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Research Report

Unlocking blue foods resources for food and nutrition security in Indonesia

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Policy Brief No. 27

Unlocking Blue Foods Resources for Food and Nutrition Security in Indonesia

by Sarah Firdausi and Ibnu Budiman



Key Messages

- Increasing blue foods production and consumption to reach its potential is critical for achieving food security and the eco-regionalization of the food system.
- Increasing blue food consumption requires a market approach with a focus on the availability, accessibility, market growth phases, and cultural preferences of consumers.
- The Ministry of Marine Affairs and Fisheries and Bappenas must include data of blue foods such as consumer preferences, regional distribution, import and export value by type of fish, and consumption by type of fish at the sub-national level and Blue Food Assessment results to the Indonesia Food System Dashboard (DSPI) to allow for evidence-based policy planning.

The Blue Foods Progress in Indonesia

As Indonesia approaches its hundredth year of independence, the National Development Planning Agency (Bappenas) has launched a long-term national development plan (*Rencana Pembangunan Jangka Panjang Nasional 2025-2045 – RPJPN 2024-2045*), toward Indonesia Emas (Golden Indonesia) 2045. One of the 17 goals is to achieve food security. According to the Global Food Security Index¹ (GFSI), Indonesia ranked 63rd out of 113 countries. While Indonesia performs well with respect to the affordability dimension of food security, the country still scores “very weak” and “weak” in many indicators under the availability, quality and safety, as well as sustainability and adaptation dimensions.

In the technocratic document of the RPJMN 2025-2029, Bappenas highlights increasing domestic food production capacity, specifically mentioning blue foods as a key intervention to achieve food security. Improving the nutritional intake of Indonesians is also noted in RPJMN 2025-2029 as a strategic social transformation issue, since the government has been unable to meet the goal of reducing stunting prevalence among under-five year olds to 14% by 2024. This indicates a need to refine Indonesia’s strategy to meet the nutritional needs of the country’s 282 million population. Blue foods have the potential to improve both food security and nutritional intake (GAIN, 2023).

Blue foods, or aquatic foods, are plants and animals sourced from water that are suitable for human consumption. Fish, a popular variety of blue foods, offer essential nutrients like high-quality protein, omega-3 fatty acids, and various vitamins and minerals (Crona et al., 2023). Additionally, farmed fish have lower carbon emissions than other protein sources including beef, lamb, and pork (Poore and Nemecek, 2018) and are comparable to poultry. Meanwhile, wild-capture fisheries can produce around 2 to 15 kg CO₂-eq per kg of fish caught, depending on factors such as fishing methods and the type of fish (Wang et al., 2024) while poultry produce 9.87 kg CO₂-eq per kg and beef at 99.48 kg CO₂-eq per kg produced (Poore and Nemecek, 2018). Fatty fish and small fishes provide high nutritional value for relatively low environmental impact (GAIN, 2024).

Indonesia has not fully integrated blue food to maximize its potential to provide sufficient, diverse, and balanced nutrition for healthy and safe food for all (Bappenas, 2024a). Small-scale fisheries, which make up around 90% of the sector in Indonesia, experience up to 30% fish loss, estimated to equal between 75,000 and 125,000 tonnes a year (GAIN, 2020). This amount is significant considering Indonesia is the second-largest fish producer in the world after China. However, fish consumption levels per capita in Indonesia, especially marine-fish consumption, remain relatively low. The lack of policies, lack of technology and energy supply, and lack of clean water availability in the blue food value chain are among the key drivers that contribute to the decline in fish production, fish loss, and declining fish consumption (Budiman et al. 2023).

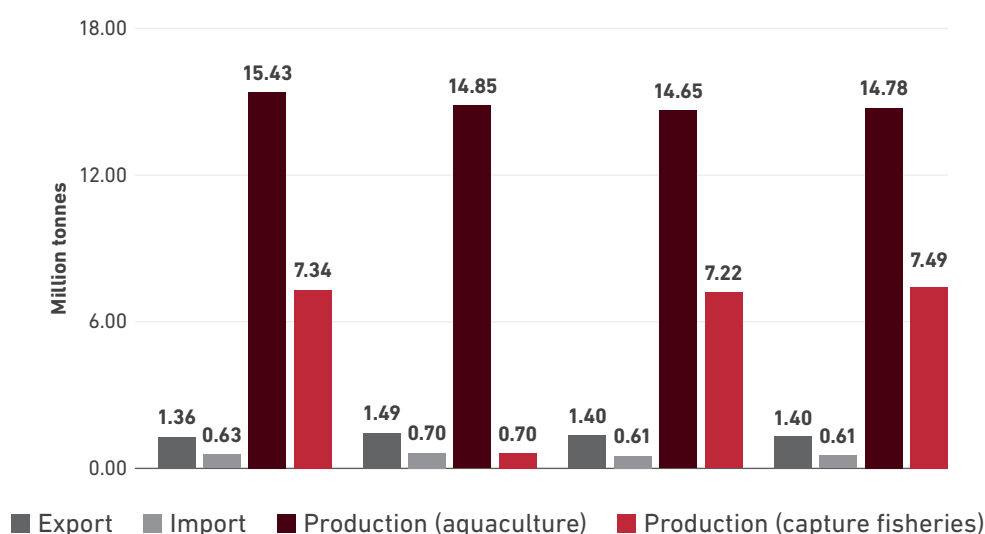
To unleash the potential of blue foods, Bappenas published the Indonesia Blue Economy Roadmap (2023) aiming to achieve the 2045 Vision of Indonesia’s blue economy. Following the roadmap, Bappenas recently launched the summary of the Blue Food Assessment in Indonesia (2024). This assessment identified and mapped the current situation of aquatic food in Indonesia, aiming to strengthen its role in the food system. The assessment covers five dimensions: nutrition, environment, small-scale fisheries and aquaculture, justice and productivity, as well as value creation and export. In 2022, blue foods contributed 2.59% to national GDP and the export value reached USD 6.24 billion. While these documents lay a crucial foundation for Indonesia’s approach to blue food, effective management and evidence-based policy making will determine whether the vision can be realized.

¹ Global Food Security Index (GFSI) assess 113 countries’ food security by scoring four dimensions of food security: affordability, availability, quality and safety, and sustainability and adaptation.

Blue Food Production, Consumption, and Export

In 2023, Indonesia's fish production value reached IDR 463.5 trillion (MOMAF Statistics, 2024), making it the largest fish producer in the ASEAN region². According to the Southeast Asian Fisheries Development Center (SEAFDC) (2024), Indonesia's combined capture fisheries and aquaculture produced 22.6 million tonnes per year over the 2017-2021 period (see Figure 1), about 36.3% of the total value of fishery production in the ASEAN region. This booming sector employs around three million workers in both marine and inland waters capture fisheries and two million in aquaculture (MOMAF Statistics, 2024). However, around 90% of these are small-scale fisheries, whose welfare is often overlooked. Key challenges for small-scale fisheries include ineffective fisheries management, declining fish stocks, and their inability to compete with larger fisheries. These factors make small fishers prioritise fisheries for export owing to price preference (Sari et al., 2021).

Figure 1.
Fish production, import, and export in Indonesia (2019 - 2022)



Source: The Food System Dashboard, 2024; MOMAF Statistics, 2024

According to the Global Food System Dashboard, Indonesia also has a notably high value in both exports and imports when compared to other ASEAN member states. Indonesia was a net exporter of fish for twelve consecutive years, from 2010 to 2021. Its promising potential may also serve as one of the factors why the Indonesian government tends to manage blue foods as natural resources and focuses on its potential value as an export (Tigchelaar et al., 2022).

To increase domestic consumption, the government has launched interventions such as the GEMARIKAN (*Gerakan Makan Ikan* or fish consumption movement) program, which began in 2004. The Ministry of Marine Affairs and Fisheries (MOMAF) also built several supporting infrastructures such as cold storage, integrated marine and fisheries centers (SKPT), modern fish markets, and several other supporting facilities under the mandate of Presidential Decree No.7/2016 on the acceleration of fisheries industry and Presidential Regulation No.3/2017 on Action Plan for Accelerating National Fisheries Industry Development, 2018 – 2019. Fish consumption increased from 2012 (33.89 kg/capita/year) to 2024 (36 kg/capita/year) (MOMAF, 2024).

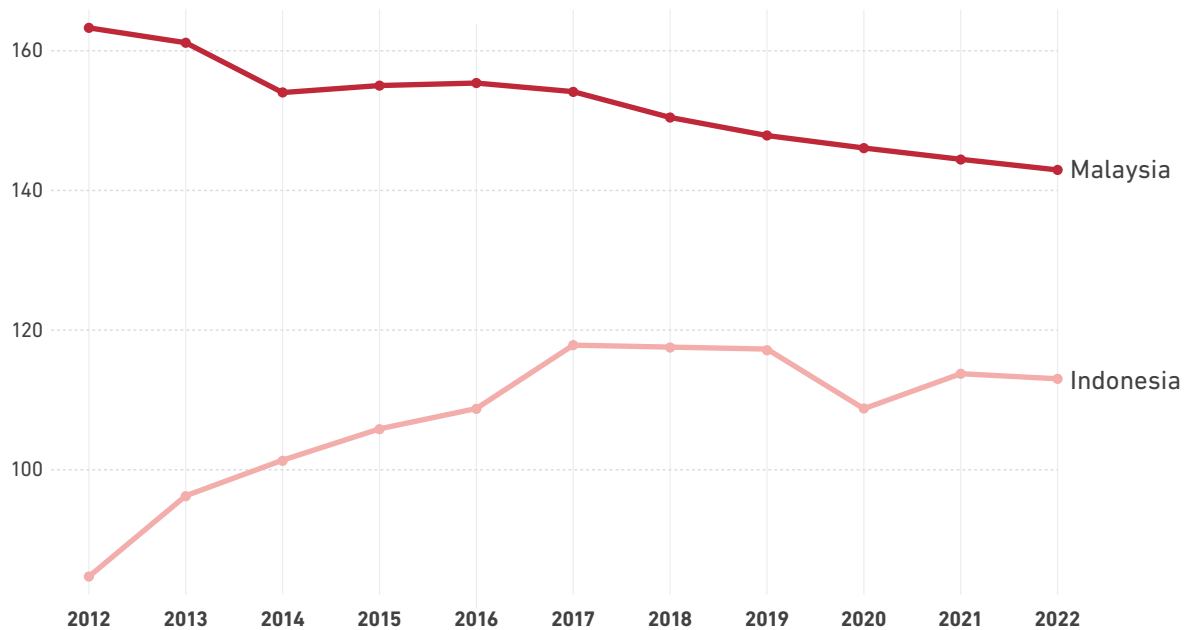
However, there are significant distribution issues that impact the availability and quality of fish across the country due to infrastructure, transportation, export prioritization and illegal fishing practices (WRI 2020; CGIAR 2019).

² The Association of Southeast Asian Nations (ASEAN) is an international organization made up of 10 countries in Southeast Asia: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, The Philippines, Singapore, Thailand, and Vietnam.

The seasonal nature of aquaculture fisheries also causes the oversupply of fish in certain periods, which may lead to food waste. Indonesia is still lacking in marine-based fish consumption, which, at 0.88 kg/capita/year, is lower than other countries in the region including Malaysia, Vietnam, Cambodia, and Myanmar (Appendix 1). This might reflect low domestic demand for marine blue foods which may drive firms and fishers to sell in foreign markets (Soares Estefes & Rua, 2013).

Consumption could also link to the availability of fish as Putriantini et al. (2022) found a positive relationship between fish availability and attitude towards fish consumption among Indonesian youth. Availability of fish refers to the presence of fish resources that are suitable for human consumption. The number is determined by factors such as production (wild capture and aquaculture), imports, exports, and post-harvest losses, as well as their accessibility and affordability in domestic markets (FAO, 2020). According to The Food System Dashboard, Indonesia has lagged behind Malaysia in terms of availability per capita for ten consecutive years (see Figure 2), although Indonesia’s fish production surpasses Malaysia’s by far. The fish consumption market in both Indonesia and Malaysia is in its ‘growth’³ phase, which means the market demand could still be expanding (Han et al., 2022). This presents an opportunity to increase the demand for fish, especially marine fish.

Figure 2.
Availability of fish (g/capita/day)



Source: The Food System Dashboard, accessed October 2024

³ According to Han et al., (2022) the “growth phase” in the context of fish consumption markets, refers to one of four stages in the market’s lifecycle: introduction, growth, maturity, and decline. During the growth phase, fish consumption increases significantly, driven primarily by rising real GDP and growth in fish production. This phase represents an expansion in market demand as more people incorporate fish into their diets, supported by both economic development and production scalability.



Diagnostic Tools to Boost Blue Foods Consumption

Bappenas Regulation No.4/2023 on the Government Work Plan 2024 outlines regionalizing food systems based on local food commodities and local socio-cultural wisdom as one approach to improve food availability, access, and quality. Unfortunately, strategies for maritime, fisheries, and marine management are mentioned separately. Blue foods should be more integrated into the food system, given their potential to enhance the nutritional intake of Indonesians. The regionalization strategy should also consider aspects such as availability, accessibility, market growth phases (Han et al., 2022), and cultural preferences.

Following the plan of food system regionalization, the newly launched Indonesia Food System Dashboard (*Dashboard Sistem Pangan Indonesia* – DSPI) can be used as a tool for evidence-based policymaking. Indicators from DSPI, along with data from the MOMAF, could provide insight into factors contributing to blue foods value chains at provincial and district levels. Some useful indicators presented in DSPI include (1) Average caloric price (ACP) of fish⁴, (2) Relative caloric price (RCP) of fish⁵, (3) Proportion of household food and beverage consumption spent on fish, and (4) Median income per person per day.

Box 1.

Example of indicators related to fish production, export, and consumption in Central Sulawesi

Using complete data can help policymakers decide priority areas of improvement. As an example, below is a compilation of data and indicators related to the blue food value chain in Central Sulawesi, one of Indonesia's top fish-producing regions.

Indicators on Blue Foods Value Chain in Central Sulawesi

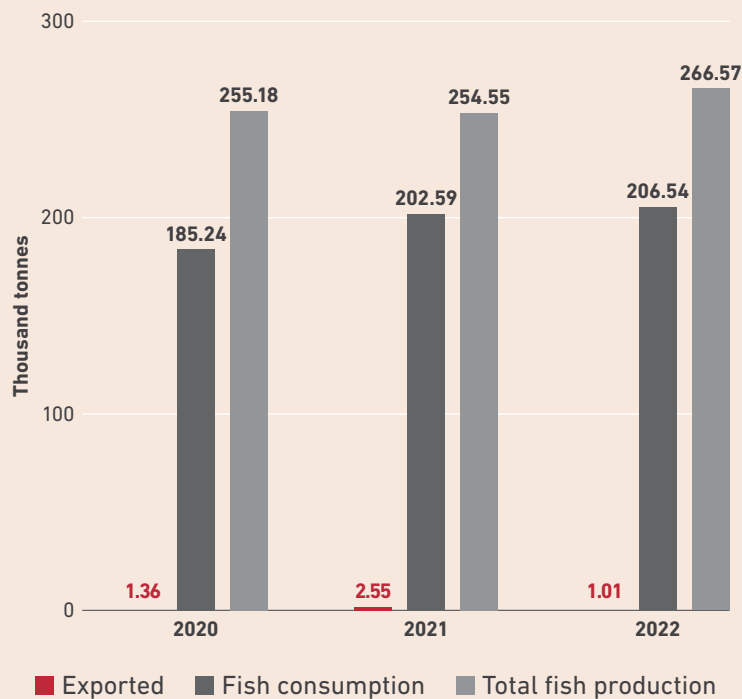
Central Sulawesi	2020	2021	2022
Production of capture fisheries (tonnes)	255,177.9	254,553.1	266,574.1
Fish consumption ⁶ (tonnes)	185,234.9	202,586.7	206,535.4
Fish export volumes (tonnes)	1,355.3	2,552.5	1,010.3
Median income per person per day (IDR)	27,459.0	28,212.0	29,537.6
Proportion of household food and beverage consumption spent on fish (%)	10.1	10.8	2.9
Relative caloric price (RCP) of fish (IDR/calorie)	18.9	20.4	28.5
Average caloric price (ACP) of fish (IDR/calorie)	19.0	20.0	10.4

Source: Compiled from Statistics Indonesia, Statistics MOMAF, and Indonesia Food System Dashboard

⁴ Average caloric price (APC) of fish is the cost in IDR Rupiah per calorie.

⁵ Relative caloric price (RCP) of fish is a measure of the cost of obtaining calories from fish compared to rice as the most important staple food in Indonesia.

⁶ Data on fish consumption is compiled from fish consumption per capita (Angka Konsumsi Ikan – AKI) from MOMAF and population in Central Sulawesi in the respective year from Statistics Indonesia



The information gathered from sources such as DSPI, Statistics Indonesia, and Statistics MOMAF highlights the current conditions and trends of key factors contributing to the blue foods value chain in Central Sulawesi. These insights can inform better regional policy and strategy regarding blue foods provision, management, and consumption.

As shown in the Figure, there is more than a 20 percent gap between fish production and the total fish export and consumption in Central Sulawesi each year. This raises important questions about whether this gap represents loss and waste in the value chain or other possibilities, such as redistributing fish to other regions in Indonesia. Further, the RCP of fish increased in 2022 to IDR 28.5/calorie, while its ACP declined. It indicates that while the price of obtaining a calorie of fish has become cheaper, it is still relatively less affordable than a calorie obtained from rice. Coupled with the fact that households spent much less of their food consumption on fish, this suggests that people have increasingly preferred to fulfill their calorie intake by consuming more rice than fish. This brief presents data from available sources to illustrate the potential use of different indicators. A more comprehensive analysis of the correlations between each indicator is necessary to identify priority areas for improving the food system.

Recommendations

The following recommendations should be considered by the government in seeking to improve the blue food value chain for food and nutrition security in Indonesia:

- **Using data from the Indonesia Food System Dashboard (DSPI) to identify prospects, challenges, market conditions, and priority areas regarding blue food value chains at the national and sub-national levels.** Bappenas and Bappeda (regional development planning agency) could use and update Blue Food Assessment regularly and incorporate it into DSPI as a diagnostic tool to support their strategy formulation on food system eco-regionalization in Bappenas Regulation No.4/2023 on the Government Work Plan 2024 and further policy instruments.
- **Integrating datasets of fish production, export, import, regional distribution, and consumption by type of fish at sub-national level into DSPI.** Given the diversity across regions, a systematic approach and identification of various actors involved is important. Adding more information to the DSPI so that it is aligned with the available indicators from the Global Food System Dashboard could help Indonesian policymakers create a more robust analysis to support regulation for (blue) food planning. The dashboard could also incorporate data that are resourceful for enterprises such as the number and type of fish industry, the number of fish processed, and industry mapping.
- **Fostering partnerships with the private sector to address fish distribution issues and increase investment for the improvement of supporting infrastructure such as the cold value chain.** The DSPI can also be useful to the private sector for their business insights, allowing them to help drive innovation and resource efficiency which ensure the viability and scalability of a sustainable blue food value chain. Additional public support, such as investment in cold storage, improving logistics, and opening market access for quality fish is essential. Incorporating the private sector into this framework is vital, as their expertise and resources can drive innovation and efficiency in blue food production.

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Annex

Fish Consumption by type of fish within ASEAN Member States in 2022 in kg/capita/year⁷

Country	Type of fish				Total
	Demersal fish ⁸	Freshwater fish	Marine fish	Pelagic fish ⁹	
Indonesia	6.8	17.89	0.88	11.32	41.25
Malaysia	11.34	6.07	8.79	17.77	52.17
Cambodia	0.04	30.61	7.32	0.33	40.96
Vietnam	0.27	16.67	8.82	3.29	40.94
Myanmar	-	33.42	6.62	0.18	40.31
Thailand	1.24	8.86	0.04	11.3	28.62
Philippines	3.08	7.72	0.72	11.87	26.19
Laos	-	24.42	0.55	0.18	25.21

Source: World Population Review (2022), modified

⁷ Singapore and Brunei are not included due to lack of data.

⁸ Demersal fish are fish that live and feed on or near the bottom of sea or lakes (FAO, 2020).

⁹ In contrast with demersal fish, pelagic fish occupy open water away from seabeds and typically near the surface or mid-depth (FAO, 2020).

ABOUT THE AUTHORS

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