



The Role of Fisheries in National Food Security



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Abstract

The fisheries sector plays an important role in supporting Indonesia's national food security by providing a source of high-quality and sustainable animal protein. Capture fisheries and aquaculture not only meet the food needs of the community but also contribute significantly to the economy and welfare of coastal communities. This study employs a literature review method to analyze the contributions, challenges, and efforts to improve the fisheries sector in support of national food security. The results of the study indicate that sustainable fisheries resource management, improved aquaculture technology, and appropriate policy support are essential to maintain the continuity of food supply from the sea. Collaborative efforts among the government, businesses, and the community are crucial to strengthening the fisheries sector's role as a pillar of national food security.

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1 Introduction

Food security is one of the most important strategic issues in national development, especially for developing countries such as Indonesia, which has a large population. Food security is not only about the availability of sufficient food, but also includes quality assurance, safety, affordability, and sustainability of food supplies for all levels of society (Harper et al., 2013). As an agrarian country, Indonesia is highly dependent on the agricultural and fisheries sectors to meet its national food needs. However, with rapid population growth and changes in consumption patterns, pressure on food availability has also increased significantly (Aisyah, 2024).

Adequate national food availability is a key prerequisite for achieving food security, but this needs to be supported by equitable food distribution and accessibility down to the household level. Dependence on food imports can threaten national food sovereignty and reduce the country's independence in managing its food needs. This highlights the importance of strengthening domestic food production, including through optimising the potential of the fisheries sector as the main source of animal protein for the Indonesian people.

Fisheries play a strategic role in national food security as they are one of the key sources of protein after staple crops such as rice. Fish production from capture fisheries and aquaculture is able to supply the high-quality protein that is greatly needed in the consumption patterns of the Indonesian people (Bondad-Reantaso et al., 2012). Not only is the quantity of production important, but also the nutritional quality contained in fish, which is closely related to public health and sustainable human resource development (Alpha Carmelite, 2013).

The growth of the fisheries sector in recent decades has begun to make a positive contribution to the national production of animal protein, although it still faces various challenges that limit its optimal potential. Fisheries infrastructure, cultivation techniques, and processing technology still need to be improved in order to maintain fisheries productivity and sustainability. In addition, the socio-economic aspects of fisheries affect food security in coastal areas, where the majority of the population is highly dependent on fisheries resources (Damayanti, 2019).

National food security also requires sustainable management of fishery resources to avoid overfishing and damage to marine ecosystems. Proper fisheries management based on conservation principles will ensure the long-term availability of food from the fisheries sector. Therefore, government regulations and policies play a crucial role in preserving fisheries resources while increasing production capacity (Akmaluddin, 2014b).

Indonesia has enormous marine potential as a source of fish food, with vast waters and abundant biodiversity. If managed optimally, fisheries can become an important backbone of national food security, even contributing to the blue economy as a new paradigm for sustainable and inclusive marine resource management. This is in line with the government's goal of promoting economic growth and the welfare of coastal communities through the fisheries sector (Wicaksono, 2024).

The problems faced by the fisheries sector in Indonesia include the loss of productive water areas due to pollution and coastal development, climate change affecting fish populations, and pressure from the use of environmentally unfriendly technology. These obstacles have the potential to reduce the fisheries sector's contribution to food security if they are not immediately addressed with appropriate strategies and innovations (Djata, 2022). In addition to environmental issues, institutional and regulatory aspects in the fisheries sector also pose their own challenges. Coordination between fisheries resource management agencies and management policies that are not always effective can slow down the optimisation of the fisheries sector's potential. Therefore, policy reform and institutional strengthening are needed to encourage integrated fisheries development from upstream to downstream (Baltasar Taruma Djata, 2022).

On the other hand, technological developments and industrialisation in fisheries bring great opportunities to increase production efficiency and the added value of fishery products. Modern aquaculture technology, innovative capture fisheries management systems, and high-quality fish processing can increase the supply of safe and nutritious food. The application of this technology also supports food security by expanding markets and increasing the income of fishing communities and fish farmers (Purnomo, 2012).

The role of human resource education and training in the fisheries sector is crucial to supporting the development of competent and innovative human resources in the field of fisheries. Improving the capacity of fishermen, fish farmers, and fisheries business actors is essential to enable them to manage fishery resources effectively and sustainably. This aspect is part of national efforts to create food security that is not only based on quantity but also on the quality and resilience of the food system (Firdaus, 2020).

National food security must also be viewed holistically, taking into account regional and household security as the spearhead of food fulfilment. Local fisheries in various regions of Indonesia play an important role in meeting the food

needs of local communities. Therefore, the empowerment of traditional fisheries and the development of local fishery products are key strategies in supporting food security at the grassroots level (Tauhid, 2024).

Overall, fisheries play an important role in Indonesia's national food security, which must continue to be improved and developed through various technical innovations, appropriate policies, and sustainable management. This literature review aims to explore the contribution of the fisheries sector to food security, as well as the various efforts and challenges required to support this role so that it can have a significant impact on national food security and the welfare of the Indonesian people.

2 Materials and Methods

The research method used in this study was a literature review with a descriptive qualitative approach. This method was carried out by collecting, studying, and analysing various secondary data sources in the form of books, scientific journals, research reports, policy documents, and articles related to the role of fisheries in national food security. The data obtained was then systematically synthesised to describe the contributions, challenges, and development efforts of the fisheries sector as part of national food security (Eliyah & Aslan, 2025). The analysis was conducted critically to identify important issues and formulate recommendations based on findings from relevant literature. This technique was chosen because it allows the researcher to explore in-depth information from various reliable sources without conducting direct primary data collection in the field, making it efficient in terms of time and cost while also providing a comprehensive overview of the topic (Ferrari, 2020).

3 Results and Discussions

Contribution of the Fisheries Sector to National Food Security

The fisheries sector plays a very important role in achieving national food security in Indonesia, given that fish and fishery products are a vital source of animal protein for the community. Fish contributes to approximately 50 per cent of the total animal protein intake in the Indonesian diet, making it one of the main sources of food that is easily accessible and relatively affordable for various segments of society, especially those with low incomes. Therefore, the fisheries sector is a key pillar in maintaining adequate nutrition and meeting national nutritional needs (Hasibuan & Ginting, 2025).

Fish is not only important as a source of protein, but also rich in micronutrients such as calcium, iron, zinc, and vitamins A, B, and D, which are essential for supporting public health and preventing malnutrition problems such as stunting and malnutrition. This complete nutritional content makes fish a better source of protein than meat from livestock. Therefore, increasing fish consumption can improve national nutrition quality and reduce malnutrition rates, which remain a major challenge in Indonesia (Yunita, 2024).

Capture fisheries and aquaculture are two complementary sub-sectors that provide fish supplies to the community. Capture fisheries, especially those involving small-scale and traditional fishermen, contribute a large portion of the total national fish production. Approximately 90 per cent of fishermen in Indonesia are small-scale fishermen who form the backbone of the coastal community's economy. However, they still face various challenges, particularly in terms of economic welfare and access to modern production technology (Erlyn, 2023).

On the other hand, the growing fish farming industry offers great potential for increasing the sustainable availability of fish as a food source. Marine aquaculture, such as seaweed and bivalve farming, does not require additional feed, resulting in relatively low operating costs and an environmentally friendly approach. The development of this industry plays a strategic role in expanding the diversification of marine food sources and increasing the supply of fish in the national market, including as a reliable source of protein for the community (Alamsyah, 2019). In addition to nutritional value and production, the fisheries sector also contributes significantly as a source of livelihood for millions of coastal communities and small-scale fishermen in Indonesia. This sector drives the local economy, increasing the income and economic resilience of communities that are highly dependent on marine resources. Thus, strengthening the fisheries sector also means supporting social and economic stability in coastal areas that are vulnerable to poverty (Fuskah, 2022).

Per capita fish consumption in Indonesia is still relatively low compared to neighbouring countries such as Malaysia, Singapore, and Japan. In 2018, national fish consumption stood at 50.69 kg per capita per year, while the government's target is to reach 54.49 kg in 2019. Significantly increasing fish consumption is one way to strengthen food security by utilising Indonesia's abundant marine resources (Anugrah & Alfarizi, 2021).

Increased fish consumption not only provides health benefits but also addresses dual nutrition problems, such as obesity and stunting, that still occur in Indonesian society. Through adequate and balanced nutrition, especially animal protein from fish, efforts to improve the quality of human resources can be realised more optimally, thereby supporting comprehensive national development (Damayanti, 2010).

Although the fisheries sector has great potential, various challenges still loom. The low exchange rates for fishermen and fish farmers reflect the economic instability they experience, which can have a negative impact on the sustainability of the fishing industry. This factor needs to be a key consideration in government policy to improve the welfare of fishing businesses while maintaining food supplies from the sea (Carmelite, 2012).

Fisheries production in several provinces, such as Jambi, has shown a positive upward trend in recent years, both in the marine fisheries sector, inland waters, and aquaculture. However, this production is still not fully able to meet consumption needs, which continue to increase in line with population growth. The production deficit indicates the need for strategies to increase production capacity so that the availability of fish can meet national demand (Purnomo, 2015).

Sustainable management of fishery resources is key to maintaining the sector's contribution to food security. Overfishing and damage to marine habitats threaten future fish availability (Damayanti, 2022). Therefore, the implementation of prudent and environmentally friendly fisheries management policies, including marine resource conservation, needs to be continuously promoted and strictly monitored.

The contribution of the fisheries sector is also evident in the development of food diversification with a lower environmental impact compared to land-based animal products. Marine aquaculture, such as seaweed and bivalves, not only provides nutritious food but also helps maintain the quality of the marine environment through its ecological function in cleaning the water. The development of sustainable mariculture can be an effective solution to increase marine food production without causing serious environmental burdens (Carmelite, 2011).

The fisheries sector also has the potential to support the blue economy, which integrates sustainable marine resource management with economic development and social welfare. This is in line with the government's vision of achieving inclusive and sustainable development, as well as strengthening food security through the optimal utilisation of marine resources (Nasution & Yanti, 2014).

Enhancing the role of the fisheries sector in national food security requires collaboration between various parties, ranging from the government, fishing communities, entrepreneurs, and research and educational institutions. This synergy is important to overcome existing challenges and take advantage of available opportunities, to ensure that food production and consumption from the fisheries sector runs well and sustainably (Farquhar, 2024).

Finally, strengthening the fisheries sector as a pillar of national food security not only has an impact on meeting the nutritional needs of the community but also makes a significant contribution to poverty alleviation, job creation, and regional economic development. Therefore, adequate attention and investment in this sector is very important for the sustainability and welfare of the nation as a whole.

Efforts to Improve and Challenges Facing the Fisheries Sector in Supporting National Food Security

The fisheries sector in Indonesia faces various challenges that require serious attention so that its contribution to national food security can be optimised. One of the main challenges is the welfare gap between small and large-scale fisheries businesses, with 90 per cent of fishermen being small-scale fishermen who still live below the poverty line. This situation calls for policy interventions that can increase the income and welfare of small-scale fishermen so that they can play a more active role in food provision (Pihlajamäki, 2018).

Efforts to improve the fisheries sector have begun through the development of environmentally friendly and efficient aquaculture technologies, such as the use of biofloc systems and other modern aquaculture technologies. These technologies not only increase productivity but also reduce negative impacts on the environment, thereby helping to maintain the long-term sustainability of fishery resources (Zhan, 2024). The availability of adequate infrastructure, such as fishing ports, cold storage, and fish processing facilities, is a key factor in supporting increased fish production and distribution. The government and private sector are expected to invest more resources in the development of this infrastructure so that the fish supply chain can run smoothly and avoid post-harvest losses (Rice & Garcia, 2011).

Human resource education and training in the fisheries sector is another important step in improving the capacity of fishermen and fish farmers. Training in fishing techniques, aquaculture, processing, and marketing of fishery products can increase productivity and the added value of fishery products (Kent, 1997).

The role of government policy in sustainable fisheries management is essential to prevent damage to marine ecosystems caused by uncontrolled fishing practices. Strict monitoring of fishing zones, restrictions on destructive fishing gear, and catch quotas are some of the measures being implemented to preserve fishery resources (Damayanti, 2020). Another challenge faced is water pollution, which poses a serious threat to the sustainability of aquaculture and capture fisheries. Domestic waste, industrial waste, and plastic pollution reduce water quality and the health of marine ecosystems, thereby negatively impacting catch yields and fish production (Akmaluddin, 2014a).

Global climate change also has a significant impact on the fisheries sector through increased sea temperatures, changes in ocean currents, and rising sea levels. These conditions affect fish distribution and abundance as well as aquaculture productivity, requiring adaptation through technical innovation and effective policies in marine resource management. Increasing national fish consumption is also part of the food security efforts (Nasution, 2021). The government is promoting fish consumption campaigns through various nutrition education programmes. This is important because Indonesia's per capita fish consumption is still below the national target and that of neighbouring countries, so increasing consumption is believed to improve public health while stabilising market demand for fishery products (Funge-Smith & Bennett, 2019).

Fiscal support and subsidies for fishermen and fish farmers are also strategies to increase their productivity and welfare. Subsidies for fuel, environmentally friendly fishing gear, and easy access to capital are expected to overcome the limitations of capital and production costs that have hampered the development of the fisheries sector (Harper et al., 2013).

The development of fisheries-based ecotourism in coastal areas is also an innovative effort to increase the added value of the fisheries sector. Ecotourism not only strengthens the local economy but also raises public awareness of the importance of marine resource conservation for food and environmental sustainability (Aisyah, 2024).

Collaboration between the government, academics, business actors, and the community is crucial in developing a resilient and sustainable fisheries sector. This synergy can facilitate research and development, policy advocacy, and the strengthening of the socio-economic capacity of coastal communities (Rabo et al., 2014).

The use of digital and information technology has also begun to be applied to modernise the fisheries sector, such as the use of surveillance drones, geographic information systems (GIS), market information applications, and digital transactions. These innovations are expected to improve operational efficiency as well as the transparency and competitiveness of fishery products in domestic and international markets (Bondad-Reantaso et al., 2012).

Gender aspects are also beginning to be considered in the development of the fisheries sector, where women fishers and fisheries entrepreneurs are given equal training and opportunities to contribute. The role of women in fisheries management and product marketing has the potential to improve the welfare of families and coastal communities as a whole (Alpha Carmelite, 2013).

Land and water access issues for aquaculture remain a significant obstacle for fish farmers, especially in coastal areas prone to land conflicts. Proper marine spatial planning and recognition of rights to marine resources are essential to support sustainable and integrated aquaculture development (Damayanti, 2019).

Efforts to improve the fisheries sector must be accompanied by consistent strengthening of regulations and law enforcement. Illegal fishing, destructive fishing, and illegal fish trade must be prevented through strict supervision and firm legal action so that fishery resources can be properly preserved for the future of national food security (Akmaluddin, 2014b).

Thus, the role of fisheries in national food security emphasises that the fisheries sector is a strategic pillar in providing animal protein, which is greatly needed by the Indonesian people. Fisheries not only provide a nutritious and diverse food source, but also serve as the main livelihood for millions of coastal communities, thereby contributing directly to food security and socio-economic welfare. Despite facing various challenges such as overfishing, climate change, and infrastructure limitations, efforts to improve aquaculture technology, sustainable resource management, and strengthen government policies are essential to maintain the continuity of food supply from the sea. In addition, the development of the fisheries sector also supports food diversification and a sustainable blue economy. Through synergy between the government, businesses, academics, and the community, the fisheries sector is expected to continue to play an optimal role in promoting strong, high-quality, and equitable national food security for the overall welfare of the Indonesian people.

4 Conclusion

Fisheries play a highly strategic role in supporting Indonesia's national food security, particularly as a primary source of affordable and nutritious animal protein for all segments of society. The contribution of the fisheries sector, both capture fisheries and aquaculture, not only meets food needs but also provides significant economic value added for coastal communities and the country as a whole. Stable fish production and increased fish consumption can improve the nutritional quality of the community while reducing malnutrition problems such as stunting, which remains a national challenge.

Efforts to develop the fisheries sector through the application of modern aquaculture technology, sustainable management of fishery resources, and improved infrastructure and supportive policies are essential to optimise the role of fisheries in food security. Despite challenges such as overfishing, climate change, and environmental pollution, the fisheries sector still has great potential if it is well managed and supported by synergy between the government, business actors, and fishing communities.

With sustainable management and appropriate innovation, the fisheries sector can become a key driver of national food security, not only ensuring adequate nutrition but also strengthening the economic welfare of coastal communities. Fisheries also play a role in food diversification and blue economy development, making them an important pillar in national development towards a developed, independent, and prosperous Indonesia.

Conflict of interest statement

The author declared that he has no competing interests.

Statement of authorship

The author has a responsibility for the conception and design of the study. The author has approved the final article.

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