adults, the 2018-2019 ENNS showed that fish, meat, and poultry consumption was highest among adults with mean intake of 131 grams/day. Only 45.8% of adults met the EAR for protein, while calcium inadequacy remained high at 96.1%.

Role of Fish in Diet Diversity & Vulnerable Households: Among poorer households and rural populations, fish (which includes small fish species) forms a more important share of animal-source foods than meat or poultry. In infant/toddler diets, households in the poorer quintiles depend more on fish for protein; Dietary diversity is low overall, especially in lower socio-economic status (SES) groups, and this correlates with deficiencies in many micronutrients[45].

The 2018-2019 ENNS showed that rice and rice products remained the most consumed food group, followed by fish and fish products, and vegetables, regardless of household size. Poor households had higher intake of carbohydrate-rich foods (e.g., cereals and products), while rich households had higher intake of protein-rich foods including fish. Fish, meat, and poultry accounted for a larger share of daily household food expenditure, particularly in urban households. Despite the reliance on fish, only 55.1% of households met the Estimated Average Requirement (EAR) for protein, with fish and seafood serving as key sources of good-quality protein in many Filipino diets.

Fisher folk Households: Children in households headed by fisher folk still show high rates of under nutrition (stunting, underweight, wasting) compared to national averages, despite their proximity to fish resources. This suggests that even when access is better, other factors (income, food preparation, diversity) influence nutritional status[46].

Among school-age children, the ENNS 2018-2019 reported an average total food intake of 455 grams/day (~1,187 kcal). Rice was the top consumed food item (94.7%), followed by coconut oil and eggs (34.3%). Fish contributed to protein and micronutrient intakes, particularly calcium and vitamin A. Only 13.9% met the daily REI, while 67.5% met the EAR for protein. There were high prevalence of inadequacies for vitamin C (90%), vitamin B1 (94.9%), vitamin B2 (75.4%), vitamin A (76.7%), iron (97.1%), and calcium (93.3%).

Adolescents had an average daily intake of 616 grams (~1,591 kcal). Rice was most commonly consumed (247 grams), followed by chicken eggs and coconut oil. Fish consumption contributed to protein and micronutrient intake. Only 9.1% met the daily REI, and 43.9% met the EAR for protein. Vitamin A inadequacy was observed in 75.8% of adolescents, with high prevalence also for vitamin C (97.9%), vitamin B1 (79.4%), vitamin B2 (90.8%), iron (99.1%), and calcium (92.2%).

Pregnant women had an average total food intake of 599 grams/day (~1,512 kcal). Rice was consumed by 94.9% of pregnant women, followed by coconut oil and chicken eggs. Fish, meat, and poultry consumption was 111 grams on average, contributing 18.5% to the total intake. Only 17.2% met the EAR for protein. High prevalence of inadequacies was observed in vitamin A (70.5%), vitamin C (93.6%), vitamin B1 (91.1%), vitamin B2 (94.2%), and calcium (91.0%).

Lactating mothers had an average total food intake of 619 grams/day (~1,632 kcal). Rice was consumed by 94.8% of mothers, followed by coconut oil and 3-in-1 coffee. Commonly consumed protein-rich foods included eggs (28.6%), lean pork (16.3%), and chicken meat (10.8%). Fish contributed to protein and micronutrient intake. Only 19% met the EAR for protein. High prevalence of inadequacies was observed in vitamin A (72.7%), vitamin C (96.1%), vitamin B1 (86.7%), vitamin B2 (93.1%), and calcium (94.0%)

Protein intake & Fish's contribution: The "State of Fish in Nutrition Systems (FINS)" work along with the 2018-2019 Expanded NNS found that only about 55.1% of households meet recommended protein intakes. Fish and seafood are key sources of good-quality protein in many Filipino diets[47].

Based on the 2018–2019 Expanded National Nutrition Survey (ENNS) and the "State of Fish in Nutrition Systems (FINS)" study, only 55.1% of Filipino households meet the recommended protein intake. The gap is even more stark among individual population groups that are in dire need of this nutritional intake. Only 17.1% among pregnant women, 19.1% among lactating mothers, and 27.2% among the elderly are meeting the recommended intake, according to the same survey in 2018-2019. Fish & seafoods are the main source of good quality protein for Filipinos, highlighting the importance of ensuring availability and accessibility.

Moreover, the 2021 ENNS reported that 97.2% of Filipino adults and 95.5% of elderly individuals have calcium deficiency. The DOST-FNRI recommends consumption of calcium-rich foods such as small fish, shellfish, cereals, green leafy vegetables, and dairy products to address this gap.

5.5. Gaps in data on small fish consumption in Philippines:

Most surveys & literature don't differentiate between *small fish eaten whole* vs *fish flesh only*. It's not always clear whether fish consumption figures include bones, heads, viscera, which affects micronutrient estimates (calcium, vitamin A, etc.). There is limited direct evidence quantifying how much small whole fish consumption contributes specifically to calcium or other micronutrients in national-level data.

6. Fish Loss and Waste (FLW)

6.1. The main points along the chain where losses occur (landing, transport, processing, and retail).

At Landing: A study by the National Fisheries Research and Development Institute (NFRDI) estimated that postharvest losses at landing sites amount to approximately 0.97% for capture fisheries and 4.02% for aquaculture commodities. This translates to a financial loss of about PHP 15.2 million annually.

During Transport: Losses during transportation are influenced by factors such as inadequate cold chain infrastructure, leading to spoilage and quality degradation.

At Processing: Processing stages, including drying, smoking, and salting, incur weight loss, trimming losses, and quality downgrades, often exacerbated by poor hygiene and packaging. *At Retail:* In wet markets, fish may spoil due to exposure to heat, delayed sales, and inadequate storage or display infrastructure.

The Bureau of Fisheries and Aquatic Resources (BFAR) has recognized the importance of addressing FLW and has outlined strategies in its Comprehensive National Fisheries Industry Development Plan (CNFIDP) 2021–2025. The plan aims to reduce postharvest losses and enhance the competitiveness of Philippine fish and fishery products. [48] [49] [50]

6.2. Available estimates of quantity and value lost.

Fish loss and waste (FLW) in the Philippines present significant challenges to food security and the economy. Estimates indicate that between 25% to 40% of fish produced are lost due to various factors such as inadequate post-harvest equipment, poor handling, and lack of cold storage facilities Oceana Philippines[51].This translates to substantial economic losses, with some regions reporting post-harvest losses of up to 40% in specific municipalities[52].

Table 6.1: Overall estimated loss of capture commodities

Commodity	Landing Area				Wet Market			
	Volume assessed (MT)	Volume Loss (MT)	TMFL (%)	FL (PHP) (in ,000)	Volume assessed (MT)	Volume Loss (MT)	TMFL (%)	FL (PHP) (in ,000)
Small pelagics	378.02	10.13	1.84	247	53.34	.12	.17	6.2
Sardines	171.21	11.75	2.14	219	17.63	.19	.27	7.2
Total	549.23	21.88	3.98	466	70.97	.31	.44	13.57

TMFL: Total Market Force Loss (Source: Tadifa et al, 2022)

FL: Financial Loss

For instance, a study in Samar province found that small-scale fisheries experienced losses ranging from 25% to 75% along the value chain, particularly in remote and impoverished areas Global Nutrition Report[53]. Nationally, if post-harvest losses were reduced by half, it could save approximately 133,000 metric tons of fish annually, benefiting nearly 10 million Filipinos dependent on small-scale fisheries Global Nutrition Report.

These figures underscore the urgent need for improved infrastructure, better handling practices, and policy interventions to mitigate FLW and enhance the sustainability of the Philippines fisheries sector.

6.3. Causes (infrastructure, handling, storage).

In the Philippines, post-harvest losses in fisheries are significantly influenced by issues related to infrastructure, handling, and storage. Infrastructure limitations, such as inadequate landing sites, insufficient cold chain facilities, and poor transport networks, often lead to fish spoiling before reaching markets. Many rural fishing communities lack proper ice-making facilities and insulated transport, resulting in rapid deterioration of catch, particularly for small pelagic and highly perishable species. Handling practices at landing and during transport are often suboptimal; fish may be left exposed to heat, stacked improperly, or handled roughly, causing physical damage that accelerates microbial spoilage. Storage challenges also contribute heavily: cold storage facilities are limited in capacity and sometimes unreliable due to inconsistent electricity supply, while traditional preservation methods (like sun-drying or salting) are often insufficient for high-value species intended for fresh consumption. Together, these factors create cumulative losses along the value chain, reducing both the quantity and economic value of fisheries products in the Philippines.

Post-harvest losses in the Philippine fisheries sector are a significant concern, with spoilage rates ranging from 25% to 40% due to inadequate infrastructure, handling, and storage practices. These losses not only affect food security but also result in substantial economic losses for fisher folk and the broader supply chain.

Infrastructure Challenges

1) **Cold Chain Deficiencies**

The Philippines faces a critical shortage of cold chain infrastructure, including refrigerated storage and transport facilities. Existing cold storage units are often underutilized or

strategically located away from production areas, leading to inefficiencies and increased spoilage during transit. The Cold Chain Innovation Hub's 2020 report highlights that most cold chain systems are developed and operated by major logistics companies and retailers, which are disconnected from local production regions[54].

2) Limited Post-Harvest Facilities

Many fishing communities lack essential post-harvest facilities such as ice-making plants, processing units, and proper landing sites. This deficiency hampers the preservation of catch quality and reduces the shelf life of fish products. The Iloilo Fish Port Complex, for instance, has undergone rehabilitation to include new fish processing plants and cold storage facilities, aiming to improve post-harvest handling.

Handling Practices

1) **Inadequate Training**: Fisher folk and traders often lack training in proper handling techniques, leading to physical damage to fish during unloading, sorting, and transport. This damage accelerates spoilage and reduces the marketability of the catch.
2) **Exposure to Environmental Factors**: Fish are frequently exposed to high temperatures and poor air circulation during handling, which exacerbates microbial growth and quality deterioration. Implementing standardized handling protocols and providing training can mitigate these issues.

Storage Limitations

1) **Insufficient Cold Storage Capacity**: The lack of adequate cold storage facilities near fishing areas leads to delays in cooling the catch, resulting in quality loss. The Philippine Cold Chain Industry Roadmap 2022–2025 emphasizes the need for increased investment in cold storage infrastructure to support the fisheries sector[55].
2) **Power Supply Issues**: Unreliable electricity supply in rural areas affects the operation of cold storage units, leading to interruptions in the preservation process and increased spoilage rates.

Government Initiatives and Policy Framework

1) **Comprehensive National Fisheries Post-Harvest and Marketing Assistance and Infrastructure Plan (CPHMAIP) 2018–2022**: This plan aims to reduce fisheries post-harvest losses to 10% and enhance the competitiveness of Philippine fish and fishery products through improved infrastructure and support services[56].

2) **Republic Act No. 8550 (Fisheries Code of 1998)**: This law mandates the provision of appropriate technology, research, financial, and marketing assistance support to municipal fisher folk, including the construction of post-harvest facilities[57]

6.4. Mitigation practices or innovations.

In the Philippines, addressing post-harvest losses in fisheries has led to the adoption of several innovative practices and technologies aimed at improving handling, storage, and overall efficiency.

One notable advancement is the deployment of solar-powered cold storage units in remote areas. These off-grid systems, such as the Ecofrost cold room developed by Next Agri Corp

Philippines and Ecozen, utilize solar energy to provide refrigeration, reducing reliance on unreliable electricity grids and mitigating spoilage due to inadequate cooling[58].Additionally, the rehabilitation of facilities like the Iloilo Fish Port Complex has introduced modern infrastructure, including processing and refrigeration units, to support the transhipment of goods and ensure the quality of marine products. These initiatives, along with policy frameworks such as the Comprehensive National Fisheries Post-Harvest and Marketing Assistance and Infrastructure Plan (CPHMAIP) 2018–2022, aim to reduce fisheries post-harvest losses and enhance the competitiveness of Philippine fish and fishery products[59].Collectively, these efforts represent a concerted push towards modernizing the fisheries sector, improving livelihoods for fisher folk, and ensuring food security through reduced waste and enhanced product quality.

7. Socio-economic and Gender Dimensions

7.1. Employment generated by the sector (fisheries, aquaculture, post-harvest).

The fisheries sector in the Philippines is a significant source of employment, encompassing capture fisheries, aquaculture, and post-harvest activities. As of early 2025, approximately 1.3 million individuals were employed in agriculture-related fishing and aquaculture industries, with figures peaking at over 1.7 million in mid-2023[60].

The sector's workforce is predominantly male, with men comprising about 70% of the registered fisher folk. However, women play a crucial role in post-harvest activities, including processing, vending, and marketing, contributing significantly to the sector's value chain[61].

Aquaculture, particularly in regions like Bangsamoro and Region I, is a major contributor to employment, with thousands engaged in fish cage farming and seaweed cultivation[62]. Overall, the fisheries sector not only provides direct employment but also supports livelihoods in coastal communities, playing a vital role in food security and economic stability.

7.2. Describe the role of women in processing, trading, and marketing.

Women in the Philippines play a pivotal role in the fisheries sector, particularly in processing, trading, and marketing. While men are more visible in fishing activities, women are integral to the post-harvest phase, where they engage in sorting, cleaning, drying, salting, and packaging fish. These activities are essential for adding value to the catch and ensuring food security in coastal communities. In regions like Banate Bay, women are actively involved in vending fish within their communities, contributing significantly to local economies[63].

Beyond processing, women also participate in fish trading and marketing. They often act as intermediaries, purchasing fish from ports and selling them in local markets or door-to-door. This role not only provides them with income but also positions them as key players in the supply chain, ensuring that fish reaches consumers efficiently. However, despite their significant contributions, women's roles are often undervalued, and they face challenges such as limited access to resources, training, and decision-making platforms[64].

The Illuminating Hidden Harvests study indicated the following[65]:

- 42% of people depending on SSF for their livelihoods are women

- Women form 52% of fish processers and 52% of fish traders
- 23% of the people employed in fish harvesting for sale in the Philippines are women
- 51% of subsistence fishers who use fish only as food are women

Recognizing and empowering women in the fisheries sector is crucial for sustainable development. By providing them with the necessary support and resources, their potential can be fully realized, leading to enhanced food security and economic resilience in coastal communities.

7.3. Highlight constraints faced by small-scale actors (e.g. access to finance, technology).

Small-scale fishers in the Philippines face significant constraints that hinder their economic resilience and sustainable development. Limited access to formal financial services is a primary challenge; many fishers rely on informal lenders or traders, often incurring high interest rates, due to the absence of collateral and low financial literacy.[66] Additionally, inadequate access to technology and technical support exacerbates their vulnerability, as many lack the resources to invest in modern equipment or sustainable practices. These barriers are compounded by inconsistent government support and bureaucratic inefficiencies, which impede the effective delivery of resources and assistance to these communities. Addressing these constraints is crucial for enhancing the resilience and sustainability of small-scale fisheries in the Philippines[67].

8. Sustainability and Resilience

8.1. Summarize stock status where available (overfishing, recovery, habitat pressures).

The status of fish stocks in the Philippines is concerning, with overfishing, habitat degradation, and illegal fishing practices significantly impacting marine ecosystems. According to Oceana, 87% of the country's marine fish stocks were classified as overfished as early as 2017, with species like Bali sardinella, yellow fin tuna, and round scad experiencing substantial declines in catch volumes due to overexploitation and illegal fishing activities [68]

Additionally, the intrusion of commercial fishing vessels into municipal waters, which are designated for small-scale fishers, further exacerbates the depletion of fish stocks and threatens the livelihoods of local communities[69]. Habitat degradation also plays a critical role in the decline of fish populations. Aquaculture practices have been linked to the destruction of mangrove habitats, degradation of sea grass ecosystems, and water pollution, all of which negatively affect marine biodiversity.[70] Moreover, areas like Burias Pass and Danajon Bank, known for their rich marine biodiversity, suffer from overfishing and destructive fishing methods such as blast fishing, leading to significant declines in fish populations. While there are efforts to address these issues, such as the establishment of Marine Protected Areas (MPAs) and stricter enforcement of fishing regulations, the effectiveness of these measures is often hindered by inadequate governance and enforcement mechanisms. For instance, a Supreme Court ruling that allows large commercial fishing boats in municipal waters has

raised concerns among local fishers and environmentalists, fearing that it may further deplete fish stocks and undermine conservation efforts[71].

In summary, the Philippine fisheries sector faces significant challenges due to overfishing, habitat degradation, and illegal fishing practices. Addressing these issues requires comprehensive and effective management strategies, strengthened enforcement of regulations, and active participation from local communities to ensure the sustainability of marine resources.

8.2. Outline environmental risks (pollution, waste, carbon intensity).

The Philippine fisheries sector faces significant environmental risks, including pollution, waste, and carbon emissions, which threaten marine ecosystems and coastal communities.

Pollution and Waste: The Philippines is among the world's top contributors to ocean plastic pollution, generating approximately 2.7 million metric tons of plastic waste annually, with an estimated 20% entering the oceans. This pollution adversely affects marine life and the livelihoods of small-scale fishers. Additionally, aquaculture practices have been linked to environmental degradation, including the destruction of mangrove habitats, degradation of sea grass ecosystems, sediment disruption, water pollution, and declining water quality. Israeli Journal of Aquaculture.[72]

Carbon Intensity: The agriculture sector, which includes fisheries, accounts for about 25% of the Philippines' greenhouse gas emissions. This sector's carbon intensity is influenced by practices such as the use of fossil fuels in fishing operations and the degradation of carbon-sequestering coastal ecosystems.[73] Addressing these environmental risks requires comprehensive strategies, including improved waste management, sustainable aquaculture practices, and the protection of critical coastal ecosystems.

8.3. Describe climate risks and adaptation measures.

The Philippine fisheries sector faces significant climate risks, including ocean acidification, coral bleaching, sea-level rise, and extreme weather events such as typhoons. These factors disrupt marine ecosystems, reduce fish stocks, and threaten the livelihoods of coastal communities. For instance, aquaculture, particularly in brackish water ponds and seaweed farms, has been severely impacted, accounting for 85% of the total economic loss in certain regions[74]. In response, various adaptation measures have been implemented. The Department of Agriculture (DA) is integrating climate risk assessments into regional and provincial planning to enhance disaster preparedness and response[75].

Additionally, the Food and Agriculture Organization (FAO) emphasizes the importance of incorporating climate change considerations into fisheries management to protect production systems and strengthen community resilience[76].Community-driven initiatives also play a crucial role. For example, in Tagkawayan, Quezon, fisher folk have engaged in mangrove replanting and sustainable livelihood diversification to mitigate climate impacts[77].These local

efforts, supported by national policies and international partnerships, aim to build a more resilient fisheries sector in the Philippines.

8.4. Identify resilience factors (diversification, community practices, early warning systems).

In the Philippines, fisheries resilience is supported by a mix of livelihood diversification, strong community practices, and disaster preparedness systems. Many small-scale fishers engage in alternative work such as construction or small enterprises during closed seasons or climate disruptions, while others shift between species or fishing grounds to reduce income risk. Community-based management systems, including cooperatives and "Bantay Dagat" volunteer patrols, strengthen social networks, promote shared resource stewardship, and improve adaptive capacity. Projects like "Fishing for Climate Resilience" also help communities co-manage fishing grounds and restore coastal ecosystems, enhancing long-term sustainability.

Early warning systems and disaster preparedness measures, supported by institutions like the FAO and the Department of Agriculture help reduce losses from frequent typhoons and monsoons. Local disaster risk reduction programs, ICT-based weather alerts, and savings or insurance schemes further buffer vulnerable households. Together, these strategies grounded in diversification, social cohesion, and institutional support enable fishing communities to recover faster from shocks and sustain livelihoods amid environmental and climate pressures[78,79].

9. Governance and Policy Framework

9.1. Provide an overview of national fisheries and aquaculture policies.

Table 9.1: Main Policies and Laws

Name of Act/Policy	Details	Reference
Republic Act No. 8550 – The Philippine Fisheries Code of 1998	This is the foundational law governing fisheries and aquatic resources in the Philippines. It declares the State policy to achieve food security through sustainable use, management and conservation of fishery resources; reserves fisheries resources exclusively for Filipino citizens; supports municipal fisher folk; establishes fisheries institutions (BFAR, FARMCs) to manage resources; and regulates commercial vs municipal fishing, post-harvest facilities, and trade.	https://www.informea.org/en/legislation/philippine-fisheries-code-1998-republic-act-no-8550
Republic Act No. 10654 – Amendment to RA 8550 (Illegal, Unreported, and Unregulated Fishing Act)	Amends parts of the Fisheries Code to strengthen measures against illegal, unreported, and unregulated (IUU) fishing. Adds provisions emphasizing ecosystem-based approaches to fisheries management, precautionary principle, and obligations under international conventions in managing threats, migratory stocks, etc.	https://elibrary.judiciary.gov.ph/thebookshelf/showdocs/2/61041
Agriculture and Fisheries Modernization Act (RA No. 8435), 1997	Provides a broad framework for modernizing agriculture and fisheries, aiming at improving productivity, trade competitiveness, rural incomes, sustainable development, and poverty alleviation of fisher folk. Includes incentive mechanisms (trade & fiscal) for modernization.	https://www.bfar.da.gov.ph/wp-content/uploads/2021/03/Republic-Act-8435.pdf
National Aquaculture Development & Management Plan (ADMP) 2025–2030	Launched by DA-BFAR in late 2024, this is the first dedicated plan focused entirely on aquaculture. Its goals: improve sustainability, productivity, environmental stewardship, equity (making sure marginalized fisher folk are not left behind), and competitiveness. Key agendas include ensuring quality seed stock,	https://www.bfar.da.gov.ph/2024/10/01/da-bfar-launches-five-year-plan-to-advance-ph-aquaculture-industry/

Name of Act/Policy	Details	Reference
	reducing production costs, strengthening market linkages, bolstering climate resilience.	
Philippine National Aquasilviculture Program (PNAP)	An earlier government scheme focusing on combining aquaculture and silviculture, especially mangrove rehabilitation, livelihood support for coastal fisher folk, community hatcheries, etc. Helps in addressing poverty, climate change, food security in municipal fisheries areas.	https://repository.seafdec.org/handle/20.500.12066/3981

9.2. Describe food safety and quality assurance systems.

In the Philippines, food safety and quality assurance in the fisheries sector are governed by a comprehensive regulatory framework led by the Bureau of Fisheries and Aquatic Resources (BFAR) under the Department of Agriculture (DA). The system is anchored in key legislations such as the Food Safety Act of 2013 (Republic Act No. 10611) and the Agriculture and Fisheries Modernization Act (RA No. 8435)**,** which established the Bureau of Agriculture and Fisheries Product Standards (BAFPS) to develop and enforce quality and safety standards for fishery products.

BFAR implements Fisheries Administrative Orders (FAOs)-notably FAO No. 212 (2001) and FAO No. 211-01 (2001)-which mandate the adoption of Hazard Analysis Critical Control Point (HACCP) systems, Good Manufacturing Practices (GMP)**,** and Sanitation Standard Operating Procedures (SSOP) in fish processing and shellfish facilities. The Fisheries Inspection and Quarantine Division and the National Fisheries Laboratory Division ensure compliance through inspections, laboratory testing, and issuance of sanitary and health certificates for domestic and export trade. Despite these robust measures, challenges persist, particularly among small-scale processors who face financial and technical barriers to meeting stringent certification and traceability requirements. Limited laboratory capacity and inconsistent enforcement at local levels also hinder full compliance. Nevertheless, the Philippines continues to strengthen its seafood safety framework to align with international standards and protect both consumers and exporters[80].

9.3. Note participation in international agreements (e.g. WTO fisheries subsidies, PSMA, CITES).

The Philippines ratified the WTO Agreement on Fisheries Subsidies (FSA) on 27 February 2024, becoming the 70th WTO member to do so. Under the FSA, the Philippines commits to prohibiting subsidies that contribute to illegal, unreported and unregulated (IUU) fishing, overfished stocks, and fishing on the unregulated high seas. At the same time, the agreement includes provisions allowing developing and least-developed countries some flexibility, particularly for small-scale fishers operating in their Exclusive Economic Zone (EEZ). The Philippines was also appointed to the Fish Fund Steering Committee, which is part of the

Fisheries Funding Mechanism established under the WTO Fisheries Subsidies Agreement. This gives the country a role in guiding how technical assistance and capacity building funds are used to help developing members meet their obligations under the FSA[81].

The country is a party to the FAO's Agreement on Port State Measures (PSMA), which aims to prevent, deter, and eliminate IUU fishing via measures including port access control and inspection of foreign vessels[82]. With regard to CITES, the Philippines has taken actions related to the listing and trade control of certain marine species. For example, seahorses are listed under CITES Appendix II. Although the Fisheries Code already had banned extraction of CITES-listed marine species (including seahorses) since 1998, trade has continued, mostly illegally or unmonitored. There is ongoing interest in developing management plans to legalize trade in a sustainable way, with monitoring and regulation[83].

The Philippines is also party to the following international conventions:

- Convention on Biological Diversity (CBD)
- Nagoya Protocol on Access to Genetic Resources and their Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar)
- United Nations Framework Convention on Climate Change (UNFCCC)
- Kyoto Protocol to the United Nations Framework Convention on Climate Change
- Paris Agreement
- United Nations Convention on the Law of the Sea (UNCLOS)
- United Nations Fish Stocks Agreement (UNFSA)

9.4. Summarize institutional arrangements for managing value chains.

The Philippines' fisheries value chain is managed through a multi-tiered institutional framework involving national agencies, local government units (LGUs), and industry stakeholders. At the national level, the Bureau of Fisheries and Aquatic Resources (BFAR), under the Department of Agriculture (DA), is the primary agency responsible for policy formulation, resource management, and enforcement of fisheries laws[84]. The Department of Trade and Industry (DTI) and the Bureau of Agricultural and Fisheries Product Standards (BAFPS) play roles in standardizing product quality and facilitating market access.

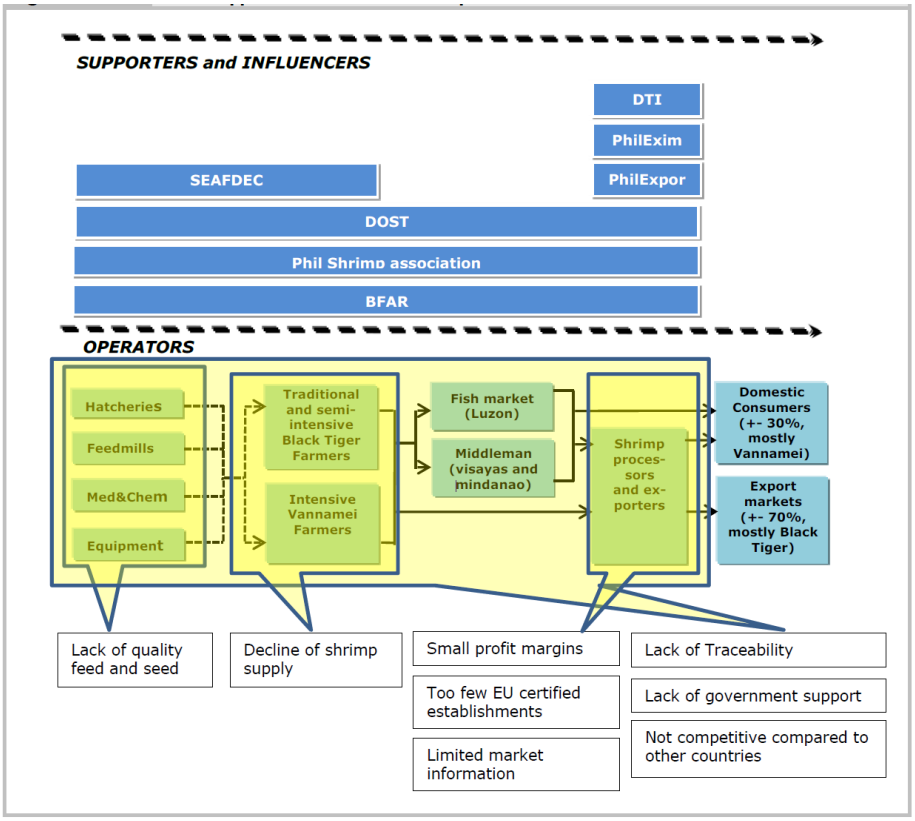

Figure 9.1: Value chain for shrimp and its main bottle neck in Philippines[85]

Local government units (LGUs) are integral to the value chain, issuing permits for aquaculture operations and enforcing local ordinances related to fisheries management[86]. Industry stakeholders, including fishers, processors, and traders, operate within this framework, often forming informal networks that influence production and market dynamics. The National Plan of Action for Small-Scale Fisheries (NPOA-SSF), launched in 2024, emphasizes the importance of small-scale fisheries, focusing on governance, sustainable resource management, and value chain development to enhance the livelihoods of rural communities.[87]

10. Key Challenges and Opportunities

10.1. Identify the most pressing constraints (production, markets, nutrition, gender, governance).

1) Production
    a. Declining capture fisheries due to overfishing and habitat degradation.
    b. Limited infrastructure (cold chain, landing sites, ice plants).
    c. Inadequate access to finance and modern technology for small-scale fishers.
    d. Post-harvest losses reaching 25–40% of production.
2) Markets
    a. Dependence on imports to stabilize supply.
    b. Price volatility in domestic markets; high mark-ups by intermediaries.
    c. Complex tariff and certification requirements constrain trade competitiveness.
    d. Weak cold chain and transport logistics.
3) Nutrition
    a. Declining per capita fish consumption (from 36 kg to 14.32 kg)
    b. Persistent undernutrition and micronutrient deficiencies.
    c. Low dietary diversity in poorer households despite proximity to fish resources.
    d. Lack of disaggregated data on small fish consumption.
4) Gender
    a. Women's roles undervalued despite high participation (71% in post-harvest).
    b. Limited access to credit, training, and decision-making platforms.
    c. Gender disparities in resource access and formal recognition.
5) Governance
    a. Fragmented institutional arrangements; overlapping mandates.
    b. Weak enforcement of fisheries laws and management of municipal waters.
    c. Inconsistent policy implementation and local enforcement capacity.
    d. Limited support for small-scale actors despite recent policy advances.

10.2. Highlight promising opportunities or best practices that could be scaled up.

1) Production
    a. Expansion of sustainable aquaculture (seaweed, milkfish, tilapia).
    b. Solar-powered cold storage units in remote areas (Ecofrost).
    c. Rehabilitation of facilities (e.g., Iloilo Fish Port).
    d. National Aquaculture Development & Management Plan 2025–2030 supports sustainability and equity
2) Markets
    a. Digital traceability and catch documentation systems (BFAR).
    b. Expansion of sustainability certifications (e.g., MSC for tuna).

c. Simplification of licensing and tariff incentives for vessel and gear modernization.
d. Strengthening domestic market supply chains to keep fish affordable.

3) Nutrition
   a. Promotion of small, nutrient-rich fish species (sardine, dilis) in diets.
   b. Fish identified among top sources of protein, calcium, and vitamin A in children's diets.
   c. Integration of fish into national food and nutrition security plans.
   d. Use of fish-based interventions to tackle micronutrient deficiencies.
4) Gender
   a. Strengthen women's cooperatives and post-harvest enterprises.
   b. Recognition of women's economic roles in the National Plan of Action for Small-Scale Fisheries (NPOA-SSF).
   c. Capacity-building and access-to-finance programmes targeting women fish vendors/processors
5) Governance
   a. Strengthened national frameworks — e.g., Fisheries Code (RA 8550, RA 10654), WTO Fisheries Subsidies Agreement, PSMA compliance.
   b. Establishment of 12 Fisheries Management Areas (FMAs) with multi-stakeholder bodies.
   c. Improved coordination under DA-BFAR's modernization and NPOA-SSF programmes.

11.Priority Policy Recommendations

11.1. Actionable policy recommendations linking aquatic foods, value chains and FSN and Recommendations should be specific, feasible, and linked to national priorities.

These table gives six recommendations which directly address the Philippines' food security and nutrition priorities by linking value chain modernization with equity and resilience. Reducing fish loss and waste strengthens availability; gender inclusion ensures fair participation; compliance measures enhance trade and safety; sustainable aquaculture supports environmental goals; nutrient-rich fish improve diet quality; and climate adaptation protects livelihoods against increasing environmental shocks.

Table 11.1: Priority Policy Recommendations

	FSN Dimension	Policy Recommendation	Specific and Feasible Actions	Linked National Priorities / Frameworks
1	**Fish Loss and Waste (FLW)**	Modernize post-harvest systems and cold chain	• Establish solar-powered cold storage, ice plants, and modern	○ *Comprehensive National Fisheries Post-Harvest and Marketing*

	FSN Dimension	Policy Recommendation	Specific and Feasible Actions	Linked National Priorities / Frameworks
		infrastructure to cut fish losses by half.	landing sites in key coastal regions (BARMM, Visayas, Mindanao). • Train fisherfolk cooperatives in hygienic handling and value addition. • Strengthen BFAR-led monitoring of post-harvest efficiency.	*Assistance Plan (CPHMAIP)*; ○ *BFAR Modernization Program*; ○ *Philippine Fisheries Code (RA 8550)*.
2	**Gender Inclusion**	Empower women in fisheries value chains through enterprise, finance, and leadership opportunities.	• Expand microfinance and cooperative grants for women processors and traders. • Institutionalize women's representation in Fisheries Management Areas (FMAs) and local value chain councils. • Offer training in product diversification, safety standards, and digital marketing.	○ *National Plan of Action for Small-Scale Fisheries (NPOA-SSF, 2024)*; ○ *Philippine Gender Equality and Women's Empowerment Plan*.
3	**Compliance and Trade Readiness**	Enhance traceability, certification, and compliance capacity across fisheries value chains.	• Fully implement the National Seafood Traceability System and HACCP in small-scale processing hubs. • Provide technical support for export-oriented certification (e.g., MSC, BFAR HACCP).	• *WTO Fisheries Subsidies Agreement*; • *Port State Measures Agreement (PSMA)*; • *RA 10654 (IUU Fishing Act)*.

	FSN Dimension	Policy Recommendation	Specific and Feasible Actions	Linked National Priorities / Frameworks
			• Build local compliance units under FMA structures for better alignment with WTO and PSMA.	
4	**Environmental Sustainability**	Scale up sustainable aquaculture and seaweed farming with environmental safeguards.	• Support smallholders with eco-efficient aquaculture systems and low-impact feed. • Rehabilitate mangrove areas under aquasilviculture programmes. • Promote seaweed farming as a low-carbon livelihood for coastal women and youth	*National Aquaculture Development & Management Plan (ADMP 2025–2030)*; *Philippine National Aquasilviculture Program (PNAP)*; *Philippine Development Plan 2023–2028*.
5	**Nutrition Contribution**	Integrate small, nutrient-rich fish into national food and nutrition programmes.	• Include sardines, dilis, and galunggong in school feeding and community feeding initiatives. • Develop fortified or dried small-fish products for maternal and child nutrition. • Conduct awareness campaigns on the nutritional value of local aquatic foods	○ *National Nutrition Action Plan*; ○ *RA 11291 Magna Carta for the Poor*; ○ *National Food Policy (NEDA)*.
6	**Climate Resilience and Readiness**	Strengthen fisheries and aquaculture adaptation to climate risks through integrated management and early warning.	• Incorporate climate risk mapping into FMA and aquaculture zoning. • Support livelihood diversification (e.g., seaweed,	○ *DA–BFAR Climate Resilience Program*; ○ *Nationally Determined Contribution (NDC) commitments*;

	FSN Dimension	Policy Recommendation	Specific and Feasible Actions	Linked National Priorities / Frameworks
			shellfish) during closed seasons. • Enhance early warning systems and insurance access for fisherfolk.	○ *Philippine Disaster Risk Reduction Framework*

12. Scoring Summary (Harmonized Assessment)

Table 12.1: Traffic-light scoring for six key dimensions

Dimension	Score (1-5)	Colour	Key notes
Fish loss and waste	2		High post -harvest losses
Gender inclusion	3		Increasing recognition of women's roles: gender disparity exist in accessing resource and in decision making
Compliance and Trade Readiness	3		Working towards compliances, but inconsistent across regions
Environmental Sustainability	3		Initiatives in place to promote sustainability practices; but challenges by over fishing and habitat degradation
Nutrition Contribution	4		Aquatic foods are important nutrient source; higher consumption in coastal communities
Climate Resilience and Readiness	3		Vulnerable to climate change, though adaptation strategies in place, pose challenge in strict implementation

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Bay of Bengal Programme
Inter-Governmental Organisation
91 St. Mary's Road, Chennai - 600 018, India.
Tel: +91 44 42040024
Email: info@bobpigo.org | www.bobpigo.org