

# Mapping the potential of the blue economy in efforts to improve the welfare of small-scale fishers, case study of Morodemak Village, Demak Regency, Central Java Province

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**Abstract.** Indonesia, one of the world's largest maritime and archipelagic countries, possesses significant biological wealth, particularly in fish resources. Morodemak Village, situated near the Coastal Fisheries Port of Morodemak, holds substantial potential in terms of its fisheries resources. Mapping the potential of the blue economy could help address resource sustainability and the welfare of fishers. This study aims to map the potential of the blue economy based on the livelihoods of small-scale fishers in Morodemak Village. The mapping of this potential can help address issues related to resource sustainability and the welfare of fishers. The study analyzes the situation of small-scale fishers in Morodemak Village using primary and secondary data from interviews and government institutions. Employing a triangulation technique, the mixed-method approach integrates both quantitative and descriptive statistics to explain costs and returns. Three types of small-scale fishers are identified based on the fishing gear used: *bolga* (a traditional lift net), *branjang* (a local trap net), and mini purse seine. The potential of the blue economy can be seen in the economic turnover that has occurred in Morodemak Village. Fishers sell marine products directly to the Fish Auction Place, and these products are resold by large and small traders for distribution to various cities. Further research is needed on the involvement of stakeholders in the efforts of Demak Regency to develop the blue economy, so that it can improve the welfare of fishers.

**Key Words:** blue economy, Demak, welfare, small-scale, fisher.

**Introduction.** Poor environmental conditions are an important problem that is still a major topic of discussion because they have an impact on the sustainability of human life, especially in coastal areas (Villasante et al 2022). The occurrence of water pollution, waste, and disasters causes a decline in environmental quality and weakens the carrying capacity of life. This causes people's lives in coastal areas to continue to experience pressure, resulting in poverty, lack of prosperity, lack of facilities, and the emergence of crime. Therefore, efforts are needed to improve environmental and economic conditions to respond to damage to natural conditions by planning sustainable living while preserving nature.

The blue economy concept is one of the concepts used to improve the economy and development in coastal areas, which is based on the harmony of environmental characteristics (Spamer 2015). This concept includes a sustainable marine economy that can generate economic and social benefits while ensuring the environmental sustainability of the source of these benefits in the long term (Childs & Hicks 2019). In other words, the blue economy concept focuses on aspects of sustainable use of marine resources for economic growth and improving livelihoods. This concept is closely related, especially in coastal areas, where there are various types of fishers, pond farmers, and traders involved in economic activities in the capture fisheries sector.

Fisherman groups are one of the main and most important aspects of the capture fisheries business. However, in reality, fishing groups still live in a circle of poverty and are in dire need. This condition is generally caused by low skills and knowledge in the use of fishing equipment and boats, which are still simple, so that fishing is not optimal (Al-Hafidz

et al 2024). This is due to the limitations of the fishing technology used, which affects their productivity levels. and causes the economic level in coastal areas to remain low. In fact, Indonesia is one of the largest maritime and archipelagic countries in the world, which has very high biological wealth, especially fish resources.

Morodemak Village is one of the areas with significant potential in terms of fisheries resources, primarily due to its proximity to the Coastal Fisheries Port of Morodemak. This port is one of the nine Technical Implementation Units under the Department of Maritime Affairs and Fisheries of Central Java Province. The port is home to a fish auction site, which plays a vital role in the large fisheries potential of Demak Regency. Notably, the Coastal Fisheries Port of Morodemak is the only Type C Fishing Port in the region. In light of this, mapping the potential of the blue economy could be crucial in addressing challenges related to resource sustainability and the welfare of local fishers. By conducting this mapping, we can identify marine resources that can be regularly utilized while gaining insights into critical data such as fish migration patterns, sea conditions, and environmental factors that influence fishing yields. This approach allows for more informed decision-making, reduces the negative environmental impacts of fishing, and promotes more sustainable management of marine resources.

Therefore, this research aims to map the potential of the blue economy based on the livelihoods of small-scale fishers in Morodemak Village, with a focus on sustainable practices and resource optimization.

## Material and Method

**Description of the study sites.** This research was conducted in Morodemak Village, Demak Regency, Central Java Province, Indonesia (Figure 1). This research was conducted within two months (October - November 2023). Morodemak Village was chosen as the research location because it is one of the large fishing villages in Demak Regency and has considerable fisheries potential, making it well-positioned for the development of the blue economy.

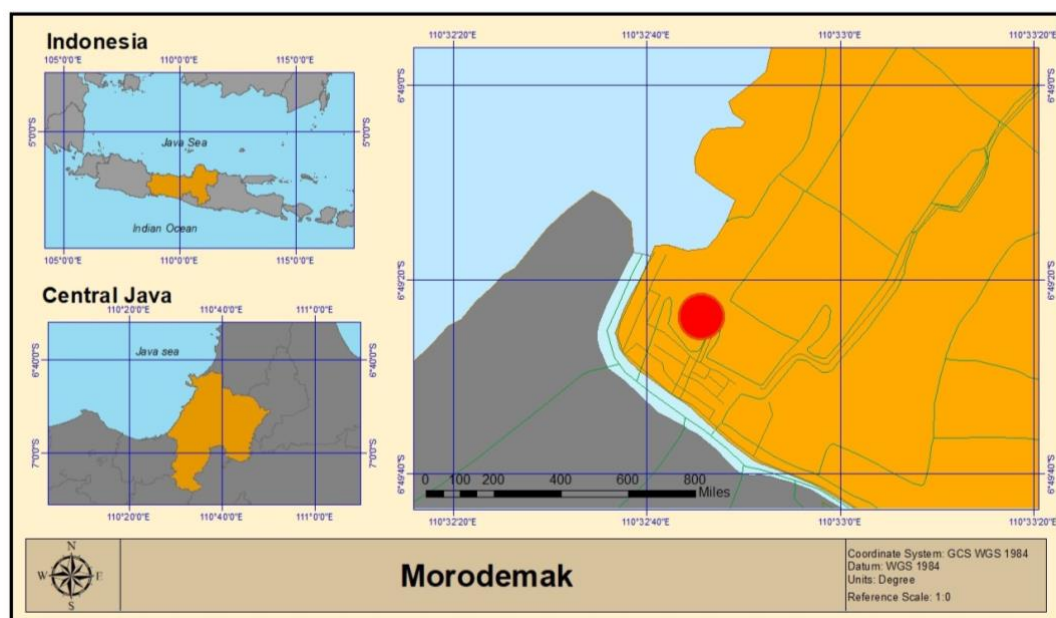


Figure 1. Study Location: Morodemak, Indonesia.

**Sampling.** This study utilized both primary and secondary data. The primary data were collected through interviews with small-scale fishers, while the secondary data were obtained from government agencies, journals, books, and other relevant sources such as news articles. A total of 30 respondents were involved in this study. These respondents were selected using the snowball sampling technique, which is particularly useful for identifying a specific group of individuals in a community. In this case, the respondents

were small-scale fishers residing in Morodemak Village. Initially, a few fishers were approached, and then they referred other fishers within the community, thereby expanding the sample size. This method allowed for a more accurate representation of the small-scale fishing population in the area.

This study employed a mixed-method approach, combining both quantitative and qualitative research, to assess the economic conditions of small-scale fishers in Morodemak Village, with an emphasis on the potential of the blue economy. The first section of the study focuses on understanding the characteristics of the fishers, including their socio-economic conditions, fishing practices, and operational costs. Descriptive statistics are used in the quantitative phase to analyze fixed and variable costs, as well as revenue streams from fishing activities. Descriptive statistics are particularly useful in identifying financial trends and patterns, offering a clear picture of how small-scale fisheries operate financially (Neuman 2006). Data is collected through structured surveys to identify the expenses and incomes of fishers, providing an understanding of their economic sustainability.

In the second part of the study, the focus shifts to the blue economy, which relates to the sustainable use and management of marine resources, specifically the fisheries in Morodemak Village. This section examines how the results of fishing activities can contribute to the broader objectives of the blue economy, ensuring long-term environmental sustainability while enhancing the livelihoods of fishers. Using a triangulation method, the qualitative data from in-depth interviews with fishers, government officials, and local stakeholders are compared with secondary data from literature to understand how blue economy principles are being applied within the community. Creswell (2018) suggests that triangulation strengthens the reliability of the study's findings by comparing multiple data sources. The qualitative approach in this study helps explain the local dynamics of fishing practices and highlights the role of the blue economy in fostering sustainable marine resource management.

Creswell (2009) emphasizes that a mixed-method approach is essential for capturing the complexity of socio-economic issues, especially in contexts like small-scale fisheries, where both economic and environmental factors play critical roles. By combining both quantitative and qualitative methods, this study provides a comprehensive understanding of how the blue economy can shape the future of small-scale fishing communities, promoting both resource sustainability and improved welfare for local fishers.

## Results and Discussion

**Respondent profiles.** The respondents in this study were fishers living in Morodemak Village, Demak Regency, Central Java Province. Based on the results of the interview, 30 fisher respondents were obtained. Table 1 shows the profile of respondents in the study.

The characteristics of respondents indicate that age, experience, and education play an important role in shaping fishers' capacity and strategies. Most respondents are within the productive age group (37-46 years) with long fishing experience (21-30 years), reflecting the dominance of skilled labor in fishing activities. This aligns with the findings of Al-Hafidz et al (2024), who highlight that productive age and extensive experience strengthen work capacity and adaptability to marine environmental changes.

Furthermore, the relatively low education level limits access to information and new technologies, even though education remains a critical factor for innovation adoption (FAO 2020). The variation in fishing gear, dominated by bolga, illustrates both economic stratification and capital constraints, ultimately influencing income levels. Nugroho et al (2021) emphasized that the choice of fishing gear strongly determines both catch outcomes and fishery sustainability. Thus, these variables are interconnected in shaping the socio-economic structure of fishers and should be considered in coastal fisheries management policies.

Table 1

## Social demographic profile of respondents

<i>Category</i>	<i>Frequency</i>	<i>Percentage (%)</i>
<i>Age</i>		
27-36	8	27
37-46	14	47
47-56	6	20
> 56	2	7
<i>Education</i>		
Not attending school	3	10
Elementary school	10	33
Junior high school	14	47
Senior high school	3	10
<i>Experience</i>		
< 10 years	2	7
10-20 years	2	7
21-30 years	23	77
> 30 years	5	17
<i>Duration of fishing</i>		
0-2 days	21	70
3-5 days	5	17
> 6 days	4	13
<i>Fishing gear</i>		
Bolga (traditional lift net)	14	47
Branjang/Bagang (traditional trap net)	8	26.50
Purse Seine	8	26.50

**Mapping Fisher's conditions.** The village of Morodemak, located along the river, heavily relies on fishing as its primary livelihood. Fishers use three types of fishing gear: Bolga, Bagang, and Mini Purse Seine. Each of these fishing methods yields different catches, influenced by the size and type of the vessel used. Larger vessels demand more crew members and higher operational costs, while smaller vessels are more cost-efficient but typically result in lower catch yields. This differentiation in vessel size and operational costs reflects the unique economic strategies employed by the fishers. The following Table 2 provides a detailed description of the fishing vessels operating in Morodemak.

Economic strategies among fishers demonstrate clear differentiation. Smaller vessels like bolga focus on low-cost, local markets, while larger vessels such as mini purse seines target high-value markets but require substantial capital investment. This pattern reflects socio-economic stratification, as emphasized by Schreiber et al (2022) and Chen et al (2020a). Their studies highlight how fishing technology directly influences welfare, as simpler, traditional fishing gear often proves more environmentally adaptable but yields lower economic returns. On the other hand, modernized fishing technologies, while increasing production value, often deepen economic disparities between large and small-scale fishers, a point underlined by Nugroho et al (2021) and Al-Hafidz et al (2024). They assert that technological advancements and increased vessel capacity improve profitability but exacerbate inequality, particularly among small-scale fishers who lack access to the necessary capital for such upgrades.

Table 2

## Key characteristics and operational differences

<i>Aspect</i>	<i>Bolga ship</i>	<i>Mini purse seine</i>	<i>Bagang ship</i>
Ship size (gt)	15-17 GT	> 20 GT	> 25 GT
Net size	1-2 inches	Long and wide (adapted for large fish)	0.3-0.8 inches
Crew capacity	10-17 people (owner, 1 captain, crews, workers)	±70 people (owner, captain, crews, and workers)	Large capacity, depending on operation needs
Fishing time	03.00 am - 11.00 pm (One day fishing)	03.00 am - 09.00 pm (One day fishing, with permits)	Night fishing, with resting hut above the bagang structure
Target species	Small fish (e.g., Acetes, Anchovies)	Large fish (e.g., Swordfish, Mackerel, Tuna)	Coastal pelagic fish attracted by light
Fishing frequency	Daily	Not daily, depends on permits and fish availability	Frequent at night
Supplies needed	Minimal (basic consumption items like rice, coffee, cigarettes)	High (rice, noodles, coffee, sugar, tea, cigarettes, fuel, maintenance, license fees)	Moderate (snacks, noodles, fuel, maintenance, depreciation for nets and lamps)
Unique features	Small ship, cost-efficient, but limited income potential	Productive, higher catch value, but requires significant investment and higher operating expenses	Pyramid-like structure with hut for shelter and observation, uses bamboo rollers for net pulling

Table 3 shows the breakdown of expenses for three types of fishing vessels: Bolga Ship, Mini Purse Seine, and Bagang Ship. The operational costs vary significantly across these vessels. The Bolga Ship has the lowest overall expenditure, particularly in consumables like cigarettes and food, which are cheaper compared to the Mini Purse Seine and Bagang Ship. The Mini Purse Seine incurs higher costs for consumables and storage, reflecting its larger crew and more intensive operations. In contrast, the Bagang Ship has the highest costs, especially in fuel and depreciation, due to its larger size and complex fishing gear. Fuel costs for the Bagang Ship are the highest, typical of larger vessels that require more fuel for longer journeys. Additionally, depreciation is a major factor for the Bagang Ship, primarily due to its expensive fishing equipment, such as nets and lamps. Depreciation rates for fishing gear vary significantly depending on the type and usage, which affects the economic lifespan of the equipment and, consequently, operational costs (Quiros et al 2018; Saarrankan 2020). Gear loss is another significant issue, often caused by conflicts with other gear, cargo vessels, seabed structures, and inclement weather (Campbell et al 2021). Different types of fishing gear, such as nets, traps, and lines, experience considerable annual loss rates, further exacerbating the economic burden on fishing operations.

Maintenance costs, while minimal for Bolga Ship, can be a hidden challenge for the other vessels if not well-managed, as regular maintenance is key to avoiding larger, more expensive repairs. Administrative fees, particularly taxes, are relatively similar across all ships but can still affect profitability, especially in high-tax regions. The overall costs reflect not just the size of the vessel but also its operational model, with larger ships incurring more substantial costs due to the scale of their operations and the complexity of their equipment. This financial overview highlights the economic pressures faced by fishers and the importance of efficient cost management in ensuring profitability. According to a study by FAO, fuel consumption is one of the major operational expenses for fishing vessels,

especially in deep-sea fishing, where longer trips are necessary (FAO 2020). Zhang et al (2022) emphasize that efficient ice storage is vital for preserving the quality of the catch and directly influences the revenue generated. In a more recent study, Shaffril et al (2021), the increasing importance of fuel-efficient technologies and alternative energy sources in reducing operational costs makes fishing more sustainable in the long run. Furthermore, Adams & Chumchuen et al (2023) discuss the role of maintenance in prolonging the lifespan of fishing vessels and reducing the long-term costs of repairs, which is especially relevant for the Bagang Ship, which requires high-tech fishing gear. Lastly, the relationship between taxes and fishing operations is explored in Bennett et al (2021), where they note that taxation can influence the profitability of fishing businesses, particularly in regions with high tax rates. This body of literature underscores the importance of understanding these cost structures to maintain sustainable and profitable fishing operations.

Table 3

Cost structure analysis of small-scale fishing vessels in Morodemak

<i>Category</i>	<i>Bolga ship (USD)</i>	<i>Mini purse seine (USD)</i>	<i>Bagang ship (USD)</i>
Consumption			
Cigarette	21.91	43.47	28.02
Coffee	1.83	1.83	1.64
Sugar	0.97	2.56	-
Tea	2.13	2.13	-
Rice	3.29	3.29	-
Noodles	8.08	8.08	85.33
Snack	-	-	28.61
Storage			
Ice cube	4.26	12.05	-
Fuel oil			
Diesel oil	77.64	10.35	181.34
Depreciation cost			
Fishing gear	0.85	0.83	4,868.52
Maintenance cost			
Docking	0.06	-	-
Administration fee			
Tax	18.39	21.04	52.86
<b>Total cost</b>	<b>125.95</b>	<b>441.54</b>	<b>8,940.03</b>

The income generated by the Bolga Ship, Mini Purse Seine, and Bagang Ship is closely tied to their respective operational costs (see Table 4). The Bolga Ship, with an income of 367.88 USD, operates on a smaller scale and incurs lower costs for consumables, fuel, and maintenance. This modest income aligns with the relatively low costs of running the ship, as it catches smaller, lower-value fish like Acetes and Anchovies. The expenses associated with the Bolga Ship are minimal, indicating a low-risk, low-reward business model. FAO (2020) suggests that smaller fishing operations, like the Bolga Ship, tend to be more cost-efficient because of their limited fuel consumption and smaller crew. Similarly, Chen et al (2020b) emphasized the importance of lower operational costs in small-scale fisheries, highlighting that these vessels can operate profitably with minimal investment in resources. The Mini Purse Seine, with an income of 4,336.55 USD, catches a variety of fish like Mackerel, Tuna, Chub Mackerel, and Spanish Mackerel. It incurs higher costs due to larger fuel consumption, a bigger crew, and more intensive maintenance needs. Parker et al (2015) argue that larger vessels, like the Mini Purse Seine, typically have greater income potential but require more capital for operations, creating a balance between costs and revenue.

The Bagang Ship, which generates 12,684.39 USD, operates at the largest scale, catching high-value fish such as Spanish Mackerel and Chub Mackerel. While this ship generates the highest income, it also incurs the greatest costs, including fuel, maintenance, and the depreciation of expensive fishing gear like nets and lamps. Despite these

substantial expenses, the Bagang Ship remains profitable due to the high revenue from its larger and more valuable catches. This aligns with Bayramoglu et al (2018), who stated that larger fishing vessels require high upfront investment but can be profitable when the catch volume justifies the expenses. Similarly, Ameyaw et al (2021) highlighted that larger-scale fishing operations must manage their high operational costs efficiently to sustain profitability. Thus, the Bagang Ship exemplifies how large-scale operations can offset high costs through efficient management and valuable catches, ultimately generating substantial income despite significant expenditures.

Table 4

Income from fishing catches for different types of fishing vessels

<i>No</i>	<i>Bolga ship (USD)</i>	<i>Mini purse seine (USD)</i>	<i>Bagang ship (USD)</i>
1	124.42 (Acetes)	780.83 (Mackerel Tuna)	2,278.85 (Mackerel Tuna)
2	243.53 (Anchovies)	1,119.71 (Chub Mackerels)	3,278.16 (Spanish Mackerels)
3	-	3,043.91 (Spanish Mackerels)	3,278.16 (Chub Mackerels)
Total income	367.88	4,336.55	12,684.39

Table 5 illustrates the varying challenges and opportunities across small-, medium-, and large-scale fishing operations. The Bolga Ship, with a modest income of 367.88 USD, mainly targets lower-value species like Acetes and Anchovies. This keeps operational costs low but restricts income potential. Chuenpagdee (2020) noted that small-scale fisheries often struggle to achieve substantial profits due to their reliance on low-value species and limited scalability. In contrast, the Mini Purse Seine, earning 4,336.55 USD, benefits from higher-value catches such as Mackerel Tuna and Spanish Mackerel. Although it faces increased costs for fuel, crew, and maintenance, it generates significantly higher returns. Merten et al (2022) emphasize that medium-scale fisheries strike a more balanced path, sustaining incomes through valuable catches while maintaining manageable operating costs.

When compared side by side, the Bagang Ship stands out for its economies of scale, achieving the highest income but also bearing the heaviest financial burden. Mazuki & Man (2025) argue that while large-scale operations offer greater profit opportunities, they require meticulous cost management, particularly regarding fuel and maintenance, to avoid undermining profitability. In summary, small vessels like the Bolga Ship keep costs low but face growth limitations; medium vessels such as the Mini Purse Seine offer a balance between cost and return; while large vessels like the Bagang Ship maximize income but depend on efficient cost control to remain sustainable.

Table 5

Income allocation and crew compensation

<i>Position</i>	<i>Bolga ship (USD)</i>	<i>Mini purse seine (USD)</i>	<i>Bagang ship (USD)</i>
Ship owner	220.73	2,168.28	6,342.19
Ship captain	55.18	433.66	1,268.44
Ship crew	55.18	867.31	3,171.10
Laborer	36.79	867.31	3,171.10
Total	367.88	4,336.55	12,684.39

**Blue economy potential of Morodemak village.** The northern coastal areas of Central Java are characterized by diverse land uses, including settlements, industries, and public facilities (Kusuma & Irwani 2013). Small-scale fishing is a key livelihood for the people of Morodemak, particularly along its coast. The fish production data presented in Figure 2 illustrates the volume of various fish species caught, which significantly contribute to the overall economic activity of the region.

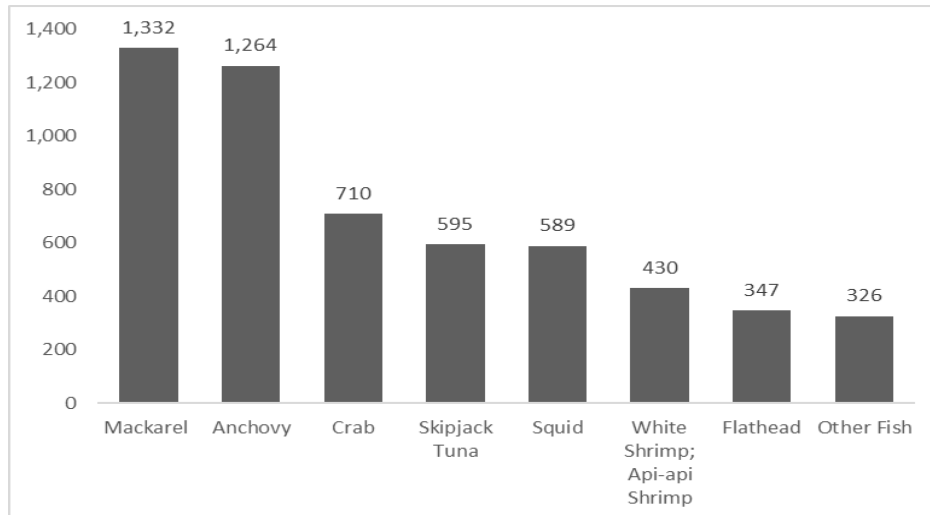


Figure 2. Capture Fisheries Production of Morodemak (Ton) (MMAF 2024).

The diverse range of fish species caught in Morodemak reflects the potential of its fisheries, directly tied to the blue economy's goal of sustainable marine resource use for economic growth (Bennett et al 2021). High-value species like mackerel, anchovies, and crab contribute to income generation for local fishers, aligning with blue economy principles (Dağtekin, Gücü, & Genç 2022). As discussed in earlier data, larger vessels like the Bagang Ship, with an income of 12,684.39 USD, target high-value fish, driving higher earnings, while smaller vessels such as the Bolga Ship focus on lower-value species like Acetes, yielding a modest 367.88 USD (Chuenpagdee & Jentoft 2019; Uddin et al 2021). This income disparity highlights the challenges in balancing economic growth with sustainability. Over-reliance on high-value species can lead to overfishing, contradicting blue economy principles if not managed sustainably (Nataniel et al 2022). To support the livelihoods of small-scale fishers while promoting sustainability, policies should focus on resource conservation, equitable access, and environmentally friendly technologies (Amadu et al 2021). The application of blue economy principles will ensure both economic prosperity and long-term marine health for Demak's fishing communities.

Figure 3 shows the daily activities carried out by fishers at Morodemak. Fishing activities in Morodemak typically begin in the early morning and conclude by noon, with all routines revolving around the day's catch. The sale of fresh fish remains the primary economic activity at the landing site, while fish processing is generally limited to anchovies and salted fish. Although small-scale fishers in Morodemak appear relatively prosperous, they face numerous challenges that threaten the sustainability of their livelihoods. These difficulties largely stem from social, environmental, and policy-related changes. Socially, conflicts among fishers and migration pressures have become increasingly common, reflecting competition over limited resources and shifting livelihood opportunities (Rasheed, Abdulla & Zakariyya 2016; Sowman & Raemaekers 2018). Environmentally, climate change and coastal degradation pose serious risks to fishing productivity and community resilience (Sultana et al., 2022). Problems such as rising sea surface temperatures, changing monsoon patterns, and marine pollution further exacerbate the situation (Hilmi et al 2019; Pérez-Guevara & Kutralam-Muniasamy 2020; Islam & Walkerden 2022). Despite Morodemak's significant fishery production, coastal communities in Demak Regency must contend with fragile environmental conditions. The region's low-lying topography makes it highly vulnerable to sea-level rise, tidal flooding, coastal erosion,

and sediment accretion (Riyanti et al 2017). These environmental pressures not only disrupt fishing operations but also threaten coastal infrastructure and the long-term sustainability of local fisheries. Flooding occurs when water accumulates on coastal land during high tides, known as tidal floods. These floods happen annually, submerging settlements in several coastal villages in Morodemak. While climate change is a significant factor contributing to tidal flooding, human activities also play a role. Tidal floods have a profound impact on the lives of coastal communities, disrupting their daily activities and livelihoods (Entorf & Jensen 2020). The impact is not only on infrastructure, but also on the social and economic aspects of the local community.

Based on in-depth interviews, the Morodemak area was known for its fertility, with locals describing it as "gemah ripah loh jinawi," a prosperous and bountiful land. In the past, when shrimp were caught, the nets were often so heavy with catches that they could barely be lifted due to the abundance. However, over the last 30 years, significant changes have occurred. Flood erosion and tidal flooding started affecting the area. As the Demak Regency became more attractive to investors, pollution worsened. The presence of chemicals in the soil, coupled with low pH levels, hindered plankton growth, disrupting the marine food chain and reducing the number of fish in the area. While fish are still present, they struggle to grow large. The effects of these environmental changes were first felt in 1998 when major flooding struck the region. Over time, the situation has worsened, and the community now faces the challenge of adapting, a process that cannot be completed quickly.



Figure 3. Capture fisheries production activities: (a) fishing activities; (b) fish auction market conditions; (c) fish sales; and (d) dried fish processing.

Government policy changes can also lead to the marginalization of small-scale fishers (Sowman et al 2021). Policies should not only focus on increasing per capita income but also prioritize the sustainable livelihoods of fishers (Rani et al 2019). While natural, social, and governmental changes can bring positive outcomes, a collaborative approach with the community is essential for effective implementation. One possible solution is the development of the blue economy, which can serve as a strategy for sustainable resource management and the improvement of local fisheries livelihoods.

Blue economy can be one of the strategies for sustainable use of marine resources. The condition that needs to be considered is the balance between the use of resources and how processing is carried out. The government needs to provide a larger study on the implementation of the "Blue Economy" policy, which will be implemented as a form of encouragement to improve the economy of a region. Studies need to be carried out so that no coastal community feels marginalized because of the policy. Previous research has explained that several criteria need to be considered in the formulation of blue economy policies to be right on target according to Bennett et al (2021) are: (1) grabbing, displacement and exploitation of marine resources; (2) environmental justice due to pollution and waste; (3) environmental degradation and reduced availability of ecosystem services; (4) impacts on the livelihoods of small-scale fishers; (5) loss of access to marine resources necessary for food security and well-being; (6) unequal distribution of economic benefits; (7) the social and cultural impacts of marine development; (8) marginalization of women; (9) violations of human rights and indigenous peoples; and (10) errors in decision-making and governance.

The potential of the blue economy can indeed provide an increase in the regional economy, but careful application is needed so that fishers continue to improve their welfare. Therefore, several efforts need to be considered to obtain effective, efficient, and sustainable blue economy policy results.

**Discussion.** The findings of this study reveal that the economic structure of fishers in Morodemak shows a clear disparity between small- and large-scale fishing groups. Large vessels equipped with modern technologies, such as Bagang and Mini Purse Seine, generate substantially higher incomes compared to traditional boats like Bolga. This reflects a socio-economic differentiation that is determined not only by production capacity but also by access to capital, technology, and market networks. Nugroho et al (2021) and Al-Hafidz et al (2024) emphasized that technological modernization in the fisheries sector indeed improves efficiency and productivity, but at the same time widens the gap among fishers. Small-scale fishers tend to lag due to their limited financial capacity to upgrade their fleets or adopt new technologies. This phenomenon aligns with Schreiber et al (2022), who found that modernization in the marine sector often benefits capital-intensive fishers, while traditional fishers remain trapped within a subsistence economy.

Similarly, Chen et al (2020a) argued that access to technology and markets strongly determines the level of fishers' welfare, where those with greater capital tend to hold stronger bargaining power in the supply chain. This explains why large-scale fishers in Morodemak are able to accumulate higher profits and expand their networks, whereas small-scale fishers struggle to meet daily needs and maintain livelihood stability. Such disparity is not merely an economic issue, but also a structural one rooted in unequal resource distribution and the lack of inclusive marine policies. As Bennett et al (2021) noted, the dominance of large-scale technology without redistributive and inclusive policy measures tends to deepen social inequality within coastal communities.

From a sustainability perspective, this study highlights the persistent dilemma between economic growth and environmental conservation. Large vessels with intensive fishing operations often target high-value species such as mackerel, tuna, and chub mackerel, which, according to Nataniel et al (2022), increases the risk of overfishing and ecological imbalance. Similar concerns were raised by Hilmi et al (2019) and Islam & Walkerden (2022), who documented that excessive exploitation of marine resources along the northern coast of Java has led to declining fish stocks and significant habitat degradation. In contrast, small-scale fishers play an essential ecological role, as traditional fishing gears like Bolga are more adaptive and environmentally friendly. These findings

support Chuenpagdee & Jentoft's (2019) argument that small-scale fisheries possess high ecological value because they operate within the carrying capacity of the ecosystem, even though their economic returns remain modest.

Moreover, environmental pressures in Morodemak have further exacerbated the socio-economic vulnerability of coastal communities. Coastal erosion, tidal flooding, and water pollution caused by industrial activities have directly reduced fishery productivity. Riyanti et al (2017) pointed out that the low topography and seawater intrusion in Demak Regency increase the frequency of tidal flooding each year, disrupting fishing activities and damaging harbor infrastructure. Entorf & Jensen (2020) also emphasized that tidal flooding not only affects economic conditions but also creates social trauma and weakens community cohesion. These findings suggest that ecological vulnerability and social instability are mutually reinforcing, placing small-scale fishers in an increasingly fragile position.

In terms of policy implications, the blue economy approach offers a potential framework for balancing economic growth with the sustainability of marine resources. However, as Bennett et al (2021) warned, the implementation of blue economy initiatives can become exploitative if social and ecological justice principles are ignored. Bennett identified several key risks in blue economy practices, including ocean grabbing, environmental degradation, inequitable distribution of economic benefits, and the marginalization of small-scale and women fishers (Bennett et al 2021). Therefore, the blue economy should not be perceived merely as an economic growth strategy, but as a sustainable development paradigm that integrates social, economic, and ecological dimensions.

This study reinforces the idea that implementing the blue economy in Morodemak should focus on three interrelated aspects. First, economic justice, by ensuring equal access to capital, technology, and markets for small-scale fishers. Second, ecological sustainability, through limiting excessive fishing practices and promoting environmentally friendly technologies such as selective gears and alternative energy sources. Third, participatory governance, in which marine management policies are designed collaboratively with coastal communities as active stakeholders. As Sowman et al (2021) emphasized, the success of marine resource management largely depends on cross-sector collaboration and mutual trust between governments and local communities.

**Conclusions.** Morodemak fishers can be grouped into three types based on their fishing gear: bolga, branjang, and mini purse seine fishers. The potential of the Blue Economy can be seen in the economic turnaround that occurred in Morodemak Village. Fishers sell marine products directly at the fish auction site and resell them through large and small traders for distribution to various cities. This potential needs to be increased to provide welfare for fishers around the fish auction site in Morodemak. Although Morodemak's small-scale fishers appear prosperous, they often face several challenges. Common issues stem from social, environmental, and government policy changes. Social challenges include conflict, labor issues, and migration. Environmental issues, such as climate change and environmental degradation, also pose significant challenges. Despite large fisheries production, coastal communities in Demak Regency, especially in Morodemak, must contend with vulnerable environmental conditions. The region's low topography makes it susceptible to rising sea levels, tidal floods, abrasion, and accretion.

The development of the blue economy in Morodemak is crucial, and further studies are needed to map the existing blue economy potential. In this research, the role of stakeholders in advancing the blue economy is not yet visible, indicating a need for additional research on their involvement in developing the blue economy within Demak Regency. Ensuring the successful implementation of the blue economy will be essential for improving the welfare of local fishers.

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