Gender Disparities in Coastal Livelihoods: Climate Risks, Income Gaps, and Adaptation Barriers in Rufiji Delta, Tanzania

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Abstract

Men and women in the coastal communities of Tanzania are affected by climate change differently. This paper explored the role of gender in access to livelihoods and climate adaptation in the Rufiji Delta, one of the most ecologically diverse but vulnerable areas in the country. Based on the data of 368 men and women involved in fishing, processing and trading. Ecosystem-based adaptation (EBA) examined income patterns, climate risks and participation. The results show that there is an evident imbalance, with 91 percent of women experiencing losses of income due to flooding as opposed to 65 percent of men, and only 9 percent of women participated in adaptation processes such as mangrove restoration, as opposed to 22 percent of men. Men still hold higher paying jobs like boat ownership with an average salary of 120 dollars a month, which is more than three times the salary of women in the same position. Structural Equation Modelling (SEM) revealed that women are more vulnerable to climate shocks (β = 0.52) and this decreases their adaptive capacity (β = -0.26). Women are also limited in their involvement in adaptation by low income and absence of credit (β = -0.19). On the other hand, the availability of credit (odds ratio = 3.2) and education were the other factors that enhanced the probability of engaging in EBA. These findings indicate that there is a need to have inclusive policies that enable women to access resources, credit, and decision-making platforms to enable them to contribute equally to climate resilience in the coastal regions of Tanzania.

Keywords: Gender, Coastal Livelihoods, Climate Shocks, Income Gaps, Adaptation, Rufiji Delta

Introduction

Coastal regions in the world are suffering the combined effects of environmental degradation and climate change. About 680 million people (almost 10 percent of the world population) inhabit low-lying coastal areas, where they are exposed to the threat of their livelihood and well-being in the context of sea level rise, erosion, and loss of biodiversity (Intergovernmental Panel on Climate Change (IPCC), 2022). Not all such vulnerabilities are evenly distributed, but rather they are determined by social inequalities, especially gender disparities, which determine access to resources, decision-making, and adaptive capacity (Graziano et al., 2018; Prakash et al., 2022). Coastal communities in Africa are very reliant on climate-sensitive livelihoods like fisheries, aquaculture, and mangrove ecosystems with women and men playing different roles in the livelihood systems (Mulonga & Olago, 2024). Understanding and responding to gender relations can, therefore, not only be a question of equity but also a precondition to successful climate adaptation and sustainable coastal development.

Gender in Tanzania is recognised as one of the dimensions of critical importance in the governance of natural resources and climate resilience. Gender has been mainstreamed to the National Climate Change Response Strategy (2021-2026) and the National Environmental Policy (2021) developed by the government. The different programs, like the introduction of Ecosystem-Based Adaptation (EBA) in the coastal mangrove areas, are supposed to be of advantage to both women and men without discrimination. Inclusive participation in the management of marine resources is also highlighted in the National Fisheries Policy (2015). Such policy frameworks are based on the premise that gender-equitable access to livelihood assets, information, and decision-making processes can enable sustainable coastal development and increase household and community resilience to climate shocks (URT, 2021; Yanda et al., 2023).

Nevertheless, in reality, the desired effects of these policies are not achieved. The role of women in the coastal economies is high, but it is mainly informal and underestimated. Although women constitute the core of fish processing and trading operations, they usually lack access to capital, fishing equipment, and market information (Ntibona et al., 2023). Besides, they are underrepresented in fisheries management institutions and climate adaptation schemes. Research conducted in coastal districts of Tanzania such as Bagamoyo, Kilwa, and Rufiji shows that women are not involved in owning boats, decision-making and high-revenue fishing processes (Nyangoko et al., 2020; Mshale et al., 2017). Such structural inequalities not only jeopardize the efficiency of adaptation strategies but also hurt the economic welfare of a large part of the coastal population.

The Rufiji Delta is a bright example of the mismatch between the policy intent and realities on the ground. It is among the most ecologically diverse but climate-vulnerable areas in Tanzania with a population of more than 50,000 people whose lives are based on mangrove forests and estuarine fisheries (Mung'ong'o, 2019). Although the mangrove conservation and EBA projects have been implemented in the delta, women have an uneven participation rate; moreover, they are at a higher risk of flooding and mangrove loss compared to men (Nyangoko et al., 2022). Past studies have considered local perceptions of climate change and the ecosystem services of mangroves (Nyangoko et al., 2022; Peter, 2017), but little research has been done to quantitatively address the gendered determinants of income and participation in adaptation, especially through a rigorous econometric analysis.

This research paper fulfils that gap by examining gender inequality in coastal livelihoods in the Rufiji Delta using the perspective of income distribution, exposure to climate risks, and involvement in EBA. The study makes use of the data of 368 respondents and employs multivariate regression models and structural equation modelling (SEM), to present evidence on the interaction between gender, livelihood assets and environmental vulnerability. It therefore adds to a more refined picture of the socio-economic constraints that coastal women have to cope with and provides policy-relevant information on how to design inclusive climate interventions in Tanzania and elsewhere.

Methodology

Study Design

The study was cross-sectional survey with quantitative and analytical research techniques. The design was suitable to measure gender-based differences in livelihoods, climate risks and adaptive behaviors among coastal populations at one particular time. The research employed structured interviews and statistical modelling methods to investigate the links between variables, including gender, occupation, income and engagement in ecosystem-based adaptation (EBA).

Study Area

This study took place in the Rufiji Delta, part of the Rufiji District in Tanzania's Coast Region. Geographically, the delta sits between 7°30' to 8°00' South and 39°15' to 39°45' East. It is home to one of East Africa's largest stretches of uninterrupted mangrove forest, thriving estuarine fisheries, and communities whose livelihoods and daily survival are closely tied to the natural environment.

The Rufiji Delta is highly sensitive to climate shifts. It regularly experiences flooding, rising sea levels, and the gradual loss of mangrove forests. These environmental pressures threaten both the health of the ecosystem and the well-being of the people who depend on it. Data from the 2022 Tanzania Population and Housing Census (NBS, 2023) shows the Rufiji District is home to 159,906 people across 37,977 households. The delta contains a mix of inland and coastal villages, making it an ideal location to study how changes in coastal ecosystems ripple through both nature and society. Figure 1 shows where the study area lies in relation to the Rufiji River, nearby villages, and the wider Coast Region.

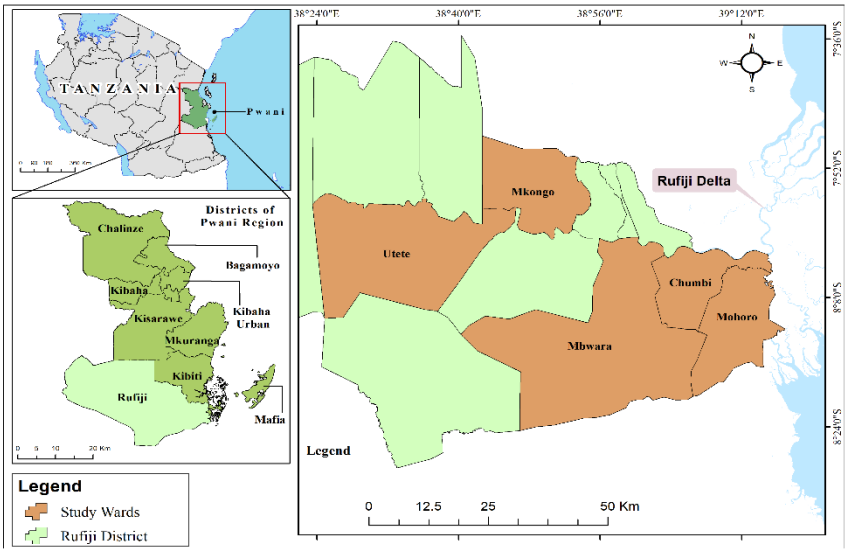

Figure 1 Location of the Study Area – Rufiji Delta, Tanzania

Study Population

The target population included men and women of 18 years and older in the coastal wards of Rufiji District and those who were actively involved in fisheries, fish processing, fish trading, or mangrove activities. The selection was done in such a way that the representation was made in terms of gender, type of livelihoods and ecological zones of the delta. Among the most important wards that were visited in the process of data collection were Utete, Chumbi, Mbwara, Mkongo and Mohoro.

Sample Size and Sampling Technique

Sample size was determined by Yamane (1967) formula of finite populations:

$$n = \frac{N}{1 + N(e)^2}$$

Where:
n = sample size needed
N = size of the population (37,977 households)
e = margin of error (0.05)

$$n = \frac{37,977}{1 + 37,977(0.05)^2} = \frac{37,977}{1 + 37,977 \times 0.0025} = \frac{37,977}{1 + 94.9425} = \frac{37,977}{95.9425} \approx 396$$

Nevertheless, time and resource limitations meant that only 368 respondents were surveyed, but this is still sufficient to meet statistical power of 95 percent confidence levels and enables disaggregation by gender, occupation, and other variables.

Multistage sampling strategy was employed. First, purposive selection of five wards was carried out because of their closeness to mangrove ecosystems and reliance on fisheries. Villages in each ward were randomly chosen. Systematic sampling of households was then done and within a household, a single respondent (male or female) who was involved in coastal livelihood was interviewed.

Data Collection

The primary data was obtained by means of structured questionnaires that were administered face-to-face by trained enumerators in Swahili language. The questionnaire included demographic information, income, livelihood functions, climatic effects and adaptation behaviours. Kobo Toolbox was used to code responses and digitise them in real-time to allow validation and geo-referencing.

Data Analysis

The analysis of the data was conducted with the help of Stata 16. The comparison of income and exposure by gender was made through the use of descriptive statistics (frequencies, means, t-tests). Income predictors were calculated with the help of Ordinary Least Squares (OLS) regression, and the determinants of EBA participation were analyzed with the help of logistic regression. The interaction terms of gender were included to evaluate differential effects. Lastly, hypothesised pathways between gender, exposure to climate shocks, and adaptive responses were tested using Structural Equation Modelling (SEM).

Model fit was evaluated using adjusted R^2 (for OLS) and pseudo-R^2 (for logistic models). Significance was assessed at p-values of 0.05, 0.01, and 0.001.

The SEM was represented using the following system of structural equations:

1. Climate Shocks Equation: $CS = \alpha_1 + \beta_1 \text{ Gender} + \varepsilon_1$
2. Income Equation: $Inc = \alpha_2 + \beta_2 \text{ Gender} + \varepsilon_2$
3. EBA Participation Equation: $EBA = \alpha_3 + \beta_3 CS + \beta_4 Inc + \beta_5 \text{ Credit} + \beta_6 \text{ Edu} + \varepsilon_3$

Where:
CS = Climate Shocks
Inc = Income
EBA = Participation in Ecosystem-Based Adaptation
Gender = Binary (Male = 0, Female = 1)
Credit = Access to credit (0 = No, 1 = Yes)
Edu = Years of formal education
ε_i = Error terms
α_i = Intercepts
β_i = Estimated path coefficients

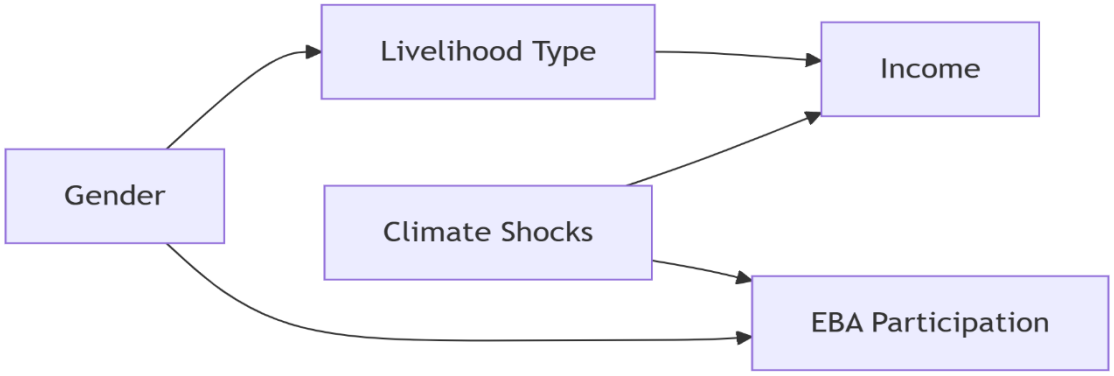

Figure 2: Structural Equation Modeling (SEM)

Ethical Considerations

This study was given ethical clearance through the administrative channels of the government. The Regional Administrative Secretary (RAS) - Coast Region issued a formal research permit. As per procedure, the RAS instructed the District Administrative Secretary (DAS) - Rufiji to approve the research and provide access to the wards selected. Additionally, all the participants were asked to sign a verbal and written informed consent prior to the interviews. The study guaranteed anonymity, confidentiality and voluntary nature of participation by respondents, and the study was conducted in accordance with the ethical principles as stipulated in the Tanzania Commission for Science and Technology (COSTECH) guidelines.

Results

The section outlines the key study findings, grouped into thematic areas: gender-based occupation and income inequalities, exposure to climate risks, income determinants and involvement in ecosystem-based adaptation (EBA). The findings are founded on quantitative study of 368 respondents (211 males and 157 females) that is selected in five coastal wards in Rufiji District.

Gendered Livelihood Structure and Income Disparities

Table 1 shows gender distribution of coastal livelihoods and the average monthly income of men and women in four major occupational categories.

Table 1: Occupation & Income Disparities (n=368)

Category	Male (%)	Female (%)	Avg. Income (Male)	Avg. Income (Female)	P-value (t-test)
Small-scale fisher	74%	26%	$95 ± $40	$50 ± $20	<0.001***
Fish processor	16%	84%	$30 ± $15	$25 ± $10	0.210
Fish trader	40%	60%	$55 ± $25	$40 ± $15	0.032*
Boat owner	85%	15%	$120 ± $50	$35 ± $20	<0.001***

As indicated in Table 1, evidence indicates that the coastal economy has a strong gendered division of labour. The high-income fishing and boat ownership occupations are dominated by men, whereas processing and trading occupations are concentrated on women. The income disparity is also statistically significant among fishers, traders, and boat owners ($p < 0.05$), indicating the existence of systematic obstacles to women access to capital-intensive or resource-controlled activities.

Male boat owners had on average 3.2 times more income than female ones. This income disparity is not only an indicator of disparity in access to physical resources such as boats, but also more fundamental institutional and financial constraints that restrict the ability of women to move up the value chain.

Gendered Exposure to Climate Risks

Table 2: Climate Vulnerability (n=368)

Exposure Metric/ Adaptation Activity	Male (%)	Female (%)
Impact of loss of mangrove	58%	82%
Income loss from flood	65%	91%
Participates in EBA	22%	9%

Table 2 reported significantly higher exposure of women to climate-related hazards. More than 80 percent of women had been displaced by mangrove degradation as compared to 58 percent of men. Similarly, 91 percent of women experienced loss of income because of flooding, which is a sign of increased livelihood fragility. Nevertheless, only 9 percent of women said that they took part in ecosystem-based adaptation (EBA) activities, as opposed to 22 percent of men. This trend shows a gender paradox of adaptation: despite the fact that women are more exposed to environmental risks, they are underrepresented in official adaptation plans. This could be explained as being due to a lack of access to information, decision-making platforms and eligibility to resource-based interventions.

Income Determinants

In order to determine what causes the difference in income between men and women, Ordinary Least Squares (OLS) regressions were estimated separately by gender, with interaction terms to identify different effects. The most important predictors are summarized in Table 3

Table 3: Income Determinants (OLS with Gender Interaction) (n=368)

Predictor	Coef. (Male)	Coef. (Female)	Interaction (β)	P-value
Boat ownership	0.48***	0.05	0.43***	<0.001
Education (years)	0.30*	0.12	0.18*	0.042
Mangrove Dependency	-0.15	-0.35**	0.20	0.008

Model Fit: Adj. R^2 = 0.41 (Male), 0.18 (Female).

Table 3 results indicate that boat ownership was a strong income generator among men as the coefficient was 0.48 ($p < 0.001$), but it had insignificant returns to women. The interaction term ($\beta = 0.43$) supports the fact that men obtain disproportional income benefits when they own boats. In a similar way, education had greater effects on male income increases ($\beta = 0.30$) compared to female ($\beta = 0.12$) perhaps because of gender barriers to converting educational attainment into economic opportunity.

The reliance on the mangrove resources negatively affected the income, especially in women ($\beta = -0.35$, $p < 0.01$), who tend to be involved in informal and environmentally sensitive livelihoods. This implies that environmental degradation has an unbalanced impact on the income-generating activities of women.

Pre-Determinants of Participation In Ecosystem-Based Adaptation (EBA)

A logistic regression model was applied to determine what promotes the EBA engagement among women. The results are shown in Table 4.

Table 4: EBA Participation (Logistic Regression)

Predictor	Odds Ratio (OR)	95% Confidence Interval
Credit access	3.2**	[1.5, 6.8]
Climate risk perception	1.8*	[1.1, 3.0]

The access to credit in Table 4 was the largest predictor of women participation in EBA with the odds being more than three times (OR = 3.2, $p < 0.01$). This observation supports the significance of financial empowerment in empowering women to take part in resilience-building efforts. Similarly, increased climate

risk perception also positively, albeit less significantly, influenced (OR = 1.8, $p < 0.05$), implying that the perception of environmental risks makes people more willing to act adaptively.

Structural Equation Modelling (SEM) Pathways Between Gender, Climate Shocks, And Adaptation

A Structural Equation Model (SEM) was built to comprehend the effect of gender on climate exposure and climate adaptation action through indirect routes. The model examined the mediating role of climate shocks (e.g. flood exposure, mangrove degradation) in the gender and engagement in Ecosystem-Based Adaptation (EBA) activity relationship. Table 5 and 6, the findings of Structural Equation Modeling (SEM) are as follows:

Table 5: Direct and Indirect Effects on Ecosystem-Based Adaptation (EBA) Participation

Pathway	Standardized β	p-value	Interpretation
Direct Effects			
Gender → Climate shock exposure	0.52	< 0.001	Climate shocks are greater on women.
Climate shock exposure → EBA	-0.26	< 0.01	EBA participation is decreased by exposure.
Gender → EBA (direct)	-0.19	< 0.05	Direct EBA participation among women is less.
Credit access → EBA	0.38	< 0.05	EBA is enhanced by an increase in credit access.
Education → EBA	0.21	< 0.05	EBA is enhanced by education.
Indirect Effects			
Gender → Climate Shocks EBA	-0.14*	< 0.01	Women's higher exposure reduces EBA.
Gender → Income/Credit → EBA	-0.19	< 0.05	Economic barriers limit women's EBA.

The Table 5 results indicate that there is a high and statistically significant direct impact between gender and climate shock exposure (0.52, $p < 0.001$). Simply stated, the risk of experiencing a climate-related shock such as flooding or mangrove degradation is significantly higher in the case of being female. This does not come as a surprise since earlier studies by Nyangoko et al. (2022) and Mulonga & Olago (2024) indicated that women in coastal ecosystems are more susceptible because of their livelihood support activities and poor access to adaptive resources. The coefficient shows that the effect is moderate to large, which supports the hypothesis that gender is a central component of climate vulnerability.

Surprisingly, there is a negative correlation between climate shock exposure and involvement in Ecosystem-Based Adaptation (EBA) (β = -0.26, $p < 0.01$). This implies that the more an individual is subjected to climate shocks the less willing they are to participate in EBA activities. Nonetheless, this observation can be described as the so-called adaptation paradox (Prakash et al., 2022) because scholars have been arguing that individuals who experienced direct and catastrophic losses do not have the time, capacity, or resources to invest in long-term adaptation processes.

The direct correlation between gender and participation in EBA also demonstrates negative impact (β = -0.19, $p < 0.05$). Women have a lower probability of participating in EBA than men even when other mediators, such as exposure to climate shock, are controlled. This is indicative of more underlying systemic problems such as lack of participation in decision making processes, the cultural norms that are deeply rooted, and the institutional ignorance of the role of women in the management of natural resources.

To a more brighter side, the availability of credit is a very important factor that enhances EBA participation (β = 0.38, p < 0.05). This implies that financial empowerment can help people, particularly women, to participate in resilience-building activities. The finding can be compared with those of the studies by Selim et al. (2018) and Ntibona et al. (2023) who highlighted the role of credit schemes in encouraging conservation and adaptation efforts.

Education also has a definite influence on promoting EBA participation (β = 0.21, p < 0.05). The increased level of education is most likely to enhance awareness and capacity of people to pass through bureaucratic procedures of adaptation. This aligns with the findings of the bigger studies in East Africa (e.g., Yanda et al., 2023) that set a positive relationship between formal education and environmental awareness and civic participation.

On the other hand, under the indirect impacts, the gender-climate shocks to EBA (β = -0.14, p < 0.01) is a potentially dangerous relationship. The increased exposure of women to environmental risks does not translate to increased action, it even decreases their involvement in EBA. Why? Since these risks are associated with burdens that restrict their capability to participate since they are faced with more losses and fewer resources, time, or mobility. This is what Martinez Fabiani (2024) calls double vulnerability: a helpful term to grasp this compounded disadvantage.

The other indirect route, gender via income or credit access to EBA (β = -0.19, p < 0.05) indicates that the financial constraints further limit the participation of women. Many women just cannot afford to engage in adaptation or conservation work because of generally low incomes and access to financial services. This is similar to the previous research by Graziano et al. (2018) and Mungongong (2019) who analyzed structural barriers in coastal livelihoods.

Table 6: Model Fit Statistics on Total Effects on Ecosystem-Based Adaptation (EBA) Participation

Pathway	Standardized β	Interpretation
Comparative Fit Index (CFI)	0.94	Shows that the model fits well (values greater than 0.90 are judged as good).
Root Mean Square Error of Approximation (RMSEA)	0.04	Indicates a tight match between the hypothesized model and the observed values (values less than 0.06 are desirable).
Standardized Root Mean Residual (SRMR)	0.03	This is a very good fit (threshold: < 0.08).
Chi-square (χ^2, df = 28)	31.6 (p = 0.29)	When p -value is non-significant (> 0.05), it means that the model fits statistically well; the observed data do not differ significantly with the model.

The fit statistics in Table 6 show that the SEM model is statistically acceptable and theoretically significant and offers a solid analytical framework to interpret the role of gendered inequalities in influencing climate vulnerability and adaptation behavior in the Rufiji Delta

Discussion

This paper has discussed the issue of gender inequality in coastal livelihoods in the Rufiji Delta with regard to the difference in incomes, exposure to climate risks and involvement in ecosystem-based adaptation (EBA). The findings indicate that there are deep-seated gender differences that characterize access to livelihood opportunities, exposure to environmental risks and involvement in adaptive responses.

Income inequality and Gendered Livelihoods

The findings indicate that men control high-income activities like fishing and boat ownership whereas women are overrepresented in low-income occupations such as fish processing and small-scale trading. The results concur with those of Nyangoko et al. (2020) who established that women in Rufiji Delta tend to work in informal labour-intensive jobs with low returns and seldom have access to capital-intensive resources like fishing boats. On the same note, Mung'ong'o and Moshy (2019) reported gendered occupational segregation in the delta, where men dominated the most profitable sections of the fisheries value chain.

These regression outcomes also affirm that the effects of boat ownership and education have greater impacts on income among men compared to women. This is in line with what Yanda et al. (2023) discovered, whereby despite having the same level of education, systemic factors do not allow women to convert their qualifications into economic benefits. The inverse relationship between income and mangrove dependency and particularly among women implies that the livelihoods most vulnerable to environmental degradation are those where women are the majority a finding that was also reported by Mwansasu (2016) when he examined changing mangrove use and its impact on subsistence economies.

Inequitable Climate Vulnerability

The study found that women were more exposed to climate shocks such as loss of income due to floods and mangrove degradation. This agrees with the findings of Nyangoko et al. (2022), who pointed out gendered exposure to ecosystem degradation in the Rufiji mangrove system. The high-risk rate among females can be attributed to their occupational status, most of which are directly associated with natural resource extraction, informal markets and daily subsistence.

In spite of this high level of vulnerability, the involvement of women in EBA was much lower. This is reflective of the trends that have been reported by Ntibona et al. (2023) where women are typically excluded in conservation governance and decision-making in the delta. In like manner, in a cross-country review of coastal climate adaptation, Prakash et al. (2022) found that despite being at the forefront of environmental risk, women are generally underrepresented in formal adaptation programmes because of institutional, cultural, and financial constraints.

EBA Participation Incentives

The logistic regression findings support the argument that access to credit and perception of climate risks are important factors that determine the role of women in EBA. The likelihood of women who had access to credit to participate in EBA initiatives was more than three times higher, which proves the importance of financial inclusion as a factor that promotes adaptive action. This observation can be substantiated by

Selim et al. (2018) in coastal Bangladesh, whereby financial empowerment played a significant role in enhancing the involvement of women in community-based adaptation initiatives.

Contrary to the anticipation that the more exposed to climate risks, the more one will be inclined to adapt, the SEM findings show that exposure to climate shock has negative impacts on EBA participation, particularly among women. The combination of vulnerability and disempowerment explains this paradox since women are both more vulnerable to climate risks and less empowered to act because of structural constraints. According to Martinez Fabiani (2024), this is the so-called double bind of coastal women being both more dependent on and more excluded by adaptive governance systems.

The SEM also demonstrates that the adverse influence of gender on adaptation is mediated by income and access to credit, which implies that economic empowerment can partly compensate gender-related exclusion. This result is consistent with Graziano et al. (2018), which reported that enhancing the financial agency of women in coastal communities in the Philippines made them more able to contribute to local marine conservation and climate efforts.

Implications of the Study

Although the gender aspects of climate vulnerability in the Rufiji Delta and in the rest of the Western Indian Ocean region have been previously explored (e.g., Mwakabungu, 2021; Mulonga & Olago, 2024), this study builds on the existing literature by quantitatively modelling (OLS, logistic regression, SEM) the associations between gender, exposure, and adaptation. This introduces rigour in the knowledge of the way structural inequalities influence adaptive behaviour. The study also, validates the statements of Nyangoko et al. (2022) and Peter (2017) that effective adaptation should not only focus on ecological knowledge but also on power asymmetries, especially in access to assets, financial resources, and institutional representation by gendered persons

Conclusion and Policy Recommendations

This study contributes to the understanding of gender disparities in coastal livelihoods by empirically analysing how gender interacts with climate risk, income structures, and adaptation behaviours in the Rufiji Delta, Tanzania. The findings reveal that while women face greater exposure to environmental hazards such as flooding and mangrove degradation, they remain largely excluded from high-income livelihood opportunities and adaptation initiatives like Ecosystem-Based Adaptation (EBA).

The findings support the presence of the structural adaptation gap where women are unable to respond to climate threats due to economic, social, and institutional barriers. Notably, the research illustrates the facilitating role of access to credit and climate risk knowledge in expanding women participation in EBA and demonstrates that gendered income gaps are determined by unequal returns to assets like boats and education. In order to overcome these challenges, the following policy recommendations are offered.

Strengthen Gender Equitable Access to Productive Assets

Determined efforts are required to empower women to have access to key livelihood resources like boats, fishing gears and storage facilities. Institutionalized targeted subsidies or cooperative models of ownership or women fisheries collectives may be used to foster equity in the value chain.

Strengthen Financial Inclusion Mechanisms

The government agencies and development partners ought to increase accessibility to micro-credit and savings schemes that favour women in the coastal regions. Financial literacy and business development training should be packaged together with credit so that it is utilized productively.

Mainstream Gender in EBA Programmes

Gender sensitivity should be incorporated into the planning of adaptation not only in the design but also in implementation and evaluation. The inclusion of women in community mangrove management committees, training and climate platforms must be enforced and checked.

Strengthen Climate Learning and Risk Communication

Since risk perception has a positive impact on EBA participation, communication campaigns are to be structured to increase awareness of women in particular concerning climate hazards, adaptation strategies, and rights to participate.

Combine Livelihood and Conservation Objectives

Given that the reliance on such degrading mangrove ecosystems is linked to loss of income, sustainable livelihood options like seaweed farming, ecotourism, and aquaculture must be encouraged, particularly to women, to minimize the vulnerability as well as preserve the essential ecosystems.

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