

Implementation of Blue Economy Policy in Marine Resource Management to Support Economic Growth

Imsar¹, Purnama Ramadani Silalahi², Nurul Aulia Dewi³, Dimas Surya⁴

^{1,2,4}State Islamic University of North Sumatra, Indonesia.

³Raudhatul Akmal Islamic College, Deli Serdang, Indonesia.

imsar@uinsu.ac.id *✉

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ABSTRACT

Keywords:

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Background: Background: Aceh Province has abundant marine resources with a coastline exceeding 2,500 kilometers, yet the fisheries sector's contribution to Gross Regional Domestic Product remains low at only 5.23%. Excessive exploitation, marine pollution, and mangrove degradation threaten ecological sustainability and coastal community welfare. The blue economy concept offers a sustainable development approach balancing economic growth and environmental preservation.

Research Gap: Previous studies have generally focused on specific sectors such as coral reef conservation without integrating multidisciplinary analysis encompassing ecological, socio-cultural, and institutional policy aspects comprehensively. Limited research has examined blue economy implementation in Aceh with a focus on local wisdom integration.

Novelty: This study offers an integrative approach combining economic, ecological, and institutional governance dimensions within a single analytical framework. It specifically examines the role of Panglima Laot traditional institutions in marine governance, an aspect underexplored in previous literature, and proposes an adaptive policy model integrating ecologically based incentives.

Method: A qualitative descriptive analytical approach was employed. Data were collected through in-depth interviews, field observations, and documentation with informants including traditional leaders (Panglima Laot) and representatives of the Maritime Affairs and Fisheries Agency. Data analysis followed the Miles and Huberman interactive model through data reduction, presentation, and conclusion drawing.

Results: Implementation of the blue economy in Aceh includes marine ecosystem conservation, mangrove rehabilitation (100 hectares annually), fish house construction, and establishment of 149,000 hectares of Marine Protected Areas. Challenges include limited human resources, inadequate infrastructure, budget constraints, and overlapping authority between central and regional governments. Panglima Laot traditional institutions play a strategic role in regulating fishing zones, enforcing customary bans, and strengthening participatory marine governance.

Conclusion: Integration of blue economy policies with local wisdom is essential for realizing sustainable and equitable marine resource management. Strengthening customary institutions, improving inter-agency coordination, and enhancing fisher capacity are critical for optimizing marine potential and improving coastal community welfare.

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INTRODUCTION

Aceh Province is known as one of the regions with the longest coastline in Indonesia, reaching more than 2,500 kilometers, and has abundant marine resources such as pelagic fish, coral reefs, and mangrove forests (Shapefile, 2022). This potential should be the foundation for a strong and inclusive maritime economy for coastal communities. However, in reality, excessive exploitation, such as overfishing, marine pollution, and mangrove ecosystem degradation, continues to increase year after year. Data shows that approximately 40% of coral reefs in Aceh waters are damaged, and nearly 30% of mangroves have been lost in the past two decades (BPS, 2021).

This situation not only threatens ecological sustainability but also reduces the productivity of the fisheries sector and exacerbates the socio-economic vulnerability of coastal communities. This reflects the paradox between the potential of natural resources and the reality of community well-being.

In line with these challenges, the concept of the Blue Economy is beginning to be adopted globally as an alternative sustainable development approach. The term (blue economy) describes the sustainable exploitation of marine resources to stimulate the economy and improve people's lives (Khafian, 2023). This idea highlights how sectoral activities are interconnected due to their impacts on marine resources and the importance of an integrated management approach (Sudarmi & Rusdi, 2022). This includes utilizing marine spatial planning to manage cross-sector trade-offs, improving data and consulting with various authorities, and calculating natural capital to identify and allocate funding and resources.

Unlike conventional economic models that tend to be exploitative, the blue economy seeks to balance economic growth and environmental preservation through resource efficiency, technological innovation, and local community involvement. In the Aceh context, implementing a blue economy can be a strategic solution to improve the welfare of coastal communities while preserving marine ecosystems. However, realizing this concept requires a deep understanding of local characteristics, as well as data-driven planning and evidence-based policy.

Furthermore, social and policy phenomena on the ground also reinforce the urgency of this research. The contribution of the marine sector to Aceh's Gross Regional Domestic Product (GRDP) remains relatively low, despite its vast marine resource potential. This can be seen from the data on the distribution of GDP or GRDP percentages at current prices for Aceh Province in 2024:

Table 1. Distribution of GDP or GRDP at Current Prices in Aceh Province in 2024

Business Field	Distribution of GRDP Percentage Based on Current Prices
Agriculture, Forestry, and Fishing	29,71
1. Agriculture, Livestock, Hunting, and Agriculture Services	23,54
2. Forestry and Logging	0,93
3. Fisheries or Fishing	5,23
Mining and Quarrying	9,12
Manufacturing	5,19
Electricity and Gas Supply	0,11
Water Supply (Water Supply, Sewerage, Waste Management, and Remediation Activities)	0,04
Construction	9,09
Wholesale and Retail Trade (Car and Motorcycle Repair)	14
Transportation and Storage	5,48
Accommodation and Food Service Activities	1,7
Information and Communication	2,96
Financial and Insurance Services	1,73
Real Estate Activities	3,88

Business Activities	0,64
Government Administration, Defense, and Compulsory Social Security	8,94
Education Services	2,75
Health Services and Social Work Activities	3,24
Other Services Activities	1,41
Total	100

Source: BPS Aceh Province 2023

Table 1 shows that the fisheries sector's contribution to Aceh Province's Gross Regional Domestic Product (GRDP) is only 5.23%. This figure is relatively low compared to the province's vast marine and fisheries potential. This is despite Aceh's strategic geographical position, located at the western tip of Indonesia and directly bordering the Strait of Malacca and the Indian Ocean. This position makes Aceh's waters a key international shipping route and offers abundant marine resources. This can be seen in the following table:

Table 2. Aceh's Marine Potential

No	Potential Aspects	Information
1	Geographical Location	Bordering the Indian Ocean and the Strait of Malacca.
2	Capture Fisheries	Sustainable potential is approximately 1 million tons per year. Main species: tuna, skipjack tuna, grouper, and shrimp.
3	Aquaculture	Saltwater (seaweed, grouper), ponds (shrimp, milkfish), and freshwater (catfish, tilapia).
4	Marine Ecosystems	Coral reefs, seagrass beds, and mangroves. Conservation area: Weh Island, Banyak Islands.
5	Marine Energy	Potential for wave energy, ocean currents, and offshore oil and gas.
6	Marine Tourism	Rubiah Island, Iboih, Lampuuk Beach, and Lhoknga potential for snorkeling, diving, etc.

Source: BPS Aceh Province 2023

Table 2 shows that Aceh has abundant and diverse marine potential. However, the low contribution of the fisheries sector to the GRDP (5.23%) indicates a gap between potential and realization. This indicates the need for strengthened marine governance, investment in the marine sector, and empowerment of coastal communities to maximize this potential for the welfare of the Acehnese people.

Cross-sector coordination among stakeholders the private sector, government, and community remains weak, and often faces overlapping regulations and policy fragmentation (Alifa, Zahidi, 2024). Therefore, a new approach is needed that focuses not only on economic output but also on strengthening inclusive and sustainable institutions and governance of marine resources.

We can also find similar research, such as this one by (Najmi, Fazillah, 2021) with the title Condition of the Coral Reef Ecosystem in the Malacca Strait Waters, Masjid Raya District, Aceh Besar Regency, as well as research by (Gusrah, et.al, 2024) entitled "Implementation of the Blue Economy Scheme in the United Nations Convention on the Law of the Sea: A Study of the Sustainability of Fisheries Resources in Coastal Sulawesi." Although much literature discusses the blue economy conceptually and at the national scale, there is still a research gap in the context of its application in Aceh. Previous studies generally focused on specific sectors such as coral reef conservation (Statistik, 2024), (Setyawati et al., 2021), without integrating a multidisciplinary analysis that encompasses ecological, socio-cultural, and institutional policy aspects comprehensively.

This research offers several novelties in addressing this gap. First, an integrative approach is used to analyze the effectiveness of the blue economy, combining economic, ecological, and institutional governance dimensions within a single analytical framework. Second, the local context of Aceh is the primary focus, considering local wisdom values and the role of prominent figures in marine management, aspects that have not been widely explored in previous literature (Dian, et.al, 2023). Third, this study also proposes a policy innovation in the form of an adaptive model for marine resource management that integrates ecologically based incentives, such as subsidies for environmentally friendly fishermen, and the development of marine biotechnology-based sectors as a source of new economic growth.

Thus, this research not only fills a gap in academic studies related to the locally based blue economy in Aceh but also offers an implementable framework that policymakers can use to design coastal development programs that are more responsive to environmental and social challenges, such as fish stock management, environmentally friendly aquaculture, the development of value-added fishery products, and waste management in tourist areas. It is hoped that the developed model can inspire transformation of the marine sector in other regions with similar characteristics.

METHOD

This research uses a qualitative, descriptive, and analytical approach with the aim of gaining a deeper understanding of the implementation of the blue economy concept in marine resource management and the role of local wisdom in supporting economic growth in coastal areas. As stated by (Hardani, 2020), This descriptive analytical qualitative research focuses on analyzing data in the form of written and spoken words sourced from informants or observations of social phenomena. This approach is considered relevant because the research seeks to describe the implementation practices of blue economy policies chronologically and systematically, while focusing the analysis on key aspects related to marine resource management based on local wisdom.

The research location is in the coastal area of Aceh Province, which has high marine potential and still maintains traditional institutional structures in marine resource management. This location was selected based on academic considerations that the area represents blue economy practices integrated with local values, such as fish stock management, environmentally friendly fisheries cultivation, development of value-added fishery products, and coastal environmental management. This research was conducted from July to September 2025, taking into account the availability of informants and the condition of marine activities in the research area.

The data sources in this study consist of primary and secondary data. Primary data were obtained directly from research subjects through in-depth interviews with key informants, including fishermen, traditional leaders (such as the Panglima Laot), and representatives of the local government, particularly the Maritime Affairs and Fisheries Agency. This primary data was used to explore perspectives, experiences, and actual practices related to the implementation of the blue economy in coastal areas. Meanwhile, secondary data was obtained from various relevant written sources, such as journal articles, scientific books, research reports, publications from the Central Statistics Agency (BPS), and policy documents related to the marine and fisheries sector. Secondary data served to strengthen the analysis and provide broader empirical context to the field findings.

Data collection techniques were conducted through interviews, observation, and documentation. The interviews were conducted in a structured manner, using question guidelines developed based on the research focus, while still allowing informants to express their views freely and in-depth. This approach aimed to obtain comprehensive data on the implementation of the blue economy, implementation challenges, the role of local wisdom, and support from local government policies. In addition to interviews, researchers also conducted direct field observations to obtain a factual picture of marine resource management practices, such as the use of environmentally friendly fishing gear, sustainable aquaculture activities, the implementation of customary regulations, marine ecosystem conditions, community participation, and coastal waste management. Documentation was used to complement the interview and observation data, including the collection of official documents, policy archives, statistical data, and photographs of activities relevant to the research focus.

Data analysis in this study was carried out interactively following the model (Huberman, 1992), which includes three main stages: data reduction, data presentation, and drawing conclusions. In the data reduction stage, researchers select and focus on data relevant to the research objectives. Next, the data is presented in the form of descriptive narratives and thematic matrices to facilitate understanding of patterns and relationships between findings (Ramdhan, 2021). The final stage is drawing and confirming conclusions, which is carried out iteratively through a process of reflection and verification of the analyzed data, resulting in valid and meaningful findings related to the implementation of the blue economy in marine resource management. To ensure data validity, this study employed several validation techniques, including: (Jhon W Creswell, 2010):

1. Source triangulation, comparing data from various sources.

2. Member checking, validating the results of direct interviews with informants.
3. Peer discussion, to avoid bias in data interpretation.

RESULTS

Challenges and Obstacles in Sustainable Marine Management

Based on interviews with the Aceh Provincial Maritime Affairs and Fisheries Office, it was discovered that the biggest challenge to sustainable marine management lies in the limited human resources (HR) of fishermen, many of whom still use traditional methods. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Office, explained:

"Most of our fishermen don't fully understand the principles of sustainability in fishing. They are still focused on their daily catch, without considering the long-term impact on the marine ecosystem." (Interview with Mr. Kariamansyah, 2025)

Furthermore, supporting facilities and infrastructure are also significant obstacles. Facilities such as modern fishing vessels, cold storage, and access to national and international markets are still relatively limited. As a result, the productivity and competitiveness of Aceh's marine products lag behind other regions in Indonesia.

Another challenge is the limited regional government budget, which prevents several strategic marine management programs from being implemented optimally. Another challenge arises from limited regional budgets, which prevent several strategic programs such as mangrove rehabilitation and fish house construction from being implemented optimally. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"The government's budget efficiency measures have impacted community empowerment activities. There used to be training and fishing gear assistance, but now these have been reduced due to limited funding." (Interview with Mr. Kariamansyah, 2025)

From a regulatory perspective, the interviewee also highlighted overlapping authority between the central and regional governments, particularly following the implementation of the Non-Tax State Revenue (PNBP) policy on fishing permits. This situation has limited regional authority in managing fishing permits. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"Previously, we could issue permits up to 60 GT ourselves. Now there are restrictions, so more intensive coordination with the central government is needed." (Interview with Mr. Kariamansyah, 2025)

Thus, it can be concluded that the challenges to sustainable marine management in Aceh stem not only from technical and economic aspects, but also encompass policy and institutional dimensions, as well as the fishing community's lack of understanding of the importance of marine conservation as a long-term source of livelihood.

Table 3. Research Results on Challenges and Obstacles to Sustainable Marine Management

Problem Aspects	Information
Fishermen's Human Resource Capacity	Fishermen still largely use traditional methods and lack a grasp of sustainability principles. They focus on daily catches, rather than the sustainability of marine ecosystems.
Limited Facilities and Infrastructure	The lack of supporting facilities, such as modern vessels, cold storage, and access to national/international markets, reduces the productivity and competitiveness of marine products.
Limited Regional Government Budgets	Budget efficiency has led to a reduction in empowerment and training activities for fishermen. Strategic programs such as mangrove rehabilitation and fish houses are not running optimally.
Conflicts and Irregularity in Fishing Areas	There are no direct conflicts, but there are challenges in monitoring fishing areas due to limited resources.
Regulatory and Institutional Constraints	There is overlapping authority between the central and regional governments, particularly regarding permits for vessels under 60 GT following the implementation of PNBP.

Understanding of Marine Sustainability and Conservation Principles	Fishermen remain low in awareness of the importance of long-term marine conservation and management.
Fiscal Support and Inter-Agency Coordination	Coordination between agencies remains weak, particularly between regional and central governments.

Source: Data processed 2025

The table above shows that the challenges of sustainable marine management in Aceh Province have a pattern, namely weak human resource capacity of fishermen, limited facilities and infrastructure, and bureaucratic obstacles due to overlapping central and regional authorities.

Implementation of Blue Economy Policy in Marine Resource Management

Interviews indicate that the Aceh Government has taken concrete steps to implement its blue economy policy, in line with the national policy direction initiated by the Ministry of Maritime Affairs and Fisheries (MMAF). The blue economy concept in Aceh is understood as a development approach based on the sustainable use of marine resources, emphasizing a balance between economic growth, environmental sustainability, and the well-being of coastal communities. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"Here, we understand the blue economy concept as an effort to balance poverty alleviation, job creation, and ecological sustainability." (Interview with Mr. Kariamansyah, 2025).

In its implementation, the Aceh Government has implemented several key programs, such as empowering coastal communities, increasing the capacity of fishermen, and developing supporting infrastructure for the marine sector. One concrete example is the development of an integrated fishing center area, which provides fish auction facilities, cold storage, and environmentally friendly fishing gear.

To support this, the Aceh Government has implemented several concrete programs. One of these initiatives is mangrove rehabilitation and restoration, which began in 2021. Each year, the government targets replanting approximately 100 hectares of mangrove areas to restore fish habitat and prevent abrasion. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"Around 30 percent of fish production depends on mangroves. So if mangroves are damaged, fishermen's catches automatically decrease." (Interview with Mr. Kariamansyah, 2025)

Furthermore, Aceh is also developing innovative concrete cube-shaped fish houses placed in shallow waters as artificial habitats for marine life. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"We built this fish house out of cement, 80 cm high, and it's arranged in three levels. Within six months, barnacles and young coral started to appear." (Interview with Mr. Kariamansyah, 2025)

This program has successfully increased the fish population in the Aceh Jaya region, and it is now a favorite fishing area for small-scale fishermen.

Another effort to support the blue economy is the establishment of 149,000 hectares of Marine Protected Areas (MPAs), or approximately 85 percent of the national target of 10 percent of marine areas to be protected. The community, including fishermen and the Panglima Laot (the Marine Commander), was directly involved in the process of determining these conservation zones. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"They know best where fish spawn and which areas need to be protected. So, a conservation map was created with the community, and then we ratified it through a regional regulation." (Interview with Mr. Kariamansyah, 2025)

However, the implementation of this policy continues to face several obstacles, such as global warming, climate change affecting seasonal patterns, and marine habitat destruction. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, added:

"Nowadays, the fishing season is unpredictable. While it used to be predictable, now it sometimes shifts due to changes in sea temperatures." (Interview with Mr. Kariamansyah, 2025)

In addition, there is a program to empower coastal communities economically through training in seafood processing and providing micro-business capital assistance to fishing groups. This step aims to

ensure that communities are not solely dependent on marine catches but also able to develop derivative businesses such as salted fish, fish floss, and other export-worthy products.

The Aceh government is also collaborating with research institutions and universities to determine fishing and conservation zones based on scientific studies. This data-driven approach is crucial for ensuring the sustainability of marine ecosystems while maintaining long-term fisheries productivity.

Overall, the implementation of the blue economy policy in Aceh is showing positive signs, although it still faces a number of technical and budgetary limitations and institutional synergies that need to be strengthened.

Tabel 4. Research Findings on the Implementation of Blue Economy Policy in Marine Resource Management

Implementation Aspects	Information
Understanding and Concept of the Blue Economy	Understood as an effort to balance economic growth, environmental sustainability, and the welfare of coastal communities
Main Programs Implemented	- Empowering coastal communities. - Increasing the capacity of fishermen. - Developing integrated fishing center infrastructure (TPI, cold storage, and environmentally friendly fishing gear).
Marine Ecosystem Rehabilitation and Conservation Program	- Mangrove rehabilitation and restoration of approximately 100 hectares per year starting in 2021. - Construction of concrete cube fish houses for marine biota habitats. - Establishment of a 149,691.39-hectare Marine Conservation Area (MPA).
Community and Local Institution Engagement	Communities and the Marine Commander are involved in creating conservation maps and fishing zones.
Scientific Collaboration and Data-Driven Approaches	Collaborating with research institutions and universities to determine conservation and fishing zones based on scientific studies.
Supporting Policies and Regulations	Aligned with national KKP policy. Focus on the blue economy, conservation, and innovation in environmentally friendly fishing gear.
Monitoring and Law Enforcement	Supervision still faces technical and weather constraints. Challenges in enforcing fishing zone regulations.
Fiscal and Institutional Support	Limited regional budgets hamper the optimization of conservation and empowerment programs.
Environmental Constraints and Climate Adaptation	The impact of climate change has caused shifts in fishing seasons and decreased marine productivity.
Implementation Results and Directions	Showing positive direction with community involvement and a strong ecological approach, but requires strengthened inter-agency coordination and budget support.

Source: Data processed 2025

The table above shows that the two provinces have implemented blue economy policies with different approaches, but with a focus on ecosystem sustainability and the well-being of fishermen. Aceh Province places greater emphasis on conservation, the involvement of indigenous communities (Panglima Laot), and integration with scientific research in fishing zone management.

The Role of Local Wisdom in Supporting Inclusive and Sustainable Marine Governance

To maintain marine sustainability, the Aceh Government, through the Maritime Affairs and Fisheries Agency, implements a fairly strict monitoring system for fishing activities. Supervision is carried out through the Marine and Fisheries Resources Monitoring Unit (PSDKP), which has the authority to take action against violations such as the use of environmentally unfriendly fishing gear, illegal fishing practices, and activities that damage the ecosystem, such as fish bombing.

In addition, the Aceh Maritime Affairs and Fisheries Agency also has a marine resource potential mapping program, which is conducted to determine the condition of fish stocks and other resources in Acehese waters. This data serves as a reference in determining sustainable fishing policies in accordance with blue economy principles.

Field monitoring is carried out collaboratively between the local government, maritime security forces (Polairud and the Indonesian Navy), and coastal communities through Community Monitoring

Groups (Pokmaswas). Pokmaswas plays a crucial role as government partners in detecting violations in coastal and marine areas.

In a socio-cultural context, research shows that the local wisdom of Aceh's coastal communities plays a significant contribution to supporting inclusive and sustainable marine management. One concrete example is the traditional institution "Panglima Laot," which has existed since the kingdom era and is legally recognized in Aceh Qanun Number 8 of 2010 concerning Customs and Customs. It serves as a traditional authority in regulating maritime activities. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Service, explained:

"The Panglima Laot is a traditional institution that regulates fishing activities and resolves disputes at sea. They are recognized by the government and have customary authority to regulate fishing areas." (Interview with Mr. Kariamansyah, 2025)

The Panglima Laot plays a crucial role in maintaining order and marine sustainability through various customary regulations that remain in effect today. One example is the prohibition on going to sea on Fridays and the three-day ban on going to sea during the Kenduri Laot (Sea Feast) tradition. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"That's a customary agreement. Fridays are considered sacred, and fishermen must stay home and not go out to sea." (Interview with Mr. Kariamansyah, 2025)

Furthermore, the Panglima Laot (the Marine Commander) also established no-take zones in coastal areas to protect fish spawning grounds. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"In some areas, fishermen are prohibited from fishing within a 100-meter radius of the coast because that's where the fish spawn. Violators will be subject to customary fines. Fines can include money, goats, or the confiscation of fishing gear." (Interview with Mr. Kariamansyah, 2025)

The Panglima Laot organizational structure consists of fishing community, district/city, and provincial levels. Elections are conducted democratically by senior fishermen in each community. The local government provides technical guidance to this institution but does not interfere with its independence. "They are independent, but under our guidance. We only provide institutional support and capacity building," said the source.

Furthermore, the Aceh Government has made Panglima Laot part of the Community Monitoring Group (Pokmaswas) program, which plays a role in monitoring marine activities. This collaboration has proven effective in preventing illegal practices such as fish bombing, the use of destructive fishing gear, and marine pollution.

Furthermore, Aceh's coastal communities have demonstrated a high level of ecological awareness through self-help initiatives such as mangrove planting, coral reef restoration, and beach cleanups. These activities involve fishing communities, NGOs, and educational institutions, all working together to maintain the balance of the marine ecosystem.

This local wisdom has been integrated into the Aceh Coastal Area and Small Islands Zoning Plan (RZWP3K), where the Panglima Laot (Panglima Laot) manages over 1.5 million hectares of marine area. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"Each Panglima Laot has its own territorial map. They know where they can fish and where they must guard." (Interview with Mr. Kariamansyah, 2025)

The strength of this formally recognized customary institution makes Aceh's marine governance inclusive and rooted in local cultural values, while supporting the principles of the blue economy. Mr. Kariamansyah, Acting Head of the Aceh Maritime Affairs and Fisheries Agency, explained:

"This local wisdom is not only a cultural heritage, but also the strongest social capital for maintaining marine sustainability and the prosperity of fishermen." (Interview with Mr. Kariamansyah, 2025)

The traditional values and social norms embodied in the local wisdom system have been proven to align with the principles of the blue economy, emphasizing the balance between economic exploitation

and environmental conservation. Thus, local wisdom in Aceh is not only a cultural heritage but also a crucial instrument in realizing sustainable, participatory, and inclusive marine governance.

Table 5. Research Results: The Role of Local Wisdom in Supporting Inclusive and Sustainable Marine Governance

Research Aspects	Information
Forms of Local Wisdom	The Panglima Laot customary institution serves as the traditional authority for regulating maritime activities and resolving maritime disputes. It has existed since the kingdom era and is legally recognized through Aceh Qanun No. 8 of 2010.
The Key Role of Local Wisdom	- Regulate fishing zones and fishing bans (for example, on Fridays and during Kenduri Laot). - Establish no-fishing areas to protect fish spawning grounds. - Partner with the government in the Community Monitoring Group (Pokmaswas) program to monitor marine activities.
Collaboration with the Government	The regional government, through the Aceh Maritime Affairs and Fisheries Agency, provides technical guidance to the Panglima Laot institution without interfering with its independence. Collaboration with maritime authorities (Polairud, Indonesian Navy) strengthens oversight.
Conservation and Ecological Activities	- Mangrove planting. - Coral reef restoration. - Participatory beach cleanups with NGOs and educational institutions. - Mapping marine potential and fish stocks through the RZWP3K program (1.5 million hectares of Panglima Laot's managed area).
Support for the Blue Economy	Customary systems support blue economy principles by balancing social, cultural, and ecological aspects. Panglima Laot serves as social capital and a crucial instrument for sustainable marine governance and the well-being of fishermen.
Challenges	- Potential conflicts between customary law and modern regulations. - Limited maritime surveillance facilities in remote areas. - Dependence on government budget support.
Strategies and Solutions	- Strengthening the capacity of customary institutions. - Integrating local wisdom into RZWP3K policies and community development groups (Pokmaswas). - Custom-based environmental education.
Conclusions	Aceh's local wisdom (Panglima Laot) serves as a socio-cultural pillar that maintains marine sustainability and supports inclusive governance based on customary values and blue economy principles.

Source: Data processed 2025

Based on the research results presented in the table above, it can be concluded that local wisdom plays a fundamental role in shaping inclusive and sustainable marine governance, especially in Aceh Province. This role not only reflects socio-cultural values passed down through generations, but also strengthens integration between the community, government, and traditional institutions in maintaining the sustainability of marine resources.

In Aceh, the customary system implemented by the Panglima Laot institution demonstrates a unique form of marine governance deeply rooted in the social structure of coastal communities. The formal recognition of Panglima Laot through Aceh Qanun Number 8 of 2010 demonstrates that customary values remain relevant and adaptable to modern policies. Customary mechanisms such as the prohibition on going to sea on Fridays and during Kenduri Laot, as well as the establishment of no-take zones in fish spawning areas, reflect the harmony between spirituality, sociality, and marine ecology. This demonstrates that customary law functions as soft law, morally and socially regulating the behavior of fishermen, thus supporting marine resource management based on blue economy principles.

In addition to institutional aspects, the synergy between the Marine Commander (Panglima Laot), maritime security forces (Polairud and the Indonesian Navy), and the Community Monitoring Group (Pokmaswas) forms an effective participatory monitoring model. The government not only provides technical support but also respects the independence of customary institutions, ensuring collaborative and equitable maritime monitoring in Aceh. Ecological initiatives such as mangrove planting, coral reef restoration, and beach cleanups also confirm that environmental awareness is deeply ingrained in Aceh's coastal communities.

Thus, this study confirms that local wisdom is not merely a cultural heritage but also an effective instrument for sustainable marine development, as it connects ecological, social, and economic aspects within an inclusive governance system oriented toward the well-being of coastal communities.

DISCUSSION

Challenges and Obstacles in Sustainable Marine Management

The research results show that in Aceh Province, sustainable marine management still faces multidimensional challenges encompassing social, economic, institutional, and environmental aspects. This finding aligns with the theory of Sustainable Ocean Governance proposed by Chuenpagdee & Jentoft, which states that the success of marine governance is determined not only by the availability of natural resources, but also by the social and institutional capacity of coastal communities to manage and protect them in a participatory manner. (Yousef, 2024).

In Aceh Province, limited human resources (HR) among fishermen are a major obstacle. Most fishermen still use traditional fishing methods and are focused on daily profits. This reflects the low level of ocean literacy among coastal communities, as explained by Fauzi (2018), who stated that ecological literacy is a key factor in building awareness of sustainable fishing practices.

Furthermore, limited facilities and infrastructure, such as modern fishing vessels, cold storage, and port infrastructure, contribute to low efficiency and competitiveness of marine products. This demonstrates weak structural support for the principles of the blue economy, which emphasize resource efficiency and sustainable added value (Morra & Ghalidza, 2020).

From a regulatory perspective, overlapping authority between the central and regional governments, particularly following the implementation of the Non-Tax State Revenue (PNBP) system, hampers the effectiveness of maritime oversight. This phenomenon reinforces the findings (Rohiani, 2021) which states that maritime decentralization in Indonesia still faces institutional fragmentation between the central and regional governments, which has implications for the slow implementation of sustainable fisheries policies.

These field results strengthen the study (Supahmi & RS, 2021) and (Rahman & Mu'awwanah, 2021), which found that traditional fishers in Indonesia are still hampered by low managerial capacity and minimal technological support. Furthermore, these findings confirm the integrated coastal management (ICM) model, which emphasizes the need for cross-sector synergy in marine governance.

The expected implications of this research include several strategic aspects in strengthening sustainable marine governance. First, it is necessary to strengthen the human resource (HR) capacity of fishermen through marine vocational education, training in the use of environmentally friendly fishing gear, and increasing blue economy literacy. These efforts are crucial so that fishermen not only act as economic actors but also as guardians of marine ecosystems who understand the principles of sustainability. Second, a reformulation of fiscal and institutional authority between the central and regional governments is needed, so that synchronization of marine resource management policies is no longer hampered by overlapping regulations or bureaucratic red tape. This arrangement will strengthen cross-sector coordination and accelerate policy implementation on the ground. Third, the implementation of a community-based co-management model is recommended, a joint management pattern between the government and coastal communities that places fishers as the primary actors in the supervision and management of fishing areas. This model is expected to increase the sense of ownership of marine resources and encourage more inclusive, adaptive and sustainable management.

Implementation of Blue Economy Policy in Resource Management

The implementation of the blue economy in both provinces demonstrates different yet complementary dynamics. In Aceh Province, the blue economy approach focuses on environmental sustainability through mangrove conservation programs, fish house development, and the establishment of Marine Protected Areas (MPAs). Conceptually, the results of this study are consistent with the Blue Economy Framework theory developed by UNEP (2015), which emphasizes three main pillars: (1) ecological sustainability, (2) economic efficiency, and (3) social justice for coastal communities.

In Aceh, the integration of science and local wisdom is a key strength, as evidenced by the collaboration between the local government, universities, and the Panglima Laot traditional institution in determining conservation zones. This approach aligns with the Science-Policy-Community Interface (SPCI) model, where scientifically based policies are supported by social legitimacy from local communities (Safas et al., 2024).

The findings of this study strengthen the study (Setia et al., 2025), which emphasizes the importance of integrating socio-economic dimensions in the implementation of the blue economy to avoid trade-offs between conservation and the welfare of fishermen. Furthermore, Aceh's success in involving indigenous communities supports the theory of participatory governance, which emphasizes multi-actor collaboration in environmental decision-making.

The expected implications of this research emphasize the importance of synergy between scientific research and public policy, particularly in mapping potential fish stocks and determining sustainable fishing zones. This integration will strengthen the scientific basis for decision-making, enabling marine management policies to be more accurate and adaptive to the dynamics of coastal ecosystems. Furthermore, the Fishermen's Village model and marine conservation program successfully implemented in Aceh Province can be replicated as good practices in other regions. This approach manages to balance economic and ecological aspects, ensuring that productive fishing activities continue without compromising the sustainability of marine resources.

Furthermore, improved fiscal and institutional coordination across levels of government is needed to ensure the effective implementation of blue economy policies and is not hampered by limited funding or layered bureaucracy. This inter-institutional synergy is crucial for creating integrated and efficient marine governance. On the other hand, the implementation of digital-based monitoring systems such as e-logbooks, satellites, and marine drones is a strategic step to strengthen real-time fish catch monitoring systems. This technology not only increases transparency and accountability in marine resource management but also assists the government in detecting illegal fishing practices and maintaining a sustainable balance in the marine ecosystem.

The Role of Local Wisdom in Supporting Inclusive and Sustainable Marine Governance

This research reveals that in Aceh Province, local wisdom plays a central role in maintaining the balance between marine utilization and conservation. The Panglima Laot customary institution serves as the traditional authority in regulating fishing zones, fishing seasons, and resolving conflicts between fishermen. This institution enjoys high social legitimacy and is legally recognized through Aceh Qanun No. 8 of 2010, demonstrating the synergy between customary systems and modern governance.

From the perspective of local wisdom-based governance theory (Lestari et al., 2024), Local wisdom, such as Panglima Laot, is an effective instrument for creating inclusive governance rooted in community social and spiritual norms. This strengthens social sustainability, as communities feel a moral responsibility to protect the sea as a source of livelihood.

This finding also aligns with research findings (Utami, 2015) and (Syafuruddin et al., 2022), This study demonstrates that the existence of customary institutions in coastal areas can reduce conflict and increase compliance with marine conservation regulations. The collaboration between the Community Monitoring Group (Pokmaswas), maritime security forces, and the Panglima Laot (Chief Marine Officer) in Aceh serves as an example of successful collaborative ocean governance practices.

The implications of this research's findings emphasize the importance of integrating local values with formal marine policies. Local governments, along with relevant institutions, need to strive to integrate customary systems into marine policies, emulating the successful Panglima Laot model in Aceh, which can be replicated in other regions through adaptation to local social and cultural contexts. Furthermore, empowering coastal communities through strengthening social institutions such as Community Monitoring Groups (Pokmaswas) and coastal customary institutions is a strategic step to strengthen community-based monitoring systems and minimize the potential for horizontal conflict among fishermen. Furthermore, harmonization of customary law and national law is needed to create marine governance that is not merely administrative, but also inclusive, participatory, and socially just. This approach is expected to build a sustainable marine management system that supports the interests of coastal communities as key actors in the blue economy.

CONCLUSION

Based on the results of research on the Implementation of the Blue Economy Concept in Marine Resource Management to Support Economic Growth in Aceh Province, several main conclusions were obtained as follows:

1. The implementation of the blue economy concept in Aceh Province has shown progress, albeit with varying degrees of effectiveness. Aceh Province is more prominent in its integration of formal policies and customary institutions through the Panglima Laot system, which serves as a socio-ecological foundation for maintaining marine sustainability.
2. Local wisdom plays a strategic role in strengthening inclusive and sustainable marine resource governance. In Aceh Province, customary regulations such as prohibitions on going to sea during certain times and community-based monitoring of fishing areas have been proven effective in maintaining the balance of the marine ecosystem and reducing conflict between fishermen. This demonstrates that integrating local cultural values with modern policies can create a just and adaptive marine management system.
3. The main obstacles to blue economy implementation include weak cross-sectoral coordination, overlapping regulations, and limited marine data and technology. Furthermore, limited financial support and access to modern markets are factors that hinder the optimization of marine potential, especially for small-scale fishermen and fish farmers.

From an economic perspective, the fisheries sector's contribution to Aceh's GRDP remains relatively low, despite its vast marine potential. This indicates that the marine sector has not yet become a major driver of the regional economy. The implementation of a blue economy can catalyze marine-based economic growth if accompanied by sustainable investment, technological innovation, and ecologically-based policies.

Overall, this study emphasizes the importance of a collaborative approach involving government, communities, and academics in building equitable and sustainable marine governance. Synergy between blue economy policies and local values is key to successfully maintaining marine ecosystems while improving the well-being of coastal communities.

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AUTHOR CONTRIBUTION STATEMENT

conceptualization, research design, and methodology development were carried out by Imsar, Purnama Ramadani Silalahi, Nurul Aulia Dewi, and Dimas Surya. Data collection, including in-depth interviews, field observations, and documentation in coastal areas of Aceh Province, was conducted by Imsar, Purnama Ramadani Silalahi, Nurul Aulia Dewi, and Dimas Surya. Formal analysis, including data reduction, data presentation, and conclusion drawing following the interactive analysis model, was performed by Imsar, Purnama Ramadani Silalahi, Nurul Aulia Dewi, and Dimas Surya. Original draft preparation and writing were conducted by Imsar and Purnama Ramadani Silalahi, while review, editing, and revision were performed by Imsar, Purnama Ramadani Silalahi, Nurul Aulia Dewi, and Dimas Surya. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of this work.

AI DISCLOSURE STATEMENT

During the preparation of this work, the author(s) used AI-assisted tools, such as grammar checkers and language enhancement software, solely for the purpose of improving readability and refining the language of the manuscript. No generative AI tools were used for qualitative data analysis, interpretation of results, conceptual development, or core scientific writing. The authors take full responsibility for the originality, accuracy, and integrity of the research findings and the final content of this article.

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CONFLICTS OF INTEREST

The authors declare that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The research was conducted independently, and the results are presented objectively and without bias. The authors have no affiliation with or financial interest in any government agency, traditional institution, or organization that could be perceived as influencing the analysis or conclusions of this study.

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