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Evaluation of Mangrove Area Changes and Fisheries Production in South Lampung Coastal: Spatio-Temporal Analysis

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ABSTRACT

Mangrove ecosystems play an important role in supporting the productivity of coastal capture fisheries by providing habitats, spawning grounds, and nursery areas for various fish species, as well as by facilitating ecological connectivity with adjacent coastal waters. This study aims to evaluate changes in mangrove cover in South Lampung Regency during 2020-2023, examine the variability of capture-fisheries production, and analyze the statistical relationships among these variables. The methods employed include multitemporal spatial analysis of Landsat 8 imagery using supervised classification and NDVI calculations, combined with statistical analyses based on Pearson correlation and simple linear regression, using fisheries production data obtained from the Department of Marine and Fisheries. The results indicate that mangrove cover increased from 475.5 ha in 2020 to 551.9 ha in 2023, in line with rehabilitation programs implemented in several coastal districts. During the same period, capture fisheries production reached 125,168 tons, dominated by squid, scads, yellowtail scads, anchovies, groupers, swimming crabs, and white shrimp. Statistical analysis revealed a powerful relationship between mangrove expansion and the catches of several key fisheries commodities. These findings are consistent with previous studies highlighting the importance of mangrove ecosystems for fisheries productivity and emphasize the role of mangrove conservation in supporting sustainable capture fisheries and coastal management in South Lampung Regency.

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INTRODUCTION

The mangrove ecosystem is a crucial coastal resource that plays an essential role in maintaining environmental balance and supporting fisheries productivity, not only within mangrove habitats but also in adjacent coastal waters. Mangrove forests function as natural barriers against coastal erosion and seawater intrusion while simultaneously providing critical ecological services such as nursery, feeding, and spawning grounds for various economically important fish, crustacean, and mollusk species (Naibaho *et al*., 2023). Through these ecological functions, mangroves contribute to sustaining fish populations that utilize mangrove habitats during certain life stages and later migrate to surrounding coastal waters, thereby supporting broader fisheries productivity (Findra *et al*., 2016).

The mangrove ecosystem supports fish production in adjacent waters through several interconnected ecological mechanisms. Mangroves function as nursery habitats that provide shelter and food resources for juvenile fish and crustaceans during early life stages (Findra *et al*., 2016). As these organisms grow, they migrate from mangrove areas to nearby coastal waters, contributing to fish availability in fishing grounds (Wahyu *et al*., 2021).

In the coastal areas of South Lampung Regency, mangrove ecosystems play a strategic role in sustaining capture fisheries productivity, which constitutes the primary livelihood for local fishing communities. However, mangrove areas in this region have experienced pressure due to land-use change, coastal development, and conversion into aquaculture ponds and settlements (Persada *et al*., 2022). Changes in mangrove extent and condition are therefore expected to influence fisheries productivity both directly, through habitat availability, and indirectly, through ecosystem processes that regulate fish recruitment and food availability. Romadoni *et al*. (2023) reported a strong positive relationship between mangrove health and fisheries productivity, highlighting the dependence of small-scale fisheries on intact mangrove ecosystems.

Previous studies have consistently demonstrated the importance of mangrove ecosystems in supporting fisheries productivity, particularly at local or site-specific scales (Kuncahyo *et al*., 2020). Like these studies, the present research acknowledges the role of mangrove conditions in influencing fish availability. However, most existing research has focused on biological observations or short-term assessments within mangrove areas, while comparative analyses that integrate multitemporal mangrove changes with regional fisheries production data remain limited. Therefore, this study seeks to complement previous findings by examining the relationship between multitemporal mangrove extent and capturing fisheries production at a broader spatial scale.

MATERIALS AND METHODS

Meterials

Time and location

The study was conducted over a three-month period, from July to September 2025, along the coastal areas of South Lampung Regency (Figure 1). The research focused on sub-districts with significant mangrove coverage and available fisheries production data, including Katibung, Kalianda, Ketapang, Bakauheni, Sragi, and Rajabasa. These locations were selected to provide a representative overview of mangrove ecosystems and their relationship with local fisheries' productivity.

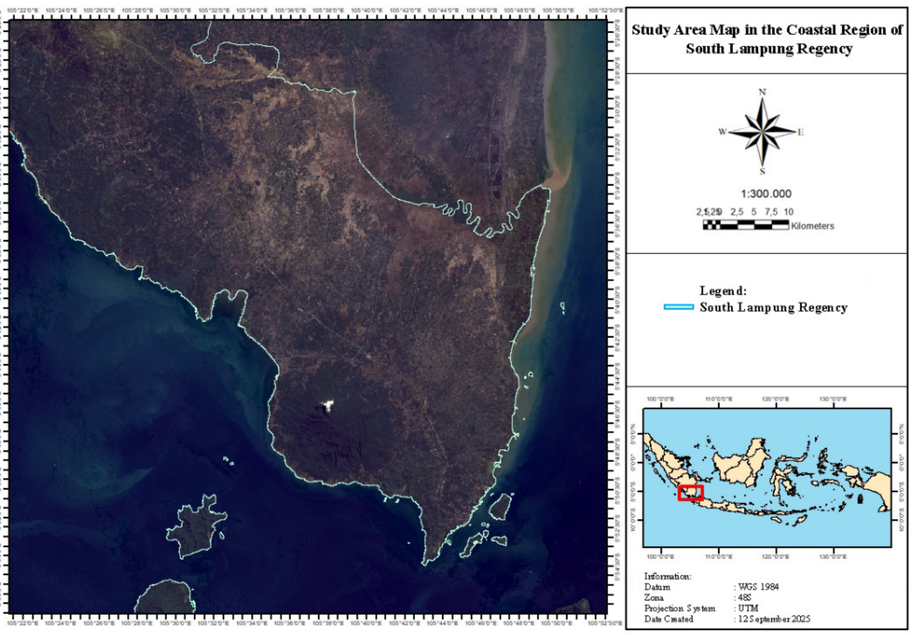

Figure 1. Map of the study area in the Coastal Region of South Lampung Regency.

This study is a descriptive and explanatory quantitative research employing a spatio-temporal and statistical approach. The methodology was designed to evaluate changes in mangrove cover and to analyze its relationship with fisheries catch in the coastal areas of South Lampung during the period 2020-2023. Multitemporal Landsat 8 OLI/TIRS satellite imagery from 2020 to 2023 was used to map and assess changes in mangrove vegetation due to its adequate spatial resolution and suitability for detecting coastal vegetation dynamics. Capture fisheries production data were sourced from Statistics Indonesia, the official and authoritative agency for fisheries statistics in the country, ensuring the reliability and consistency of the data. The combination of remote sensing and statistical analysis allows for a comprehensive assessment of both ecological changes and their socio-economic implications for local fishing communities.

Methods

Spatial data analysis

Normalized Difference Vegetation Index (NDVI) analysis is one of the most widely used vegetation index algorithms for assessing vegetation greenness, including estimating mangrove ecosystem density, as it provides information on parameters such as green leaf biomass and canopy coverage that can help determine vegetation distribution (Setiawan *et al.*, 2018). NDVI measures the difference in reflectance between red light (Red) and near-infrared (NIR) to quantify photosynthetic activity and vegetation density, with values ranging from -1 to +1, where negative values indicate non-vegetation objects, clouds, or water, values from 0.1 to 0.7 indicate the presence of vegetation, and higher values represent healthier or denser vegetation (Marlina, 2022). Landsat 8 utilizes band 5 for NIR and band 4 for Red, while Sentinel-2 uses band 8 for NIR and band 4 for Red, and NDVI values are further classified into three density classes: low, medium, and high, providing a clear framework for analyzing mangrove cover and assessing ecosystem health over time. The algorithm used can be seen in Table 1.

Table 1. Analysis of algorithms used in this research.

Algorithm	Equation	Index Value Range
NDVI (Normalized Difference Vegetation Index)		0.00 – 1.00

To ensure the spatial accuracy and quality of the data, satellite images were first processed through sharpening and geometric correction before classification. The images were then classified using supervised techniques, including the Maximum Likelihood method, which was combined with NDVI-based classification to more precisely detect mangrove vegetation areas using ArcGIS 10.7 software for multitemporal mapping. Following classification, the mangrove cover area was calculated and analyzed using a multitemporal approach to monitor annual changes, allowing for an accurate evaluation of trends and spatial patterns in mangrove cover dynamics.

Statistical analysis

The catch trends were analyzed descriptively based on annual data. Then, a simple linear regression test and Pearson correlation were conducted to examine the relationship between changes in mangrove area and fish catch. The analysis was performed using SPSS 26 and Microsoft Excel.

Simple linear regression is used to model the relationship between one independent variable (X) and one dependent variable (Y). Its purpose is to predict the value of Y based on the value of X.

The simple linear regression equation is expressed as:

$$Y = a + bX$$

Where:

Y= dependent variable

X= independent variable

a= intercept (the value of Y when X = 0)

b= slope or regression coefficient (the change in Y for each one-unit increase in X).

Pearson correlation is used to measure the strength and direction of a linear relationship between two quantitative variables. Its value ranges from -1 to 1:

→ perfect positive correlation

→ perfect negative correlation

→ no linear correlation

The formula for Pearson correlation (r) is:

$$r=\frac{\Sigma(X_i-\bar{X})(Y_i-\bar{Y})}{\sqrt{\Sigma(X_i-\bar{X})^2\cdot\Sigma(Y_i-\bar{Y})^2}}$$

Where:

X_i, Y_i= the i-th observation values

$\bar{X}$, $\bar{Y}$= the mean values of X and Y

Data analysis and interpretation

The results of the analysis are presented in the form of thematic maps, graphs, and tables. Interpretation was conducted to address the research objectives, including: (1) identification of changes in mangrove area; (2) trends in fisheries catch; and (3) the relationship between these two variables.

RESULTS AND DISCUSSION

Mangrove area in South Lampung Regency

The coastal buffer zone in South Lampung Regency is designated as a local protection area covering approximately 2,478 hectares, which are spatially distributed across several coastal districts, namely Ketapang, Kalianda, Katibung, Rajabasa, Bakauheni, and Sragi. These zones contain mangrove ecosystems that play a vital ecological role as natural barriers against coastal erosion, storm surges, and sea-level rise, while also serving as habitats and nursery grounds for various fish, crustacean, and mollusk species that support local fisheries (Persada *et al*., 2022). In addition to providing physical protection and habitat services, mangroves in these areas contribute to sediment stabilization, carbon sequestration, and nutrient cycling, thereby maintaining the productivity and resilience of the surrounding coastal environment. The selected districts are considered representative of the overall mangrove distribution and ecological condition in South Lampung Regency, making them suitable as reference sites for assessing the spatial dynamics and ecological importance of mangrove ecosystems in the region.

The results of data processing and analysis of mangrove area measurements in South Lampung Regency are presented in Table 1.

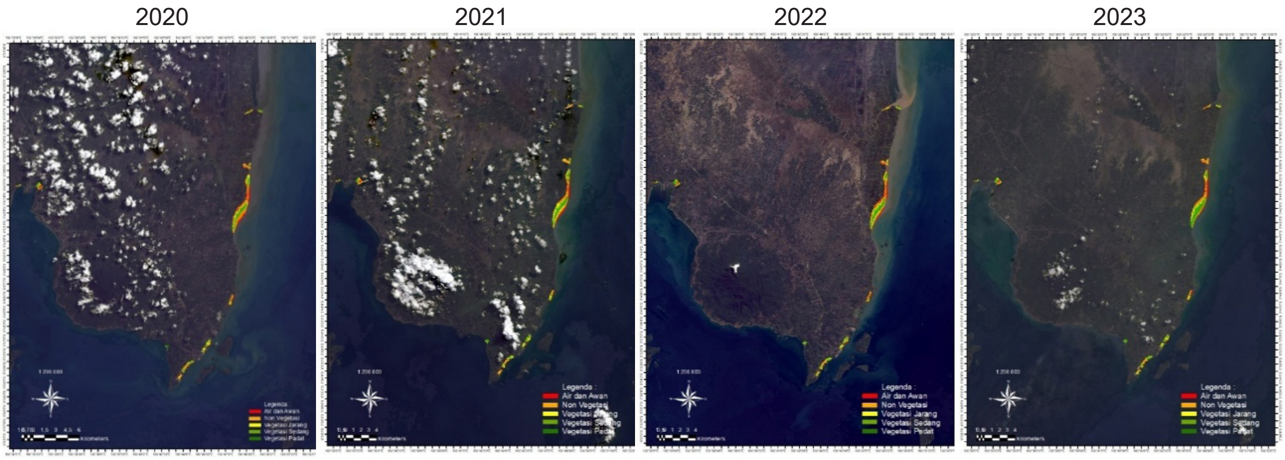

Figure 1. Spatial distribution of mangrove cover in the South Lampung Regency (period of 2020–2023).

Table 1. Mangrove Area in South Lampung Regency during 2020–2023.

No	District	Area (ha/year)			
		2020	2021	2022	2023
1.	Katibung	3.5	3.5	3.7	3.2
2.	Kalianda	37.8	35.1	43	41.4
3.	Rajabasa	1.5	1.4	1.5	1.3
4.	Bakauheni	83.9	87.8	93	95.8
5.	Sragi	26	21.8	26.6	2.2
6.	Ketapang	322.7	348.2	361.1	387.6
	Total	475.5	497.8	529.1	551.9

Based on the data presented in Table 1, the mangrove area in South Lampung Regency has shown a consistent increase from 2020 to 2023. In 2020, the total mangrove cover was recorded at 475.5 hectares, and by 2023 it had expanded to 551.9 hectares. This upward trend indicates a positive development in mangrove restoration and conservation efforts within the region. The increase in mangrove coverage reflects both natural regeneration processes and the outcomes of community-based rehabilitation programs that have been implemented in several coastal villages.

This finding is further supported by Damsir *et al*. (2023), who reported that in 2022 the mangrove area in South Lampung Regency reached approximately 524.8 hectares. The consistency between these data sources strengthens the reliability of the observed trend. The expansion of mangrove areas may be attributed to government and local initiatives focused on coastal ecosystem rehabilitation, including mangrove planting activities, environmental education programs, and the integration of mangrove management into spatial planning policies. Such efforts not only enhance coastal protection and biodiversity but also contribute to the improvement of fisheries productivity and community welfare. Therefore, the observed increase in mangrove area demonstrates a positive trajectory toward achieving sustainable coastal ecosystem management in South Lampung Regency.

Several districts experienced both increases and decreases in mangrove area each year; however, these changes were not significant. The analysis of mangrove area in this study utilized Landsat 8 satellite imagery with the NDVI processing technique, which revealed variations in mangrove coverage across different regions. According to Rahadian *et al*. (2019), such variations may be caused by several factors, including the type and period of satellite imagery used, data accuracy and scale, mapping and quantification methods, definitions and boundaries of mangrove areas, study coverage, as well as image interpretation ability and local knowledge.

Changes in mangrove area are highly dynamic. One of the main factors influencing these changes is human activity, particularly reforestation efforts conducted by various stakeholders that contribute to the expansion of mangrove areas. This can be observed in several districts that have shown increased mangrove cover since 2020. The increase reflects the success of several mangrove rehabilitation programs, such as the 2018 Krakatau Festival, organized in collaboration with the South Lampung Regency Government, through the Department of Tourism and Culture, and the Civil Engineering Student Association of the University of Lampung, as part of a series of annual mangrove conservation events (Herison *et al.*, 2018).

Mangroves along the South Lampung coast play a strategic role in protecting the shoreline from abrasion, preventing seawater intrusion, and serving as essential habitats for fish, shrimp, and crabs that support the capture fisheries sector (Andiny, 2020). Therefore, the sustainability of mangroves in South Lampung is not only ecologically valuable but also directly impacts the social and economic resilience of coastal communities.

Capture fisheries production in South Lampung Regency

South Lampung Regency features extensive and elongated coastlines, encompassing a broad capture fisheries area that serves as one of the main fisheries production centers in Lampung Province. The fishing fleet in this region is predominantly composed of jukung (small traditional boats), small sailing boats, large sailing boats, outboard motorboats, and motorized vessels (Department of Marine and Fisheries South Lampung, 2023), supporting the livelihoods of thousands of local fishers who depend directly on marine resources.

Several fish landing sites are strategically distributed along the South Lampung coast, functioning as hubs for local fishing activities and facilitating the processing and distribution of catch (Rosana *et al.*, 2024). Capture fisheries production in the regency is largely dominated by small pelagic and demersal fish species, whi ch constitute the primary sources of income and food for coastal communities, highlighting the socio-economic importance of sustainable fisheries management in the area.

Based on Table 2, capture fisheries production in 2020, 2021, 2022, and 2023 exhibited an increasing trend over the four-year period. The production was dominated by key commodities, including squid (14,639.63 tons), scad (13,724.64 tons), yellow trevally (6,376.13 tons), Indian anchovy (6,469.06 tons), mackerel (4,095.14 tons), blue swimming crab (1,068.89 tons), and white shrimp

Table 2. Capture fisheries production by fish species in the South Lampung Regency.

No	Fish Species	Production (ton/year)				Total
		2020	2021	2022	2023	
1.	Great Barracuda	203	222.4	221.31	154.23	800.94
2.	Black Rabbitfish	164	96.17	95.6	16.92	372.69
3.	Squid	4,311	3,729.89	3,783.65	2,815.09	14,639.63
4.	Yellowtail	121	314.37	315.04	264	1,014.41
5.	Cobia	-	47.59	47.56	316.58	411.73
6.	Herring	139	24.44	23.93	421.71	609.08
7.	Rainbow Sardine	172	375.47	373.03	335.52	1,256.02
8.	Red Snapper	155	282.51	281.32	411.44	1,130.27
9.	Barramundi	152	318.78	317.77	282.64	1,071.19
10.	Barramundi	-	243.75	243.03	240.04	726.82
11.	Mackerel	1,244	1,014.46	1,012.74	823,94	4,095.14
12.	Indian Mackerel	1,088	812.99	811.82	791.79	3,504.6
13.	Short Mackerel	759	906.56	905.13	587.02	3,157.71
14.	Coral Trout	132	157.29	156.7	180.63	626.62
15.	Leopard Coral Grouper	148	72.43	71.97	56.7	349.1
16.	Reef Grouper	-	68.22	67.52	67.88	203.62
17.	Goatfish	-	129.23	131.47	282.72	543.42
18.	Silver Threadfin Bream	1,596	565.03	563.43	573.13	3,297.59
19.	Trevally	933	598.99	597.82	356.96	2,486.77
20.	Bigeye Trevally	765	388	389.53	239.66	1,782.19
21.	Yellowfin Trevally	761	464,54	465.4	451.82	2,142.76
22.	Thicklip Trevally	-	246.25	248.6	462.14	956.99
23.	Scad	2,945	4050.13	4,056.71	2,672.8	13,724.64
24.	Blue Scad	-	2,835.76	2,841.78	2,142.36	781.,9
25.	Ribbonfish	2,539	471.86	469.37	947.94	4,428.17
26.	Sardine	-	535.97	534.45	646.31	1,716.73
27.	Giant Catfish	-	279.41	277.96	504.72	1,062.09

28.	Black Sea Catfish	-	244.25	243.28	505.91	993.44
29.	Ponyfish	-	222.91	222.5	371.2	816.61
30.	Painted Spiny Lobster	215	155.29	155.3	206.68	732.27
31.	Ornate Spiny Lobster	172	124.23	124.23	155.98	576.44
32.	Wolf Herring	-	141.76	14.,7	151.02	434.48
33.	Blue Swimming Crab	141	307.47	307.49	312.93	1,068.89
34.	Flatfish	-	249.46	249.03	364.45	862.94
35.	Bigeye Scad	933	1,249.29	1,248.52	842.29	4,273.1
36.	Greenback Scad	1088	1,557.11	1,555.97	1,186.06	5,387.14
37.	Yellowstripe Scad	871	1,914.34	1,923.87	1,666.92	6,376.13
38.	Sardine	-	316.68	315.55	458.62	1,090.85
39.	Spanish Mackerel	148	253.56	252.68	567,81	1,222.05
40.	Feather Anchovy	1,577	621,14	621.03	911,39	3,730.56
41.	Indian Anchovy	1,710	1,552.86	1,552.25	1,653.95	6,469.06
42.	Hardhead Anchovy	1,504	559.03	562,67	1071,8	3697,5
43.	White Anchovy	2,511	652.2	652,02	1816,9	5,632.12
44.	Yellowtail Scad	152	165.5	164.95	358.52	840.97
45.	Skipjack tuna	110	322.38	320.35	702	1,454.73
46.	Frigate Tuna	108	326.78	324.5	513	1,272.28
47.	Green Tiger Prawn	134	279.51	279.22	477.85	1,170.58
48.	White Shrimp	138	465.86	465.54	404.33	1,473.73
49.	Banana Shrimp	-	217.4	217.29	210,76	645.45
50.	Tiger Shrimp	127	93.17	93.04	141.36	454.57
51.	Green Musse	95.5	101.92	166	198.01	561.43
	Total (ton)	30,061.5	31,346.59	31,463.62	32,296.43	125,168.14

(1,473.73 tons), along with various species of grouper, snapper, and lobster.

In total, capture fisheries production in South Lampung from 2020 to 2023 reached 125,168.14 tons, highlighting the substantial contribution of this region to both food security and the fisheries economy in Lampung. The data underscore the importance of maintaining sustainable management of coastal and mangrove ecosystems to support continued productivity and economic benefits for local communities.

Relationship between capture fisheries production and mangrove area

Simple linear regression and Pearson correlation analyses were applied to examine the relationship between mangrove forest area and total capture fisheries production in South Lampung Regency. The regression analysis indicated a statistically significant association between mangrove area and fisheries production ($p = 0.002$), suggesting that variations in mangrove cover were closely related to changes in capture fisheries output. Pearson correlation analysis further demonstrated a very strong positive relationship ($r = 0.998$), indicating that higher mangrove area tended to coincide with increased fisheries production during the study period.

This statistical relationship is visually illustrated in Figure 2 using a scatter plot with a fitted linear regression line. Ecologically, this finding supports the role of mangrove ecosystems as critical habitats providing nursery, feeding, and breeding grounds for various commercially important fish and crustacean species. Similar results were reported by Wahyu *et al*. (2021), who emphasized that mangrove ecosystems play a crucial role in maintaining fish resource availability and supporting coastal fisheries productivity. Consequently, the conservation of mangrove forests represents not only an environmental priority but also an important strategy for sustaining the livelihoods of coastal fishing communities in South Lampung Regency.

Capture fisheries production closely related to mangrove forests

Mangrove forests play a crucial ecological role in maintaining the sustainability of capturing fisheries resources in coastal regions. Functioning as nursery grounds, feeding grounds, and spawning areas, mangrove ecosystems provide essential habitats for a wide variety of economically important aquatic species, including fish, shrimp, and crabs (Kuncahyo *et al*., 2020). The complex root structures of mangroves not only offer protection for juvenile organisms from predators but also create nutrient rich environments that support the early growth and survival of many species. Consequently, the extent and quality of mangrove forests play an important role in influencing the abundance, diversity, and productivity of capture fisheries in surrounding coastal waters. Degradation or loss of mangrove areas can therefore disrupt trophic interactions, reduce available habitat space, and ultimately lead to a decline in fishery yields. In contrast, well-preserved mangrove ecosystems contribute to stable and sustainable fisheries production by ensuring continuous recruitment and maintaining ecosystem balance. Several

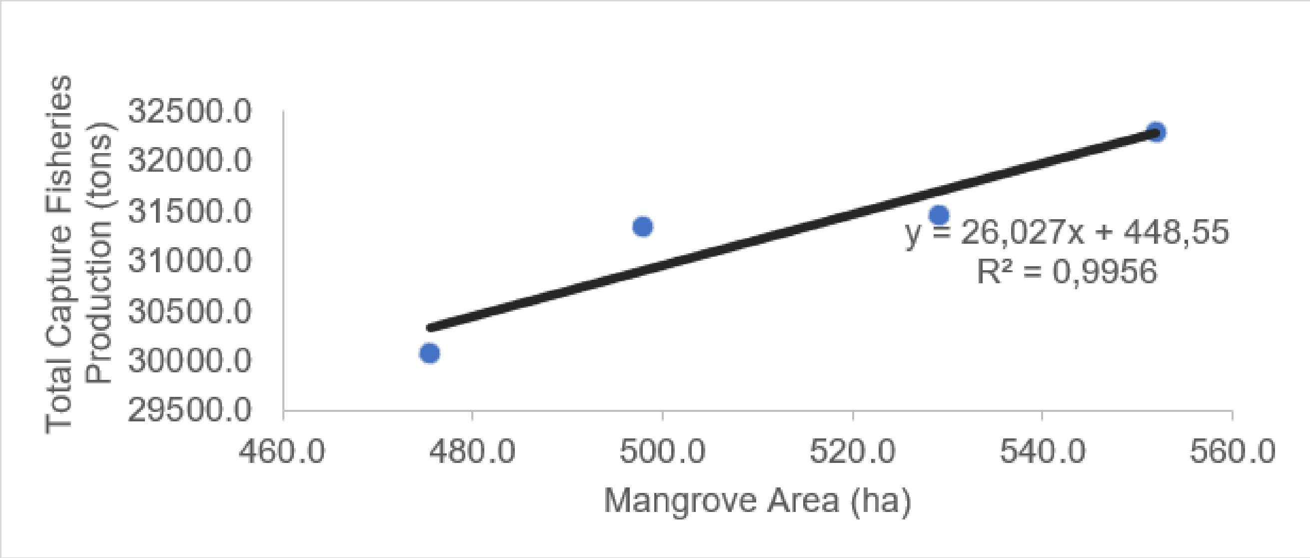

Figure 2. Scatter plot showing the relationship between mangrove area and total capture fisheries production, with a fitted linear regression line.

fishery commodities that exhibit a strong ecological dependence on mangrove habitats are presented in Table 3.

In South Lampung Regency, many small pelagic and demersal fish species that form the main catch of local fishers are closely associated with mangrove ecosystems, which provide essential habitats for feeding, shelter, and spawning. According to Findra *et al*. (2016), fish commonly found in mangrove areas include members of families such as Carangidae, Clupeidae, Cynoglossidae, Gobiidae, Latidae, Lutjanidae, Mullidae, Mugilidae, Scombridae, Serranidae, Siganidae, Teraponidae, and Trichiuridae, demonstrating the high species diversity supported by mangrove habitats.

Table 3. Production of fishery commodities closely associated with the mangrove ecosystem.

No	Fish Species	Production (ton/year)			
		2020	2021	2022	2023
1.	Barramundi	152	318.78	317.77	282.64
2.	Coral Trout	132	157.29	156.7	180.63
3.	Goatfish	-	129.23	131.47	282.72
4.	Scad	2,945	4,050.13	4,056.71	2672.8
5.	Ribbonfish	2,539	471.86	469.37	947.94
6.	Greenback Scad	1,088	1,557.11	1,555.97	1,186.06
7.	Yellowstripe Scad	871	1,914.34	1,923.87	1,666.92
8.	Green Tiger Prawn	134	279.51	279.22	477.85
9.	White Shrimp	138	465.86	465.54	404.33
10.	Tiger Shrimp	127	93.17	93.04	141.36
11.	Green Mussel	95.5	101.92	166	198.01

Although mangrove ecosystems support a wide diversity of species, commercially valuable species are relatively limited, with barramundi and groupers being the most significant for local fisheries (Retraubun *et al*., 2023). In addition, green mussels are commonly found within mangrove areas along the South Lampung coast, aligning with reports that these shellfish are widely distributed in Indonesian coastal, mangrove, and estuarine waters, where they play an important role in local aquaculture and fisheries production (Hakim *et al*., 2024). These findings underscore the dual role of mangroves in sustaining both species diversity and the economic livelihoods of coastal communities, highlighting their importance for integrated coastal resource management.

Temporal variation in mangrove area and selected fishery commodities

Figure 3 illustrates the temporal variation in mangrove area and selected fishery commodities in South Lampung Regency from 2020 to 2023. The figure demonstrates a general increasing trend in both mangrove area and fisheries production over the study period. Mangrove cover expanded gradually, particularly after 2021, reflecting the implementation of mangrove rehabilitation programs. Similarly, the production of selected fishery commodities exhibited an overall upward pattern, although moderate annual fluctuations were observed. This figure is intended to highlight temporal patterns rather than precise quantitative values.

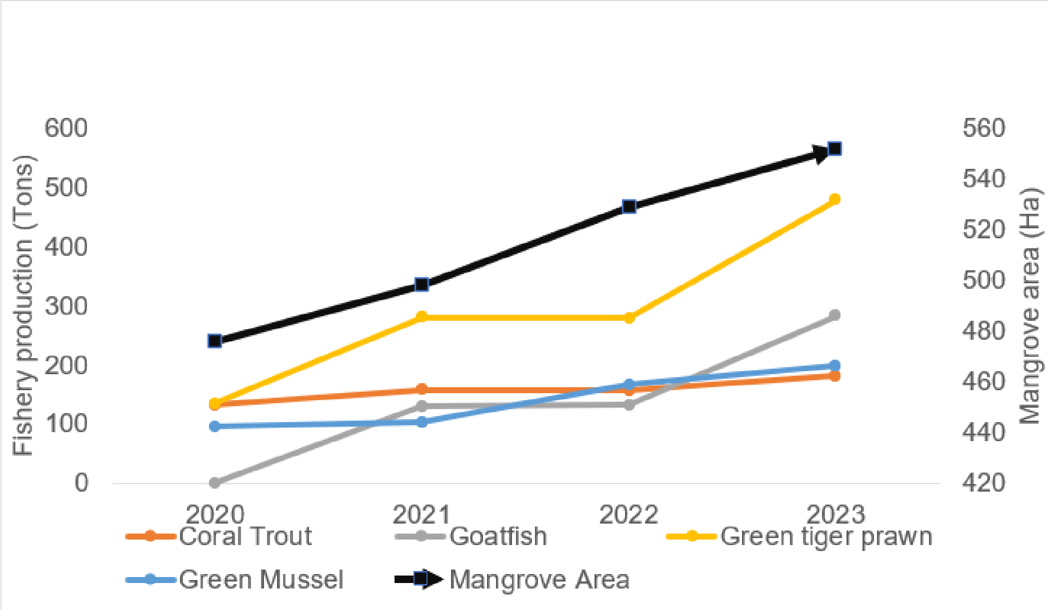

Figure 3. Mangrove area is shown on the right y-axis (ha), while fishery production is shown on the left y-axis (tons).

The correlation analysis indicates that coral trout, goatfish, green tiger prawn, and green mussel exhibit strong positive associations with mangrove area (r = 0.8–0.9), suggesting a high ecological reliance on mangrove habitats. Barramundi, ribbonfish, yellowstripe scad, and white shrimp show moderate correlations (r ≈ 0.6), while scad, greenback scad, and tiger shrimp display weak correlations (r ≈ 0.1), indicating a lower dependency on mangrove ecosystem extent. These findings highlight the varying degrees of reliance of different fishery commodities on mangrove ecosystems and underscore the importance of mangrove conservation for species with higher dependency.

The guidelines for the degree of correlation are presented in Table 4 below.

Table 4. Correlation strength guidelines.

Correlation Coefficient Interval	Relationship Strength
0.00 – 0.199	Very Weak
0.20 – 0.399	Weak
0.40 – 0.599	Moderate
0.60 – 0.799	Strong
0.80 – 1.000	Very Strong

The relationships among various fish, shrimp, and shellfish species exhibit positive correlation values, indicating that an increase in mangrove area is associated with higher production of commodities linked to the mangrove ecosystem. This observation aligns with Faqih *et al*. (2025), who emphasized the highly interdependent and mutually supportive relationship between mangroves and fish. Mangrove forests provide critical habitats for fish, shrimp, and shellfish, offering shelter, feeding, and spawning grounds, while the presence and activity of these aquatic species contribute to maintaining the ecological balance and productivity of the mangrove ecosystem.

CONCLUSION AND RECOMMENDATION

Conclusion

The mangrove ecosystem along the South Lampung coast experienced a notable expansion from 475.5 hectares in 2020 to 551.9 hectares in 2023, reflecting a restoration increase of approximately 15.9% over three years. During the same period, capture fisheries production in the region reached 125,168.14 tons, with key commodities including squid, scad, trevally, anchovy, grouper, blue swimming crab, and white shrimp. The expansion of mangrove areas is strongly linked to fisheries productivity, as mangroves provide essential nursery, feeding, and spawning grounds for many aquatic species.

Species such as coral trout, goatfish, green tiger prawn, and green mussels show high dependence on mangrove habitats, and areas with greater mangrove coverage tend to support higher catches. This positive correlation underscores the ecological and economic value of mangrove conservation, suggesting that protecting and restoring mangrove forests not only enhances biodiversity but also sustains the livelihoods of local fishermen. The findings highlight the importance of integrating ecosystem-based management strategies to optimize both environmental sustainability and fisheries production.

Recommendation

The local government is encouraged to strengthen sustainable mangrove conservation and rehabilitation programs that actively involve coastal communities, using the findings of this study as a reference for fisheries and environmental policy. Coastal communities should be engaged in mangrove preservation efforts, as such initiatives not only protect the ecosystem but also enhance fish catch productivity. Furthermore, future research that integrates socio-economic aspects of fishers with environmental factors is necessary to develop a more comprehensive and effective coastal resource management strategy in South Lampung.

AUTHOR'S CONTRIBUTIONS

LSC contributed as the conceptual lead, researcher, writer, data analyst, and in manuscript preparation; MH contributed as a writer and in manuscript preparation; and MN contributed as a writer and in manuscript preparation.

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REFERENCES

Andiny, P. 2020. The impact of mangrove forest ecotourism development on the social and economic conditions of the community in Kuala Langsa Village, Aceh. Samudra Journal of Economics and Business. 11 (1): 43-52. https://doi.org/10.33059/jseb.v11i1.1882

Arindi, Y.N. 2018. Analysis of changes in mangrove ecosystem density using NDVI and SAVI vegetation index algorithms on multitemporal satellite images (Case study: Northern Coast of Surabaya).

Damsir, D., A. Ansyori, Y. Yanto, S. Erwanda & B. Purwanto. 2023. Mapping of mangrove areas in Lampung Province using sentinel-2A and google earth satellite images. Journal of Collaboration and Innovation in Science and Technology Services. 1 (3): 207-216.

Faqih, A., D. Iswan & S.H. Rahim. 2025. Effect of mangrove individual density on fish populations in the mangrove ecosystem of Tabongo Coast, Dulupi District, Boalemo Regency. Journal of Fisheries Agribusiness. 3 (1): 10-14.

Findra, M.N., N. Adharani & L. Herdiana. 2016. Ontogenetic habitat shift of fish in mangrove forest waters. Media Konservasi. 21 (3): 304-309. https://doi.org/10.29243/medkon.21.3.304-309

Hakim, G.H., N. Taufiq-Spj & S. Redjeki. 2024. Size variation of green mussel (*Perna viridis*) on Tambak Lorok Coast, Semarang. Journal of Marine Research. 13 (4): 617-624. https://doi.org/10.14710/jmr.v13i4.43127

Herison, A., Y. Romdania, G.E. Susilo & C. Persada. 2018. Mangrove planting and extension activities during the Krakatau Festival in Kalianda, South Lampung. Proceedings of Senapati National Service Seminar, 1.

Kuncahyo, I., R. Pribadi &I. Pratikto. 2020. Composition and canopy cover of mangrove vegetation in Bakauheni Waters, South Lampung Regency. Journal of Marine Research. 9 (4): 444-452. https://doi.org/10.14710/jmr.v9i4.27915

Marlina, D. 2022. Land cover classification using Sentinel-2 imagery in Kuningan Regency with NDVI and Random Forest algorithm. STRING (Unit for Research and Technology Innovation Writing). 7 (1): 41-49. http://dx.doi.org/10.30998/string.v7i1.12948

Mustika, P.L.K., A. Saputra & F. Harahap. 2023. Analysis of the relationship between mangrove cover and fish catch in Indonesian Coastal Areas. J Coastal Resources Journal. 8 (1): 45-56.

Naibaho, A.A., M.S. Harefa, R.S. Nainggolan & V.L. Alfiaturahmah. 2023. Investigation of mangrove forest utilization and its impact on coastal areas in Paluh Getah Mangrove Beach, Tanjung Rejo. J-CoSE: Journal of Community Service and Empowerment. 1 (1): 22-33. https://doi.org/10.58536/j-cose.v1i1.3

Persada, C., F. Rusmiati, N. Ifadianto & M.M. Sesunan. 2022. Concept of developing a disaster-resilient coastal tourism village based on spatial planning: A case study of Kunjir Village, South Lampung Regency.

Rahadian, A., L.B. Prasetyo, Y. Setiawan & K. Wikantika. 2019. A historical review of mangrove area data and information in Indonesia. Media Konservasi. 24 (2): 163-178. https://doi.org/10.29244/medkon.24.2.163-178

Retraubun, A.S.W., C.I. Tupan, D.A.J. Selanno, F. Rijoly, F.S. Pello, F.W. Ayal & Y. Natan. 2023. Blue halos module as basic training material for nature conservation and sustainable fisheries (KAIL). Yayasan Konservasi Cakrawala Indonesia.

Romadoni, A.A., R. Ario & I. Pratikto. 2023. Mangrove health analysis in Ujung Piring and Teluk Awur Areas using Sentinel-2A. Journal of Marine Research. 12 (1): 71-82. https://doi.org/10.14710/jmr.v12i1.35040

Rosana, D., A.L. Ahmad & S. Suciana. 2024. Analysis of fishery port management to increase fish production at Kalianda Fishing Port, South Lampung. Marlin. 5 (1): 79-90. http://dx.doi.org/10.15578/marlin.V5.I1.2024.79-90

Setiawan, A., A. Akhbar & I. Arianingsih. 2018. Mangrove vegetation analysis using NDVI in the mangrove ecosystem of Balinggi District, Parigi Moutong Regency. Jurnal ForestSains. 15 (2): 82-90.

Wahyu, R., A. Vincentius & M. Yohanista. 2021. Relationship between dominant mangrove characteristics and diversity and quantity of fish production on the Wolomarang Coast, Sikka Regency. J Journal of Marine and Fisheries Science. 20 (3): 553-562. https://jurnal.nusanipa.ac.id/index.php/aquanipa/article/view/53