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Our Ocean: Profiling the Blue Economy and Local Development Gaps in Northern Coastal Villages of Central Java

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ABSTRACT

Background: This study aims to map and analyze the disparity in blue economy potential and local development across 100 coastal villages in ten northern coastal regencies of Central Java, Indonesia. Despite the abundant marine resources, development outcomes in these coastal regions appear uneven, suggesting possible gaps between potential and actual village-level development.

Methods: The study employs secondary data sources, including the number of fishing households, maritime transportation volumes, and coastal tourism objects. These variables were used to construct a composite Blue Economy Index, which was then compared with the Village Development Index (IDM) and Village SDGs indicators to assess local development status and sustainability.

Results: The findings reveal significant disparities between the eastern and western coastal regions. Jepara and Pati exhibit the highest blue economy scores, while Pekalongan and Tegal rank the lowest. Similarly, the levels of development and sustainability, as reflected by IDM and Village SDGs, also vary widely across the study area, indicating development gaps even among regions rich in coastal resources.

Conclusion: These results underscore the urgency of strengthening coastal village policies through integrated approaches that enhance local economic resilience while promoting sustainable marine resource management. This descriptive study provides a critical foundation for targeted policy interventions and future hypothesis testing in the broader context of coastal development and sustainable blue economy implementation.

Key words: *Blue Economy; Local Economic Development; Village SDG; Coastal Villages; Central Java; Descriptive Analysis*

INTRODUCTION

Indonesia, with the sixth-largest Exclusive Economic Zone (EEZ) in the world, possesses significant potential for the development of its marine economy. The marine economy has become a crucial pillar in generating substantial income and employment, encompassing industries such as capture fisheries, aquaculture, and fish processing, collectively contributing approximately 83% of the sector's total value (The Ministry of Marine Affairs and Fisheries, 2021). However, the growth of Indonesia's marine economy faces major challenges, particularly concerning the health of marine ecosystems. Unsustainable harvesting methods, destructive tourism practices, pollution, and the impacts of climate change all contribute to the degradation of marine ecosystems (WWF Indonesia, 2021). Additionally, the COVID-19 pandemic has further weakened Indonesia's

efforts to achieve Sustainable Development Goal (SDG) 14, which focuses on conserving and sustainably using the oceans, seas, and marine resources (UNDP, 2020). Therefore, greater and more coordinated efforts are necessary to ensure that the substantial potential of Indonesia's marine economy can be optimally utilized without compromising the sustainability of marine ecosystems (World Bank, 2021). This data is also supported by Geographical and Sovereignty data which explains that the Indonesian Sea Area is 6.4 million km² and the Exclusive Economic Zone (EEZ) is 3,000,000 km² (BIG, 2024).

Table 1. Geographical and Sovereignty Details of Indonesia

Parameter	Area/Number
Land Area of Indonesia	1,892,410.09 km²
Sea Area of Indonesia	6.4 million km²
Sovereign Area	3.4 million km²
- Inland and Archipelagic Waters	3,110,000 km²
- Territorial Sea	290,000 km²
Total Sovereign Area	6,070,000 km²
- Additional Zone	270,000 km²
- Exclusive Economic Zone (EEZ)	3,000,000 km²
- Continental Shelf	2,800,000 km²
Coastline Length	108,000 km
Number of Islands	17,001 (16,671 verified by UN)
Outer Small Islands	111

Source: Indonesian Marine Geospatial Information Centre – Pushidrosal (2023)

Socially, Indonesia's coastal areas are inhabited by around 160 million people, covering 60% of the country's population, and living within a 50-kilometer radius of the coastline in the 290,000 km² Territorial Sea. This demographic concentration indicates the importance of these regions as centers of future urbanization in Indonesia (Coordinating Ministry for Maritime and Investment Affairs, 2023). Of the total 415 regencys in Indonesia, around 300 regencys are located along the coast. This coastal area is an important frontline area for the effective management and utilization of coastal resources, although administrative authority lies in the hands of the provincial government (Statistics Indonesia, 2022). Economically, coastal resource output contributes around 30% to the national Gross Domestic Product (WWF Indonesia, 2021). These areas are rich in future resources, such as energy and medicine, most of which remain undeveloped. The development of these resources provides great opportunities for economic growth and diversification within the blue economy framework. Coastal villages also play an important role in the blue economy. Indonesia consists of 81,616 villages, with around 12,510 (17.48%) coastal villages spread along a coastline of 108,000 km^2, making it the country with the second longest coastline in the world after Canada (UNDP, 2020). These coastal villages are largely rural rather than urban, requiring targeted development strategies to address their unique challenges and opportunities. Around 90% of coastal residents depend on capture fisheries as their main source of livelihood This large dependence on marine resources emphasizes Indonesia's maritime identity, where 62% of its territory is ocean.

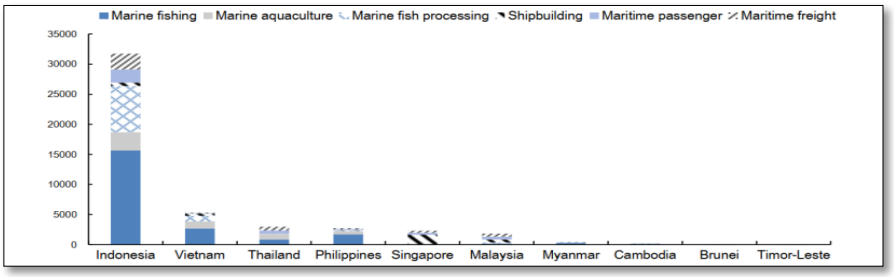

Figure 1. Ocean-economy Value Added in ASEAN Countries in 2015
Source: Bappenas (2023)

Indonesia's marine economy stands out within ASEAN and the Asia-Pacific region, primarily driven by capture fisheries, aquaculture, and fish processing. These sectors contribute 83% of the total value added across key marine industries, including fish capture, aquaculture, and fish processing. In 2015, Indonesia accounted for 84% of ASEAN's fish processing value added, with significant contributions from marine capture fisheries (73%) and aquaculture (54%). Additionally, Indonesia led ASEAN in sea freight (USD 2.6 billion) and passenger sea transport (USD 2.2 billion) value added in the same year (OECD, 2021).

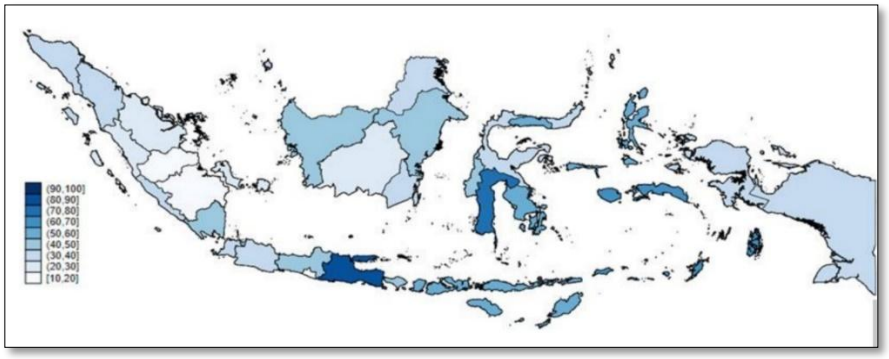

Figure 2. Indonesia Blue Economy Index by Province in 2023
Source: Bappenas (2023)

Based on provincial level data, Indonesia's blue economy development shows different geographic patterns. The higher index is mostly found in the central archipelago region, indicating the need to increase connectivity throughout the Indonesian archipelago. This development trend is in line with economic theory which emphasizes connectivity as an important factor for growth. The eastern and central regions of Indonesia tend to show higher Blue Economy Index (IBEI) scores than the western regions. The highest IBEI value was recorded in Sulawesi Selatan 80.86 and East Java Province at 71.63, while the lowest occurred in the Special Region of Yogyakarta at 10.37. This gap indicates different development performance, which may be influenced by intensive use in western regions versus relatively maintained potential in less developed regions with promising environmental conditions (Bappenas, 2023).

Based on IBEI figures, it can be explained that although geographically Central Java Province has almost the same marine management area as East Java, the index assessment figures are still far below East Java Province. The existence of this gap also raises the question of whether activities to utilize marine potential have not been able to strengthen the local economic development of coastal communities in Central Java, especially the North Coast which is administratively traversed by 10 regencys, namely Brebes, Tegal, Pemalang, Pekalongan, Kendal, Batang, Pati, Rembang, Jepara, and Demak.

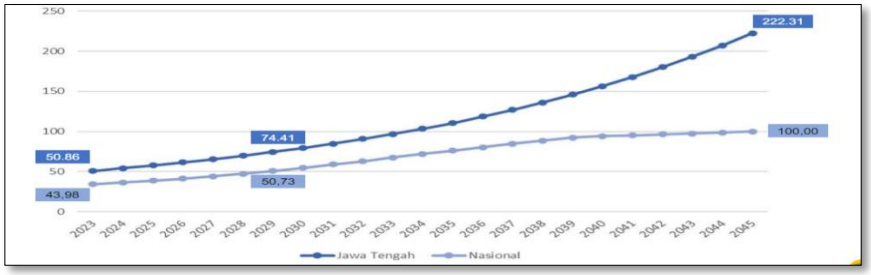

Figure 3. Central Java IBEI projections compared with National IBEI
Source: Bappenas (2023)

Despite the Blue Economy Index (IBEI) of Central Java being lower than that of East Java, when projected against the national average, Central Java's IBEI actually surpasses it. This comparison signifies that while Central Java may lag behind East Java specifically in the Blue Economy Index, it performs comparatively better than many other provinces across Indonesia. Such projections are crucial as they provide insights into how well a province can optimize its blue economy potential on a national scale. Therefore, despite inter-provincial disparities in achieving the Blue Economy Index, these projections enable governments and stakeholders to assess and direct efforts towards more inclusive and sustainable blue economic development nationwide.

Indonesia's vast territory and long coastline with 12,510 coastal villages increase Indonesia's potential as a maritime country. By utilizing blue economy principles, Indonesia can achieve significant progress in achieving the Sustainable Development Goals (SDGs), especially the Village SDGs. Central Java, although not included in the 10 regions with the highest number of coastal (*Desa Tepi Laut*) villages in Indonesia, cannot be separated from the spotlight of blue economy empowerment. The number of coastal villages which is only around 4.3% or 353/8209 turns out to be enough to give rise to complex economic problems.

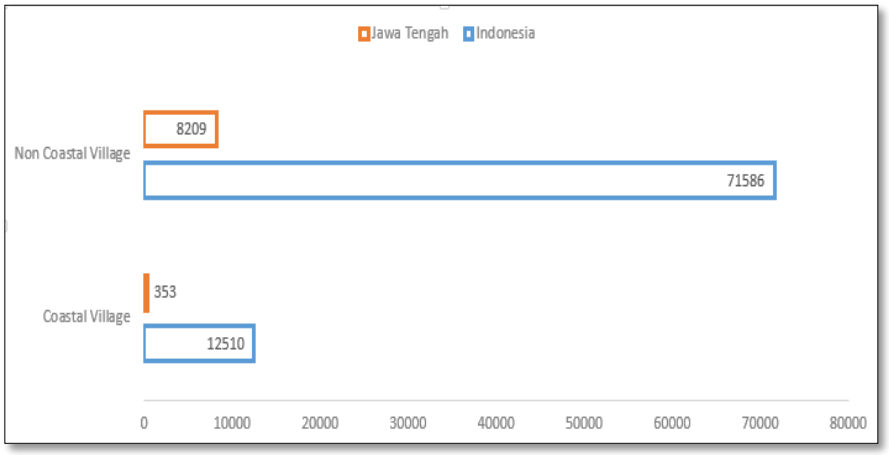

Figure 4. Number of Coastal Villages in Central Java and Indonesia
Source: Statistics Indonesia (2023)

In recent years, the poverty rate in Central Java has consistently been above the national average and is the highest in Java-Bali after Yogyakarta. In March 2023, the poverty rate in Central Java was 10.77%, while nationally it was 9.36%. The number of poor people in Central Java was 3.79 million or contributed 14.63% to the national total of 25.90 million. This number ranks third largest in Indonesia after East Java and West Java. Economic inequality, particularly in Central Java, remains a significant issue as evidenced by Statistics Indonesia (2021) reports that 12% of extreme poverty cases are found incoastal households. Despite Indonesia's rich maritime resources and status as the world's largest fish producer, socio-economic conditions for coastal communities, especially fishermen, remain poor. This indicates that Indonesia's extensive coastline has not translated into improved livelihoods, particularly in provinces like Central Java, which lags behind in Blue Economy Index scores compared to East Java (Sofianto, 2017). Comprehensive interventions are needed to address these challenges.

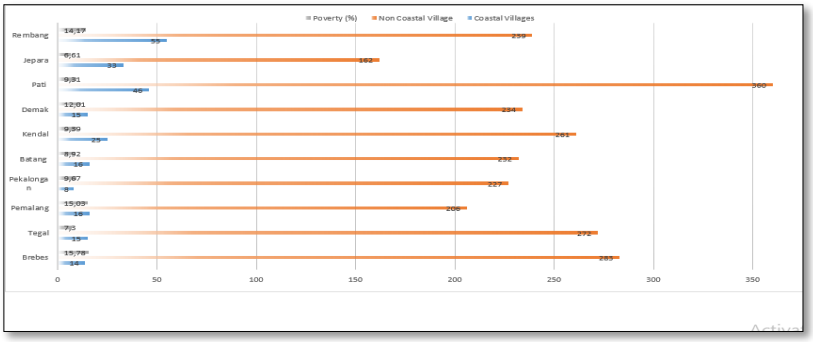

Figure 5. Poverty Percentage and Number of Coastal Villages in Northern Central Java
Source: Statistics Indonesia (2023)

Based on the data from northern Central Java, Rembang has the most coastal villages (55), while Pekalongan has the fewest (8). Brebes has the highest poverty rate (15.78%), and Jepara has the lowest (6.61%). These findings indicate varying levels of coastal village distribution and corresponding poverty rates across the region. Generally, areas with higher coastal villages may potentially face challenges related to poverty, as seen in regencies like Brebes and Rembang, where poverty rates are relatively higher compared to regencies with fewer coastal villages like Jepara and Pekalongan.

The World Risk Report 2014 identified Indonesia as highly vulnerable to climate crises, with the North Coast of Java particularly affected, where 44% of the coastline suffered abrasion (Humanis, 2020). This environmental degradation aligns with the poverty issues in the region, exacerbated by inadequate fishing equipment, lack of technological innovation, high shipping costs, and limited access to economic facilities. The research results also reveal that the poverty of the northern coastal communities of Java is caused by a "consumptive" lifestyle and a demonstration of property as a form of "success in life" (Bappeda Jateng, 2022).

Moreover, the disparity in income between small-scale and large-scale fisheries exacerbates poverty among small fishermen along the northern coast of Central Java. Overcapacity issues, coupled with unsustainable fishing practices such as coral reef destruction for construction materials, further degrade marine habitats and diminish fish stocks. These challenges reflect broader issues in coastal development and necessary strategies that harness local potentials, such as promoting sustainable marine tourism, to foster inclusive Local Economy Development in Central Java's northern coastal regions (Awaluddin et al., 2020)

Table 2. Number of Coastal Villages by Marine Resource Utilization

Central Java	Capture Fisheries	Aquaculture	Salt Industry	Nautical Tourism	Public Transportation	Mangrove
Total	299	188	74	105	33	210

Source: Marine and Coastal Resources Statistics (2023)

The potential of the marine economy in Central Java Province is reflected in the active participation of coastal villages in various sectors in 2021. Data shows that there are 299 villages engaged in capture fisheries, 188 villages in aquaculture, 74 villages in the salt industry, and 74 villages in capture fisheries sector, 105 marine tourism villages, 33 public transportation villages by sea, and 210 villages with mangroves. Utilization of marine resources not only has the potential to increase local economic income but also plays an important role in achieving the Sustainable Development Goals (SDGs) at the village level, especially the Village SDGs.

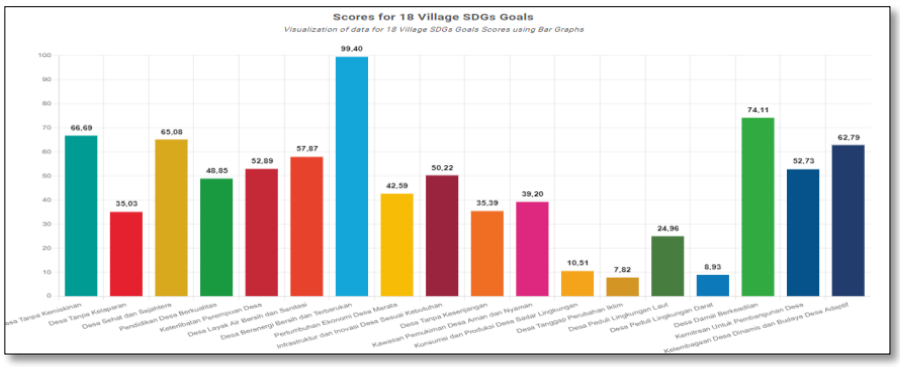

Figure 6. Village SDGs Score of Central Java in 2024
***Source:* https://sid.kemendesa.go.id/**

The Sustainable Development Goals (SDGs) assessment for villages in Central Java reveals an average score of 46.39 out of 100 across 4,239 villages, indicating varied performance across development indicators. Encouragingly, the clean and renewable energy sector achieved a high score of 99.40, showcasing successful initiatives to ensure sustainable energy access. Similarly, "No Poverty" (66.69) and "Peace, Justice, and Strong Institutions" (74.11) scored well, reflecting effective poverty alleviation and institutional frameworks. Moderate progress is seen in "Quality Education" (48.85), "Gender Equality" (52.89), and "Clean Water and Sanitation" (57.87), highlighting ongoing efforts despite needing further resources. Challenges persist in "Zero Hunger" (35.03) and "Reduced Inequalities" (35.39), while "Responsible Consumption and Production" (10.51) and "Climate Action" (7.82) reveal critical gaps requiring urgent environmental interventions.

The discrepancy in SDG scores across various indicators highlights the need for a balanced village development approach. High scores for clean energy suggest successful models for other sectors to emulate. Focusing on low-performing areas like environmental sustainability and food security is crucial. Implementing blue economy initiatives in Central Java's northern coastal region can boost economic growth, environmental sustainability, and community quality of life. Promoting sustainable fisheries, aquaculture, and marine tourism can enhance local economies while conserving the environment, thus improving Village SDGs holistically (Ekosafitri et al. 2017).

Table 3. The GRDP Growth of Central Java Province by Regency (Percent) 2018-2022

	2018	2019	2020	2021	2022
Total of Reg.	5.28	5.23	2.63	3.36	5.31
Province	5.30	5.36	2.65	3.33	5.31

Source: Statistics Indonesia (2022)

Based on the table above, it can be explained that the growth rate of Gross Regional Domestic Product (GRDP) in Central Java from 2018 to 2022 shows that economic dynamics is influenced by internal and external factors. The COVID-19 pandemic has had a significant impact, causing a slowdown in economic activity in all regions. However, signs of economic recovery are starting to appear, driven by strategic steps taken by the regional government. Sustainable GRDP growth is expected to encourage an increase in per capita income, thus contributing to the overall welfare of the population. Despite this, addressing economic inequality remains an important priority. Efforts must continue to be made to ensure the benefits of economic growth are evenly distributed across all regions and communities in Central Java. Turning to the local economy which is interpreted from Village Development Index (IDM) data in Indonesia, it is a composite

index that measures village development through three main dimensions: social which involves basic services and social resilience, economy which examining economic aspects in the village and environment which focuses on ecological and environmental resilience. Based on these three elements, data from the IDM in 2023 indicate that several villages require super-priority handling.

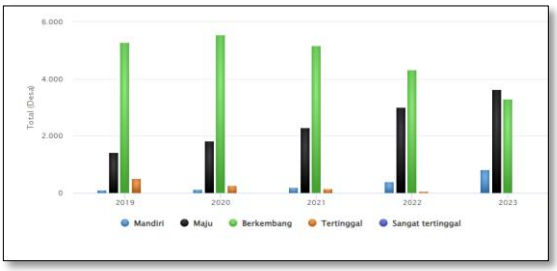

Figure 7. Integrated Village Development Index (IDM) in Central Java 2024

Source: https://sidesa.jatengprov.go.id (2024)

Additionally, the status of IDM for villages in Indonesia from 2019 to 2024 classifies the villages as follows: Independent 1.22% to 35.70%, Advanced 12.56% to 31.74%, Developing: 28.32% to 57.01%, Disadvantaged: 3.52% to 25.61% and Most Disadvantaged: 0.71% to 6.75%. From the 2019 to 2024, Central Java Province successfully reduced the number of Disadvantaged Villages from 510 to 0 by 2023. The number of Independent Villages also increased each year, rising from 115 in 2019 to 825 in 2023. This was accompanied by an increase in the number of Advanced Villages, which grew from 1,434 in 2019 to 3,646 in 2023, corresponding with a decrease in the number of Developing Villages. It can be concluded that villages with Disadvantaged and Most Disadvantaged status no longer exist in Central Java Province.

Table 4. Number of Villages by 2023 IDM Score in North Coast Java (*Pantai Utara*)

Coastal Regency	Village Status				
	Independent	Advanced	Developing	Disadvantaged	Very Disadvantaged
Brebes	13	82	197	6	0
Tegal	3	90	176	12	0
Pemalang	26	132	53	1	0
Pekalongan	2	56	209	5	0
Batang	1	73	165	4	0
Kendal	19	134	113	0	0
Demak	30	117	89	7	0
Pati	57	230	114	0	0
Jepara	23	99	62	0	0
Rembang	22	132	133	0	0

Source: https://sidesa.jatengprov.go.id/pemkab

Despite Central Java's northern coastal villages being rich in marine resources, they suffer from extreme poverty and inadequate infrastructure. This paradox highlights the need for targeted interventions to harness the blue economy effectively. Low scores in food security, environmental sustainability, and socio-economic disparities underscore the urgent need to integrate blue economy principles into regional development plans and local economic development. Based on IDM data for villages on the North Coast of Central Java, there are significant differences in the status of local economic development in various regencys. Pati Regency has the most Independent villages at 57 villages, and leads the number of Maju villages at 230 villages. In contrast, Pekalongan Regency has 176 Developing villages, while Tegal Regency has the most underdeveloped villages in its region with 12 villages. Pati Regency stands out with the largest number of Independent and Advanced villages, while Pekalongan, Brebes, Tegal and Batang Regency have a significant number of Developing villages. Pekalongan and Tegal regencys also reported large numbers of underdeveloped villages, highlighting the need for focused development efforts.

The development of the blue economy in the northern coastal region of Java can play an important role in achieving the Sustainable

Development Goals (SDGs), especially in encouraging a sustainable local economy in sectors such as fisheries, marine tourism and renewable marine energy. Through this approach, Central Java Province is expected to be able to maximize marine economic potential by protecting the ecosystem and prioritizing wise management of natural resources. This research aims to assess the current condition of the blue economy in the villages of the north coast of Java (*Pantura*) Central Java, analyze the impact of local economic development initiatives, evaluate progress towards Village SDGs, and develop recommendations for utilizing blue economy strategies to improve local development and achieve Village SDGs. These findings will provide practical insights for policy makers, local governments and development practitioners, and contribute to sustainable development in coastal areas. By exploring the blue economy, local economic development, and Village SDGs, this research seeks to bridge development gaps, improve livelihoods, and improve overall prosperity in coastal villages in the northern part of Central Java (*Pantai Utara Jawa*).

MATERIAL AND METHODS

This study employed a descriptive quantitative approach to profile the conditions of coastal villages along the northern coast of Central Java. Secondary data were collected from official sources including Statistics Indonesia (BPS), Ministry of Marine Affairs and Fisheries, Pushidrosal, and Bappenas. The analysis focused on three main variables: Blue Economy components (marine resource utilization such as fisheries, aquaculture, salt production, marine tourism, mangroves), Local Economic Development as measured by the Village Development Index (IDM), and progress on Village Sustainable Development Goals (Village SDGs), particularly Goal 14. Descriptive statistics, including frequencies, percentages, and comparative tables across districts, were used to identify disparities and development patterns.

Table 5. Summary of Blue Economy Potential and SDGs Performance in Northern Coastal Villages of Central Java

No	Regency	No. of Coastal Villages	Blue Economy Indicator (e.g. Fishing Villages)	IDM Score (Local Economic Development)	Village SDGs Score	SDGs 14 score ("Care for Marine Environment")
1	Brebes	36	33	Medium	48.23	27.77
2	Tegal	17	17	Low	41.17	11.11
3	Pemalang	21	20	Medium	45.36	19.44
4	Pekalongan	8	8	Low	39.78	16.66
5	Batang	14	14	Medium	44.82	20.83
6	Kendal	23	22	Medium	46.15	22.22
7	Demak	29	27	Low	42.31	13.88
8	Jepara	38	36	High	52.12	33.33
9	Rembang	55	50	High	50.76	30.55
10	Pati	47	45	High	53.97	37.50

Source: Statistic Indonesia (2024)

RESULTS

General overview of the research object: northern coast of central java (Pantai Utara Jawa)

The research focuses on the northern coast of Central Java, Indonesia, which stretches along the Java Sea and encompasses a diverse array of coastal communities. This region is significant for its strategic geographical location, economic activities, and socio-environmental dynamics. The northern coast of Central Java is characterized by its proximity to the Java Sea and its vital role in the region's economic and ecological systems. The area includes a mix of urban centers, rural

villages, and coastal ecosystems, making it a dynamic landscape for studying various aspects of development.

Figure 9. Research object map
Source: google. maps

The northern and southern coasts of Central Java exhibit distinct characteristics in terms of geography, ecology, and dominant economic activities.

Table 6. Differences in characteristics of the north coast and south coast of Central Java

Terms	Northern coast	Southern coast
Economic Activities	Primary economic activities along the northern coast include fisheries, coastal agriculture, marine tourism, and trade. Engagement in blue economy sectors such as mariculture and marine tourism is increasing as part of efforts to diversify the local economy.	The southern coast of Central Java is known for its promising marine tourism potential, especially related to diving, snorkeling, and underwater research. Local economies also benefit from coastal agriculture in fertile coastal areas

Source: Documentation (2024)

These differences highlight the unique contributions of the northern and southern coasts of Central Java to economic, ecological, and social dynamics in Indonesia's coastal regions. A profound understanding of their characteristics is essential for designing policies and sustainable development programs tailored to the specific challenges and potentials of each region.

Table 7. The Distribution of Samples

Brebes	Tegal	Pemalang	Pekalongan	Batang
1. Randusanga Kulon	1. Suradadi	1. Klareyan	1. Wonokertokulon	1. Denasri Wetan
2. Randusanga Wetan	2. Purwahamba	2. Danasari	2. Jeruksari	2. Denasri Kulon
3. Kaliwlingi	3. Demangharjo	3. Asemdoyong	3. Wonokertowetan	3. Ujungnegoro
4. Sawojajar	4. Plumbungan	4. Nyamplungsari	4. Pacar	4. Klidang Wetan
5. Pulogading	5. Sidakaton	5. Loning	5. Semut	5. Klidang Lor
6. Pengaradan	6. Dinuk	6. Tegalmlati	6. Bebel	6. Ketanggan
7. Krakahan	7. Maribaya	7. Pesantren	7. Silirejo	7. Depok
8. Grinting	8. Padaharja	8. Kendalrejo	8. Tegengkulon	8. Kedungsegog
9. Karangdempel	9. Bojongsana	9. Blendung	9. Pait	9. Yosorejo
10. Prapag Lor	10. Munjung Agung	10. Kaliprau	10. Tengengwetan	10. Krengseng

Kendal	Demak	Pati	Jepara	Rembang
1. Sendangsikucing	1. Betahwalang	1. Tegalombo	1. Karimunjawa	1. Tasikagung
2. Kadilangu	2. Bendono	2. Banyutowo	2. Kalianyar	2. Sumbersari
3. Mororejo	3. Morodemak	3. Dukuhseti	3. Demangan	3. Labuhan Kidul
4. Korowelang Anyar	4. Tambakbulusan	4. Dororejo	4. Telukawur	4. Pandangan Wetan
5. Margorejo	5. Wedung	5. Kenanti	5. Kedungcino	5. Banyudono
6. Kaliayu	6. Babalan	6. Jepat Lor	6. Karanggondang	6. Plawangan
7. Kalirandugede	7. Kedungmutih	7. Bulumanis Kidul	7. Ujungwatu	7. Leran
8. Gempolsewu	8. Timbulsloko	8. Alasdowo	8. Banyumanis	8. Sendangmulyo
9. Kartikajaya	9. Berahan Kulon	9. Puncel	9. Menganti	9. Tireman
10. Wonosari	10. Margolinduk	10. Growong Kidul	10. Clering	10. Bonang

Source: https://maps.google.co.id (2024)

10 villages per regency on the North Coast of Central Java were strategically selected based on geographic and socio-economic factors. These villages cover diverse landscapes from sandy beaches to mangrove forests, representing a wide range of coastal environments and economic activities including fishing, aquaculture, salt production, tourism, transportation, and mangrove conservation, ensuring balanced representation through random sampling

Descriptive analysis results

In this analysis, we examine the variables Blue Economy (X), Local Economic Development (LED or Z), and Village SDGs (Y) based on data collected from 100 villages in the Northern Coastal Region or *Pesisir Utara* of Central Java, Indonesia. Each variable represents different aspects of socioeconomic and sustainable development in these villages. The Blue Economy (X) measures the number of Fishing Households in each village, indicating the scale of reliance on fishing activities. The description number is Mean 2832.79, Median 1629, Minimum 295 (Wonokertokulon) and Maximum 7770 (Karimunjawa). The mean value of 2832.79 suggests a moderate scale of fishing households across the villages sampled, with significant variation from a minimum of 295 to a maximum of 7770. This indicates diverse economic activities, where some villages heavily rely on fishing while others may have more diversified economies.

Table 8. The Descriptive Statistics Analyze

Sample: 1 100

	SDGS_Y	LED_Z	BE_X
Mean	40.71000	0.715300	3223.200
Median	41.00000	0.700000	2440.500
Maximum	62.00000	0.900000	7770.000
Minimum	27.00000	0.540000	295.0000
Std. Dev.	5.920850	0.070531	2578.719
Skewness	0.321574	0.252287	0.733901
Kurtosis	3.881296	2.536574	2.252944
Jarque-Bera	4.959673	1.955660	11.30224
Probability	0.083757	0.376126	0.003514
Sum	4071.000	71.53000	322320.0
Sum Sq. Dev.	3470.590	0.492491	6.58E+08
Observations	100	100	100

Source: Eviews (2024)

Furthermore, Local Economic Development (LED) is measured through the Economic Resilience Index which is integrated into the Village Development Index (IDM), which shows economic resilience and diversification in each village. Furthermore, Local Economic Development (LED) is measured through the Economic Resilience Index which is integrated into the Village Development Index (IDM), which shows economic resilience and diversification in each village. Has descriptive values as follows: Mean 0.6944, Median 0.69, Minimum 0.54 and Maximum 0.90. The average LED score of 0.6944 reflects moderate economic resilience among the sampled villages, with scores ranging from 0.54 to 0.90. This suggests varying levels of economic capacity and development readiness across the villages. A more specific interpretation is that villages with higher LED scores such as Tasikagung Rembang (0.90) demonstrate greater economic resilience and capacity for sustainable development initiatives. These villages tend to be better prepared to deal with economic shocks and invest in regional development, whereas villages with lower LED scores such as Timbulsloko, Sayung Demak (0.54) have the potential to face greater economic

challenges, thus hindering their ability to achieve sustainable development goals.

The results of the description of the dependent variable, namely the Village SDGs (Sustainable Development Goals) Score, reflect the overall progress in achieving sustainable development targets in each village, the results are Mean 41.38, Median 41, Minimum 27, Maximum 62. The average Village SDGs score is 41 .38 indicates moderate progress towards sustainable development goals, with scores ranging from 27 to 62. This variation highlights gaps in development outcomes and priorities across villages. Villages with higher SDGs scores such as Randusanga Kulon, Brebes (62/100) made significant steps towards sustainable development goals, demonstrating effective local governance and community initiatives, while villages with lower SDGs scores such as Tengengwetan, Pekalongan (27/100) show slower progress in achieving sustainable development targets and therefore require targeted interventions and support.

DISCUSSION

Based on data on blue economy potential in the northern coastal regencys of Java, there are significant variations between sample regencys. Jepara Regency stands out as the leader with the highest blue economy potential (24.2%), followed by Pemalang (24%), supported by the high number of households involved in capture fisheries, the large volume and value of sea transportation, and the many coastal tourist locations. Next position is Rembang (14%), Demak (11%), Pati (9%), Kendal (6%), Batang (5.4%), Brebes (5.1%), Tegal (1.3%) On the other hand, Pekalongan Regency shows relatively lower blue economy potential (1%), which reflects the challenges in optimizing blue economy activities in the region. This analysis underscores the importance of developing tailored strategies for each region to drive sustainable and inclusive blue economy growth

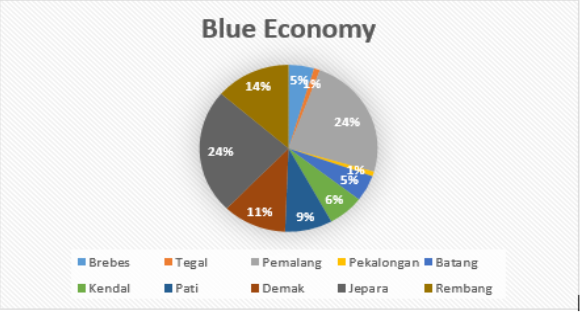

Figure 10. Blue Economy Potential Diagram
Source: Data processed (author, 2024)

Jepara's blue economy potential surpasses other coastal regencies due to key factors: its long history in shipbuilding and timber processing supports maritime infrastructure and marine resource management; a substantial number of households are involved in capture fisheries, bolstering the fisheries sector; and the region's rich coastal tourism assets, including 18 diverse beaches and the Karimunjawa islands, enhance tourism, water sports, and marine research opportunities. The Karimunjawa National Park, established in 2001, significantly contributes to marine biodiversity conservation. In line with Jepara's potential, the marine waters of Pemalang Regency also exhibit significant fisheries potential. According to data, the estimated fishery resources in the Fisheries Management Area of the Republic of Indonesia (WPP RI) 712 in the Java Sea reach 1,341,631 tons per year. Unlike other coastal areas with greater potential, Tegal and Pekalongan Regencies, despite their coastal access, face limited maritime infrastructure and support facilities for the blue economy compared to regions like Jepara, Pemalang, and Rembang. Activities such as fishing, marine tourism, and maritime industries have not been fully optimized in these northern coastal villages

Using the criteria for classifying villages based on the Local Economic Development scores, the classification categories are defined as follows:

Table 9. Classification of villages based on LED scores

Classification	Score Range	Number of Villages
Very Disadvantaged	< 0.491	0
Disadvantaged	0.491 – 0.599	2
Developing	0.599 – 0.707	51
Advanced	0.707 – 0.815	38
Independent	> 0.815	9

Source: Data processed (author, 2024)

Based on the classification criteria, the independent villages, defined as those with a Local Economic Development (LED) score greater than 0.815, include Tasikagung (0.90), Gempolsewu (0.88), Jepat Lor (0.84), Bulumanis Kidul (0.83), Alasdowo (0.83), Puncel (0.82), Telukawur (82), Tireman (0.82), and Karimunjawa (0.82). These villages exhibit high economic resilience and stability, with local economies sustaining development with minimal external support. Their success in sustainable practices offers replicable insights. The villages' economic stability provides a comprehensive study for the government to assess the effective distribution of basic assistance, such as *Dana Desa* or Village Funds, *Program Keluarga Harapan* and Social Assistance (*BANSOS*), and the transition to advanced infrastructure and technology. High quality of life, effective governance, and active community participation emphasize the importance of empowering local communities. This holistic approach ensures balanced development and positions these villages as leaders in environmental conservation and climate resilience.

Based on the classification of Local Economic Development (LED) scores, 38% of the sampled villages are classified as Advanced, 51% are classified as Developing, and 2% (2 villages) are classified as Very Disadvantaged, with scores below 0.49. Specifically, Jeruksari in Pekalongan and Timbulsloko in Demak fall into the Very Disadvantaged category. The high proportion of Developing villages suggests that while significant progress has been made, there is still substantial room for improvement. The Advanced villages demonstrate strong economic resilience, indicating effective local governance and robust infrastructure, making them potential models for other regions. Conversely, the presence of Very Disadvantaged villages highlights the urgent need for targeted interventions to address severe economic challenges and improve basic services and infrastructure.

Table 10. Descriptive Statistics of Village Equitable Economic Growth Score

Variable	Mean	Minimum	Maximum
Economic Resilience (Index Score)	0.6598	0.467 (Bendono)	0.95 (Suradadi)
Equitable Economic Growth Score	32.45	20.69 (Prapag Lor)	52.02 (Grinting)

Source: Data processed (author, 2024)

Furthermore, the Economic Resilience (*Indeks Ketahanan Ekonomi*) figure data produces an average score of 0.6598, indicating that the average sample village is in the "Developing" category. If examined from the economic resilience index ignoring social and environmental aspects, Suradadi Village has the highest economic resilience score of 0.95, far above the "Independent Village" threshold. On the other hand, Bendono village has the lowest score of 0.467 so it is included in the "Very Disadvantaged Village" category. Further analysis of the village SDGs points which focused on SDgs 8, namely Equitable Village Economic Growth *(Pertumbuhan Ekonomi Merata)*, resulted in an average score of 32.45 indicating an even level of economic growth in all villages. Grinting Village with the highest score of 52.02 shows significant economic growth, in contrast to Prapag Lor Village with the lowest score of 20.69 shows a lower level of economic growth compared to other villages.

Based on the sample data from ten northern coastal regencies of Central Java, including

Brebes, Tegal, Pemalang, Pekalongan, Batang, Kendal, Demak, Pati, Jepara, and Rembang, the analysis reveals significant variations in the 18 Village SDGs indicators:

Table 11. The 18 Village SDGs indicators

SDGs Goals	Brebes	Tegal	Pemalang	Pekalongan	Batang	Kendal	Demak	Pati	Jepara	Rembang
1. No Poverty	64,84	65,68	67,39	69,83	68,82	64,65	70,46	68,6	66,81	66,55
2. Zero Hunger	34,85	34,56	34,47	35,2	35,41	35,3	34,64	35,22	35,46	35,2
3. Good Health and Well-being	58,09	67,04	68,92	62,07	67,98	66,23	55,8	63,71	63,39	70,54
4. Quality Education	48.31	40,26	49,8	47,18	33,75	48,09	44,8	61,88	56,03	44,9
5. Gender Equality	50,81	37,22	51,7	51,11	46,33	51,06	49,83	56,73	51,17	52,1
6. Clean Water and Sanitation	54,28	55,63	55,29	55,43	57,21	57,27	56,78	55,94	57,57	56,7
7. Affordable and Clean Energy	99,48	99,48	99,3	99,44	99,43	99,24	99,29	99,53	99,52	99,37
8. Decent Work and Economic Growth	41,1	41,53	31,05	37,5	28,97	42,13	31,54	42,87	44,39	42,38
9. Industry, Innovation and Infrastructure	65,62	47,66	56,25	52,32	58,51	40,8	65,35	52,6	62,35	51,04
10. Reduced Inequality	33,88	34,99	33,6	33,76	34,62	35,5	36,91	34,29	34,02	35,61
11. Sustainable Cities and Communities	44,03	39,51	41,85	35,47	37,91	37,82	38,6	33,75	31,74	38,17
12. Responsible Consumption and Production	7	10,71	6,52	8,89	15,97	8,61	11,9	7,12	7,94	9,73
13. Climate Action	6,29	5,26	6,34	5,57	3,51	5,22	6,53	12,48	5,7	2,27
14. Life Below Water (Marine Environment)	24,31	18,25	23,81	23,72	21,37	20,61	22,23	28,44	27,04	26,27
15. Life on Land	20,3	11,45	54,44	53,36	42,35	30,72	42,27	15	8,33	4,88
16. Peace and Justice Strong Institutions	73,94	71,82	78,31	75,67	73,91	75,46	69,87	71,44	79,37	70,12
17. Partnerships to achieve the Goal	53,82	44,46	47,56	49,4	44,11	50,86	68,57	52,64	53,43	54,85
18. Dynamic Institutions and Adaptive Village Culture	61,36	54,52	61,92	57,71	61,94	60,03	56,97	62,22	68,64	65,69
SDGs	46,8	43,34	48,25	47,54	46,23	46,09	47,91	47,47	47,38	45,91
Maximum Value										
Minimum Value										

Source: Data Processed (Author, 2024)

Pati scores highest in Quality Education, Gender Equality Affordable and Clean Energy, Climate Action and Life Below Water. Jepara has the highest score in SDGs Goals points 6 & 8, namely Clean Water and Sanitation and Decent Work and Economic Growth, while Rembang has the highest score in Good Health-Well Being, Demak has the best performance in point No. Poverty, Reducing Inequality and Partnerships to achieve the Goal. Meanwhile, SDGs 2 and 12, namely Zero Hunger and Responsible Consumption and Production, are occupied by Batang in the top ranking. Pemalang is the regency with the highest Life on Land points. Brebes also scored the highest in Industry, Innovation and Infrastructure and Sustainable Cities and Communities point. In contradiction to previous achievements, the lowest scores in SDGs goals were mostly produced by Tegal regency which ranked last in Gender Equality, Life Below Water (Marine Environment) and Dynamic Institutions and Adaptive Village Culture points. Linear with Pemalang Regency which has the lowest score in Good Health and Well-being, Reduced Inequality and Responsible Consumption and Production points. Meanwhile, the lowest number in achieving SDGs points is also in Batang regency which is low in Quality Education, Decent Work and Economic Growth and Partnerships to achieve the Goal. Other SDgs goals such as No Poverty, Affordable and Clean Energy and Industry, Innovation and Infrastructure were achieved by Kendal regency. Based on overall SDGs achievement, the highest score was occupied by Pemalang (48.25/100) while the lowest score was achieved by Tegal (43.34/100).

Table 12. The Highest and Lowest Score of SDGs Goals

SDGs Goal	Highest Scoring Regency	Score	Lowest Scoring Regency	Score
1. No Poverty	Demak	70.46	Kendal	64.65
2. Zero Hunger	Batang	35.41	Pemalang	34.47
3. Good Health and Well-being	Rembang	70.54	Demak	55.80
4. Quality Education	Pati	61.88	Batang	33.75
5. Gender Equality	Pati	56.73	Tegal	37.22
6. Clean Water and Sanitation	Jepara	57.57	Pemalang	55.29
7. Affordable and Clean Energy	Pati	99.53	Kendal	99.24
8. Decent Work and Economic Growth	Jepara	44.39	Batang	28.97
9. Industry, Innovation and Infrastructure	Brebes	65.62	Kendal	40.80
10. Reduced Inequality	Demak	36.91	Pemalang	33.60
11. Sustainable Cities and Communities	Brebes	44.03	Jepara	31.74
12. Responsible Consumption and Production	Batang	15.97	Pemalang	6.52
13. Climate Action	Pati	12.48	Rembang	2.27
14. Life Below Water (Marine Environment)	Pati	28.44	Tegal	18.25
15. Life on Land	Pemalang	54.44	Rembang	4.88
16. Peace and Justice Strong Institutions	Jepara	79.37	Demak	69.87
17. Partnerships to achieve the Goal	Demak	68.57	Batang	44.11
18. Dynamic Institutions and Adaptive Village Culture	Jepara	68.64	Tegal	54.52

Source: Processed Data (Author, 2024)

Source: Data Processed (author, 2024)

These results indicate that the regencies of Kendal, Batang, Tegal, and Rembang require particular attention. Key areas needing improvement include economic growth, education, environmental sustainability, infrastructure, and addressing inequalities. Efforts to enhance these aspects are crucial for achieving sustainable development goals in these regions. This attention also applies to Pemalang, although overall it has the highest SDGs score in the northern coastal villages, but it has the lowest scores in many indicators, especially hunger, clean water and inequality.

The next discussion is the Village SDG Score Classification table which identifies and groups villages based on achieving sustainable development goals (SDGs), providing guidance for targeted policy interventions and improvement programs, while tracking the number of villages in each category.

Table 13. Village SDG Score Classification

SDGs Score Category	Score Range	Number of Villages	Description
Very High	80-100	0 (0%)	The village achieves most or all SDG goals with excellent results.
High	60-79	1 (1%)	The village achieves most SDG goals well but still has some areas for improvement.
Villages names: Randusanga Kulon			
Medium	40-59	59 (59%)	The village achieves several SDG goals but faces significant challenges in some areas.
Villages names: Sidakaton, Mororejo, Growong Kidul, Kedungsegog, Danasari, Wonosari, Pesantren, Karanganyar, Wedung, Kedungmutih, Klareyan, Klidang Lor, Sumbersari, Kedungcino, Pulogading, Kaliwlingi, Karanggondang, Bendono, Randusanga Wetan, Bonang, Margolinduk, Bulumanis Kidul, Kaliprau, Sendangsikucing, Tasikagung, Gempolsewu, Puncel, Jepat Lor, Tamanrejo, Nyamplungsari, Tegalombo, Demangharjo, Plawangan, Leran, Kartikajaya, Loning, Margorejo, Ujungnegoro, Maribaya, Banyutowo, Depok, Clering, Kaliayu, Blendung, Banyumanis, Alasdowo, Grinting, Betahwalang, Bebel, Tireman, Berahan Kulon, Sendangmulyo, Lebak, Kendalrejo, Babalan, Asemdoyong, Padaharja, Tanggung, Demangan			
Low	20-39	40 (40%)	The village achieves few SDG goals and requires substantial efforts for improvement.
Villages names: Krengseng, Silirejo, Denasri Wetan, Ujungwatu, Kadilangu, Wonokertokulon, Banyudono, Berahan Wetan, Tegalmlati, Labuhan Kidul, Sawojajar, Plumbungan, Dororejo, Denasri Kulon, Krakahan, Yosorejo, Pait, Karangdempel, Telukawur, Wonokertowetan, Dinuk, Morodemak, Bojongsana, Semut, Kalirandugede, Kalianyar, Klidang Wetan, Suradadi, Tengengkulon, Dukuhseti, Tambakrejo, Munjungagung, Prapag Lor, Jeruksari, Timbulsloko, Karimunjawa, Purwahamba, Tambakbulusan, Korowelang Anyar, Tengenwetan			
Very Low	0-19	0 (0%)	The village achieves very few SDG goals and requires profound transformation in policies and practices.

Source: Data Processed (Author, 2024)

Based on the results of descriptive statistics from 100 sample villages on the north coast of Java (*Pantura*), these findings illustrate varying profiles in achieving the Sustainable Development Goals (SDGs). With only one village in the "high" category and the majority (59%) of villages in the "medium" category, while the remaining 40% fall into

the "low" category, this shows that there is a significant inequality in achieving sustainable development in the region. The implication is that villages on the north coast of Java require different approaches in development policy to increase the achievement of the SDGs.

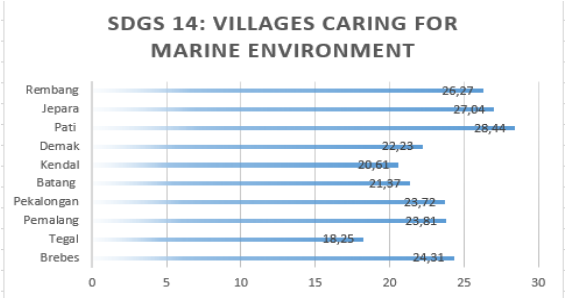

Figure 11. SDGS Score 14 (Life Below -Water)
Source: Data Processed (Author, 2024)

The ranking and condition of the northern coastal region of Central Java reveal significant variations in the implementation and outcomes of SDG point 14 (*Villages Caring for Marine Environment*). Pati and Jepara, the top-ranked regions, demonstrate success in sustainably managing and utilizing marine resources, positively impacting the local economy and community welfare. In contrast, Tegal, ranked lowest, faces major challenges such as marine pollution, overfishing, and coastal habitat degradation, which hinder economic and ecological prosperity. This necessitates policy interventions, stronger government support, and rehabilitation programs to improve marine and coastal conditions in Tegal.

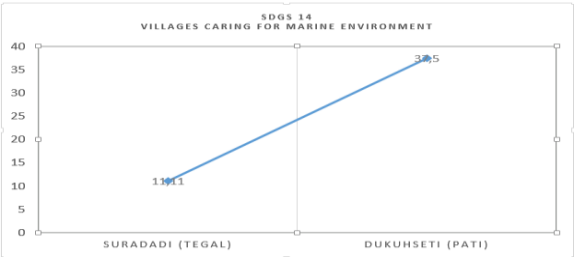

Figure 12. Disparities in SDGs 14 Implementation
Source: Source: Data Processed (Author, 2024)

The SDG point 14 scores for Suradadi (Tegal) at 11.11 and Dukuhseti (Pati) at 37.5 reveal a significant gap between the lowest and highest values. This interval of 26.39 points highlights substantial disparities in the sustainable management and utilization of marine resources between these regions. The interval signifies the extent of difference in achieving sustainable development goals related to ocean and marine resource conservation. Overall, the high SDG 14 score in Pati reflects the village's ability to leverage its marine resources sustainably, demonstrating how effective blue economy practices can drive both environmental conservation and economic prosperity. The analysis reveals significant disparities in the blue economy potential across various coastal regions in northern Central Java. Scores supporting the blue economy potential are notably higher in the eastern part of the northern coast (*Pesisir Utara bagian Timur*) compared to the western part (*Pesisir Utara bagian Barat).*

The failure to achieve SDG 14 in coastal villages north of Tegal is very concerning, especially considering the potential of the blue economy to drive sustainable development. Despite the richness of marine resources, low scores indicate significant gaps in reducing marine pollution, promoting sustainable fishing, conserving marine areas, and addressing ocean acidification. This shows that the lack of effective regulations, protection of marine ecosystems, and lack of support for small-scale fishers and failure to increase the economic benefits of marine resources further weaken the potential of the blue economy.

CONCLUSION

This study concludes that the potential of the blue economy in the northern coastal regions of Central Java reveals significant disparities among regencies. Eastern areas such as Pati and Jepara demonstrate higher SDG 14 scores and Village Development Index (IDM) ratings compared to western regions like Tegal and Pekalongan, indicating uneven utilization of marine resources, which remains concentrated in traditional sectors such as capture fisheries. A key limitation of this study lies in its descriptive

approach, which relies on limited indicators such as the number of fishing households and Village SDGs scores—without quantitatively testing causal relationships. Future research should adopt a mixed-methods approach, integrating broader blue economy indicators such as marine infrastructure investment, economic diversification efforts, and qualitative insights from local stakeholders, to provide a more comprehensive understanding and strategic direction for sustainable coastal development.

Declaration by Author

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