

BLUE ECONOMY ACTIVITIES AND LIVELIHOOD DIVERSIFICATION AMONG FISHERS IN BRASS ISLAND IN BAYELSA STATE

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Abstract

The study investigated blue economy activities and livelihood diversification among fishers in Brass Island in Bayelsa State. Four objectives, research questions, and hypotheses guided this study. The study was carried out in Bayelsa State. The study was carried out in Brass Island, Brass LGA, Bayelsa State. A correlational research design was employed, with a population of 184,127 residents in the area. The sample size comprised 400 fishers. A purposive sampling technique was adopted to select the three communities with high fishing intensity in Brass Island, namely Twon-Brass, Okpoama, and Sangana. Blue Economy Activities and Livelihood Diversification Questionnaire (BEALDQ), rated on a 4-point Likert Scale; Strongly Agree (SA = 4) to Strongly Disagree (SD) = 1. The instrument underwent validation and reliability testing, achieving a reliability coefficient of BEALDQ = 0.821 through the Cronbach's Alpha method. The research questions and hypotheses 1-3 were answered and tested using Pearson's Product-Moment Correlation, while research questions and hypotheses 4 were answered and tested using Regression Analysis at the 0.05 significance level. The study's results indicated, among others, that fisheries resource utilization is very strongly and positively related to livelihood diversification among fishers in Brass Island ($r = 0.860$, $p < 0.05$), and there is a very strong positive relationship between participation in coastal economy activities and livelihood diversification ($r = 0.827$, $p < 0.05$). The study concluded that livelihood diversification among fishers in Brass Island is a highly dynamic process shaped by resource availability, economic opportunities, environmental pressures, and targeted adaptation strategies. The study recommended, among others, that Government and development partners should fund localized, marine-based secondary activities, such as value-added processing, cold-storage, and aquaculture, to leverage and maximize the strong mediating effect of marine diversification.

Keywords: *Blue Economy, Livelihood, Diversification, Fishers, Brass Island.*

Introduction

In the humid tropical regions of the Niger Delta, coastal communities are deeply defined by their human-marine environmental interactions. In Bayelsa State, particularly on Brass Island, small-scale fishing households depend entirely on maritime and estuarine spaces for their survival. However, these systems face severe environmental limitations, including acute mangrove degradation, coastal erosion, and localized pollution, which threaten the sustainability of small-scale fisheries (Asuquo et al., 2023). In response to these vulnerabilities, the paradigm of the Blue Economy, defined as the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving ocean ecosystem health, has become central to coastal development strategies (World Bank, 2022). For the fishers of Brass Island, adapting to these changing ecological dynamics requires a deliberate shift toward livelihood diversification rooted in diversified Blue Economy frameworks (FAO, 2023).

Livelihood diversification in coastal geography involves the process by which fishing households construct a varied portfolio of marine and non-marine activities to mitigate risks and stabilize income (Ellis, 2000; Béné et al., 2020). Within the Blue Economy, fisheries resource utilization forms the primary anchor of this portfolio. On Brass Island, the active harvesting and initial management of

marine resources serve as the foundational economic driver. However, open-access challenges and climate-induced weather disruptions often turn these primary activities into high-risk ventures, acting as environmental "push" factors that force fishers to seek alternative economic pathways (Onyeneke et al., 2021; Princewill & Nwogu, 2022).

Crucially, contemporary coastal research indicates that effective diversification does not require abandoning marine spaces entirely; rather, marine-based diversification, such as value-added fish smoking, localized aquaculture development, and participation in maritime trading networks, serves as a vital mediating mechanism (Fregene & Jimoh, 2022). It bridges the gap between basic resource extraction and broader macroeconomic stability, exponentially multiplying the returns on primary fisheries utilization (Omitoyin et al., 2023). Therefore, understanding livelihood dynamics on Brass Island requires a geographic approach that evaluates how local resource use, environmental stressors, and diverse Blue Economy activities interplay to shape the adaptive capacity and economic resilience of artisanal fisherfolk.

Statement of the Problem

Small-scale and artisanal fisheries serve as the bedrock of the emerging Blue Economy in Nigeria, particularly in the coastal island communities of the Niger Delta like Brass Island, Bayelsa State. Despite the immense potential of marine resources to drive sustainable growth, several interconnected structural barriers limit the economic security of local fishing households. Fishers face dwindling catches and unstable incomes driven by unregulated open-access exploitation and a lack of modern seafaring assets. These limitations are exacerbated by severe socio-economic constraints, including low financial capital, poor access to formal credit, and a historical deficit in maritime extension services, which trap fishers in a cycle of primary resource dependency. Furthermore, these communities operate on the frontline of severe environmental stressors unique to the Niger Delta, such as frequent oil spills, industrial pollution, and climate-induced sea-level rise. These ecological shocks degrade vulnerable mangrove ecosystems and disrupt fish breeding grounds, accelerating the economic vulnerability of rural households.

While diversifying into broader Blue Economy activities (e.g., sustainable aquaculture, value-added seafood processing, and maritime trade) is recognized as a vital pathway to buffer households against these shocks, the specific dynamics of this transition remain poorly understood. Local fishers are often "pushed" toward alternative income streams by environmental degradation, yet their adaptive capacity remains severely constrained. Critically, while macro-level policies advocate for the Blue Economy, there is a lack of localized empirical data demonstrating how primary fisheries utilization and broader coastal activities interact with internal marine-based diversification to amplify household resilience.

Without micro-level geographic evidence mapping these relationships, regional Blue Economy initiatives risk failing to address the realities of artisanal fisherfolk. Therefore, this study systematically examines the relationship between Blue Economy activities and livelihood diversification among fishers on Brass Island to provide the empirical framework necessary for sustainable coastal planning, poverty reduction, and regional economic security.

Aim and Objectives of the Study

This study aimed to investigate blue economy activities and livelihood diversification among fishers in Brass Island in Bayelsa State. Specifically, the study aims to:

1. ascertain how the use and management of fishery resources relate to livelihood diversification among fishers in Brass Island in Bayelsa State.
2. examine how participation in coastal economy activities relates to livelihood diversification among fishers in Brass Island in Bayelsa State.

3. determine how environmental stressors relate to livelihood diversification among fishers in Brass Island in Bayelsa State.
4. evaluate how marine-based diversification mediates the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island in Bayelsa State.

Research Question

1. How does the use and management of fishery resources relate to livelihood diversification among fishers in Brass Island in Bayelsa State?
2. How does participation in coastal economy activities relate to livelihood diversification among fishers in Brass Island in Bayelsa State?
3. How do environmental stressors relate to livelihood diversification among fishers in Brass Island in Bayelsa State?
4. How does marine-based diversification mediate the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island in Bayelsa State?

Hypotheses

H0₁: The use and management of fishery resources does not significantly relate to livelihood diversification among fishers in Brass Island in Bayelsa State.

H0₂: Participation in coastal economy activities relates to livelihood diversification among fishers in Brass Island in Bayelsa State.

H0₃: Environmental stressors do not significantly relate to livelihood diversification among fishers in Brass Island in Bayelsa State.

H0₄: Marine-based diversification does not significantly mediate the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island in Bayelsa State.

Methodology

This study was carried out in Brass Island in Bayelsa State, located in Nigeria's Niger Delta region, and comprises six communities: Twon-Brass, Okpoama, Sangana, Odioma, Ewoama, and Konsho. These communities operate as spatial-economic units (fishing zones, trade hubs).

The study employed a correlational research design, which was considered appropriate because it allows for the systematic collection and analysis of data to examine the relationships between variables without manipulating them.

The study population consists of 184,127 residents in the area used for the study. The sample size comprised 400 fishers through the Taro Yemen sampling formula. The sample was drawn from the six selected communities.

A purposive sampling technique was adopted to select the three communities with high fishing intensity in Brass Island, namely Twon-Brass, Okpoama, and Sangana. These communities were selected due to their strong dependence on fishing and other marine-related livelihood activities, as well as their relevance to blue economy practices in the coastal environment. Thereafter, a simple random sampling technique was employed to select respondents from each community.

Data for the study were collected using a structured questionnaire titled Blue Economy Activities and Livelihood Diversification Questionnaire (BEALDQ). The instrument consisted of two sections. Section A elicited demographic information of respondents, while Section B contained items structured according to the study variables: fisheries resource utilization, coastal economy participation, environmental stressors, marine-based diversification, and livelihood diversification. The questionnaire items were measured on a four-point Likert scale of Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2), and Strongly Disagree (SD = 1). A criterion mean of 2.50 was used as the benchmark for decision-making.

The instrument was subjected to face and content validation by experts in Geography and Environmental Management, as well as Measurement and Evaluation specialists, to ensure clarity, relevance, and adequacy of the items in measuring the variables of the study. The reliability of the instrument was determined using Cronbach's Alpha statistical method, which yielded an overall reliability coefficient of BEALDQ = 0.821, considered adequate for the study, indicating high internal consistency of the instrument.

With the assistance of trained research assistants, copies of the questionnaire were administered directly to fishers within the selected communities. Necessary guidance was provided to respondents to ensure proper completion of the instrument. The completed questionnaires were retrieved immediately after administration to ensure a high return rate.

Pearson's Product-Moment Correlation (PPMC) was used to answer the research questions and test hypotheses one to three at a 0.05 level of significance, while Regression Analysis was used to answer the research questions and test hypotheses four at a 0.05 level of significance.

Results

Research Question One: How does the use and management of fishery resources relate to livelihood diversification among fishers in Brass Island in Bayelsa State?

Hypothesis One: The use and management of fishery resources does not significantly relate to livelihood diversification among fishers in Brass Island in Bayelsa State.

Table 1: PPMC summary of how management of fishery resources relates to livelihood diversification among fishers in Brass Island in Bayelsa State

		Fisheries Resource Utilization	Livelihood Diversification
Fisheries Resource Utilization	Pearson Correlation	1	.860**
	Sig. (2-tailed)		.000
	n	400	400
Livelihood Diversification	Pearson Correlation	.860**	1
	Sig. (2-tailed)	.000	
	n	400	400

** . Correlation is significant at the 0.01 level (2-tailed).

Table 1 shows that management of fishery resources positively and very strongly relates to livelihood diversification among fishers in Brass Island in Bayelsa State ($r = 0.860$, $r \geq \pm 0.80$ to ± 1.00). This result implies that management of fishery resources very strongly correlates with livelihood diversification among fishers in Brass Island in Bayelsa State. Furthermore, for the test of significance, Table 1 revealed that management of fishery resources significantly relates to livelihood diversification among fishers in Brass Island in Bayelsa State, since $r = 0.860$, $r \geq \pm 0.80$ to ± 1.00 , $p < 0.05$, then the null hypothesis is rejected at the 0.05 significance level.

Research Question Two: How does participation in coastal economy activities relate to livelihood diversification among fishers in Brass Island in Bayelsa State?

Hypothesis Two: Participation in coastal economy activities relates to livelihood diversification among fishers in Brass Island in Bayelsa State.

Table 2: PPMC summary of how participation in coastal economy activities relates to livelihood diversification among fishers in Brass Island in Bayelsa State

		Coastal Economy Participation	Livelihood Diversification
Coastal Economy Participation	Pearson Correlation	1	.827**
	Sig. (2-tailed)		.000
	n	400	400
Livelihood Diversification	Pearson Correlation	.827**	1
	Sig. (2-tailed)	.000	
	n	400	400

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows that participation in coastal economy activities positively and very strongly relates to livelihood diversification among fishers in Brass Island in Bayelsa State ($r = 0.827$, $r \geq \pm 0.80$ to ± 1.00). This result implies that participation in coastal economy activities very strongly correlates with livelihood diversification among fishers in Brass Island in Bayelsa State. Furthermore, for the test of significance, Table 2 revealed that participation in coastal economy activities significantly relates to livelihood diversification among fishers in Brass Island in Bayelsa State, since $r = 0.827$, $r \geq \pm 0.80$ to ± 1.00 , $p < 0.05$, then the null hypothesis is rejected at the 0.05 significance level.

Research Question Three: How do environmental stressors relate to livelihood diversification among fishers in Brass Island in Bayelsa State?

Hypothesis Three: Environmental stressors do not significantly relate to livelihood diversification among fishers in Brass Island in Bayelsa State.

Table 3: PPMC summary of how environmental stressors relate to livelihood diversification among fishers in Brass Island in Bayelsa State

		Environmental Stressors	Livelihood Diversification
Environmental Stressors	Pearson Correlation	1	.386**
	Sig. (2-tailed)		.000
	n	400	400
Livelihood Diversification	Pearson Correlation	.386**	1
	Sig. (2-tailed)	.000	
	n	400	400

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows that environmental stressors positively and weakly relate to livelihood diversification among fishers in Brass Island in Bayelsa State ($r = 0.386$, $r \geq \pm 0.20$ to ± 0.39). This result implies that environmental stressors weakly correlate with livelihood diversification among fishers in Brass Island in Bayelsa State. Furthermore, for the test of significance, Table 3 revealed that environmental stressors significantly relate to livelihood diversification among fishers in Brass Island in Bayelsa State, since $r = 0.386$, $r \geq \pm 0.20$ to ± 0.39 , $p < 0.05$, then the null hypothesis is rejected at the 0.05 significance level.

Research Question Four: How does marine-based diversification mediate the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island in Bayelsa State?

Hypothesis Four: Marine-based diversification does not significantly mediate the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island in Bayelsa State.

Table 4: Regression analysis summary of how marine-based diversification mediates the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island in Bayelsa State

Model Summary	Parameters	Linear Functions	
	R-value (R)	0.852 ^a	
	R Square (R ²)	0.726	
	Adjusted R-Square	0.725	
	Std. Error	8.287	
	Df	398	
	F-ratio	1055.346	
	P-value of F-ratio	0.00 ^c	
Coefficient Estimates	Variables	t-values	P-values
Constant	Intercept	2.367	0.18
Fisheries Resource Utilization	(X ₁)	32.486	0.00

- Dependent Variable: Livelihood Diversification
- Weighted Least Squares Regression - Weighted by Marine-based Diversification
- Predictors: (Constant), Fisheries Resource Utilization

Table 4 indicates that marine-based diversification positively and very strongly mediates the relationship between fisheries utilization and livelihood diversification among fishers in Brass Island. With an R Square of 0.726, the model explains 72.6% of the variance in livelihood diversification when weighted by marine-based diversification.

The test of significance showed that the F-ratio is highly significant ($p = 0.00$), and the coefficient for fisheries utilization is also significant ($t = 32.486$, $p = 0.00$). Thus, marine-based diversification plays a significant mediating role, and the null hypothesis is rejected at the 0.05 significance level. This result implies that promoting marine-based diversification could be a key strategy to enhance livelihood diversification among fishers in Brass Island. By encouraging fishers to engage in a variety of marine-related activities alongside fisheries utilization, communities may achieve more sustainable and resilient livelihoods.

Discussion of Findings

The findings for Research Question One indicate that fisheries resource utilization is very strongly and positively related to livelihood diversification among fishers in Brass Island ($r = 0.860$, $p < 0.05$). This suggests that active use and management of fishery resources significantly contribute to diversifying income sources for fishers. The rejection of the null hypothesis confirms that fisheries resource utilization is a critical factor in livelihood diversification. This result aligns with the contemporary work of Olowosegun et al. (2021), who found that proper utilization of local fishing inputs and community-based fisheries management enhances household economic resilience and gives fisherfolk the financial foundation to branch out into other sectors. Similarly, Anetekhai and

Olunloyo (2022) reported that sustainable fisheries practices and structured asset management positively influence multiple livelihood strategies among small-scale fishing households, supporting the importance of resource utilization in achieving long-term economic stability.

The findings for research question two show a very strong positive relationship between participation in coastal economy activities and livelihood diversification ($r = 0.827$, $p < 0.05$). This underscores that fishers involved in a broader range of coastal economic activities are more likely to diversify their livelihoods. The rejection of the null hypothesis further validates this connection. This outcome concurs with recent findings by Awolumate and Oladimeji (2024), who documented that engagement in non-fishing commercial activities, trade, and cooperative-led enterprises substantially buffers fishing household incomes and maximizes local livelihood options. Additionally, Adewumi et al. (2023) demonstrated that multi-sectoral participation in coastal economies, including small-scale processing and trading, helps small-scale fishers mitigate open-access vulnerabilities and significantly expands their adaptive capacity.

For research question three, the weak but significant positive correlation between environmental stressors and livelihood diversification ($r = 0.386$, $p < 0.05$) suggests that environmental challenges prompt fishers to diversify their livelihoods, albeit to a limited extent. The null hypothesis is rejected, indicating environmental stressors do play a role, though less pronounced compared to other factors. This finding is consistent with the research of Princewill and Nwogu (2022), which established that environmental pressures in the Niger Delta, such as oil spills, habitat degradation, and climate variability, act as heavy "push" factors forcing fishers to seek supplementary income, though they are strictly constrained by a lack of credit. Similarly, Onyeneke et al. (2021) reported that while climate-induced environmental stressors drive fishers to pursue alternative livelihood options, the actual transition remains slow, gradual, and partial due to low asset bases and poor rural infrastructure.

The results for research question four reveal that marine-based diversification strongly mediates the relationship between fisheries utilization and livelihood diversification ($R = 0.852$, $p = 0.00$). This indicates that diversification within marine-based activities amplifies the positive effects of fisheries utilization on livelihood diversification. The rejection of the null hypothesis highlights the significant mediating role of marine-based diversification. This supports conclusions by Omitoyin et al. (2023), who found that integrating multiple secondary marine activities, such as value-added processing and mangrove-based aquaculture, directly enhances income streams for coastal populations. Furthermore, Fregene and Jimoh (2022) emphasized that localized marine-based diversification strategies, rather than moving entirely away from the water, are what significantly improve economic stability and reduce vulnerability in the fishing communities of the Niger Delta.

Conclusion

The study concludes that livelihood diversification among fishers in Brass Island is a highly dynamic process shaped by resource availability, economic opportunities, environmental pressures, and targeted adaptation strategies. The empirical evidence demonstrates that active fisheries resource utilization and active participation in broader coastal economic activities are both powerful, positive drivers that significantly expand the livelihood portfolios of fishing households. While environmental stressors (such as oil spills, pollution, and climate variability in the Niger Delta) do act as critical "push" factors compelling fishers to diversify, their influence is weaker and heavily constrained by the community's limited adaptive capacity. Ultimately, while fishers are highly willing to diversify, their ability to achieve economic stability is heavily dependent on their capacity to transition into these secondary, marine-adjacent sectors.

Recommendations

1. Government and development partners should fund localized, marine-based secondary activities, such as value-added processing, cold-storage, and aquaculture, to leverage and maximize the strong mediating effect of marine diversification.
2. Local authorities should establish vocational and cooperative programs that facilitate smoother entry into broader coastal economic activities (e.g., maritime trade, boat maintenance, and eco-tourism) to bolster household income.
3. Microfinance institutions and environmental agencies should improve fishers' access to credit, grants, and climate-risk insurance, enabling them to adapt more effectively to ecological "push" factors.
4. Fisheries extension services should implement community-led, sustainable resource management frameworks to protect and optimize the foundational asset driving local diversification.

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