

Evaluating the Efficacy of Ecosystem-based Adaptation (EbA) Strategies in Strengthening Coastal Resilience in Badagry, Nigeria.

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Abstract The concept of ecosystem-based Adaptation (EbA) is becoming a popular nature-based approach to address the risks posed by climate change in coastal regions. Nonetheless, limited evidence exists on the efficacy of EbA strategies at the community level regarding the roles of participation, governance, and domestic financing in West African coastal communities. The recurring floods, coastal erosion, and ecosystem degradation, coupled with livelihood vulnerability, continue to threaten coastal resilience in Badagry, Lagos State, and raise questions about the efficacy of current EbA interventions in practice. The paper examines the effectiveness of EbA strategies in improving the resilience of coastal regions in seven communities in Badagry, Lagos State, Nigeria, focusing on environmental changes, community participation, and government constraints. A combined methodology was used, comprising a household survey of 350 people and complemented by interviews with key informants and field observations. The relationships among EbA practices, community engagement, and perceived resilience outcomes were analyzed using descriptive statistics and inferential methods. Results reveal that EbA strategies, including mangrove restoration, wetland conservation, and sustainable fisheries, have helped achieve better flood control, reduced erosion, and improved livelihoods, especially in communities with greater participation. However, it is weakened by ineffective policies, insufficient funding, and poor land use in certain areas, which affect long-term sustainability. The research gap the study addresses is the lack of empirical knowledge about the methods of participation and governance that predetermine the success of EbA at the community level in a Nigerian coastal setting. It proposes applying models of participation as an instrument to introduce long-term EbA programs, ensure the consistency of policy instruments, and change local financing mechanisms in a Nigerian coastal region to enhance the effectiveness of long-term EbA programs.

Keywords: *Ecosystem-based Adaptation; Coastal Resilience; Community Participation; Governance; Badagry, Nigeria*

1. Introduction

The problem of climate change continues to be a growing threat to coastal areas around the world, especially to low-lying, ecologically sensitive areas. Increased sea levels, stronger storm surges, erosion, and floods, and saline intrusion have increased in frequency and intensity and may be a danger to human settlements, infrastructure, ecosystems, and livelihoods (Parmesan, et al 2022). Developing countries have the highest vulnerability of coastal communities due to high population density, livelihoods that rely on ecosystems, low institutional capacity, and limited access to adaptation finance (Mhlana, 2024). The challenges have heightened the quest for new, sustainable, and affordable adaptation measures capable of mitigating the effects of climate risks and, at the same time, sustaining long-term socio-economic development.

The so-called ecosystem-based Adaptation (EbA) has become one of the most important nature-based strategies for mitigating the effects of climate change in vulnerable ecosystems. EbA is the process of conserving, restoring, and sustainably managing ecosystems to assist people in adapting to climate change, while upholding ecosystem services that contribute to human well-being (Chou & Sovann 2019). The EbA interventions include mangrove restoration, wetland protection, dune protection, and sustainable fisheries management, which, in turn, improve the resilience of coastal areas, reduce wave impact, regulate water circulation,

stabilise shorelines, and promote biodiversity (Alongi 2008; Cahoon, et al 2021). EbA has been generally seen as more adaptable, environmentally sustainable, and economically feasible in the long term than a hard engineering solution, especially in a resource-constrained system (Hülsen 2023).

The coastal zone of Nigeria is among the West African regions most exposed to climatic factors. Specifically, Lagos State has been identified as one of the most exposed coastal urban regions in the world due to its low elevation, high rates of urbanisation, and population and economic activities (Parmesan, et al 2022). Common issues that have developed include flooding, coastal erosion, wetland degradation, and mangrove loss, leading to displacement, livelihood losses, and infrastructure destruction. Research shows that floods in Nigeria have been highly impactful across most local governments, with coastal settlements disproportionately affected (Adelekan 2010). Over the past decades, the natural ability to cushion hazards associated with climate change has decreased drastically in the coastal environments of Lagos State due to massive destruction of mangrove ecosystems (Ndimele et al 2024).

To address such challenges, Nigeria has been implementing more Ecosystem-based Adaptation policies as part of its wider climate adaptation policy. On the coast, EbA efforts have focused on restoring mangroves, protecting wetlands, promoting sustainable fisheries, and restoring ecosystems, especially in the Niger Delta and Lagos coastal areas (Henry-Whyte 2024). These should be done to enhance ecosystem services while reducing the community's susceptibility to floods, erosion, and storms. EbA also emphasizes community involvement, recognizing the roles of local knowledge, cultural practices, and stakeholder engagement in the success and sustainability of adaptation initiatives (Keke, et al 2023).

Although EbA is increasingly getting policy and academic support, it is not performing well in practice, especially at the community level. Poor and unstable funding, poor institutional coordination, limited technical capacity, land-use conflicts, and a lack of enforcement of environmental policies remain some of the limitations to the implementation of EbA in Nigeria (Nyathi, et al 2024; Davies-Vollum et al 2025). Many EbA projects are implemented through top-down strategies that poorly incorporate local priorities and socio-cultural realities, resulting in poor ownership and low sustainability in the long term. The issues these challenges raise create important questions about how EbA strategies operate in practice and under what circumstances they promote coastal resilience.

Badagry, a coastal region in Lagos State, exemplifies these dynamics. Badagry Town, Ajido, Gberefun, Seme Border, Gbanko, Agorin Sea Beach, and Topo communities located close to the coast are becoming vulnerable to climate change and human impacts, including flooding, shoreline erosion, ecosystem degradation, and livelihood insecurity. Despite some EbA interventions, such as mangrove restoration, wetland preservation, and sustainable fisheries introduced in areas of Badagry, there is little empirical evidence that these activities can enhance coastal resilience. Specifically, little is known about the impact of community participation, governance institutions, and local funding systems on the EbA outcome at the community level.

This paper fills these gaps by focusing on the effectiveness of Ecosystem-based Adaptation measures in the coastal communities of Badagry and evaluating the circumstances through which the measures enhance the resilience of the coastal communities. The goal of the research is to test the effectiveness of EbA plans towards enhancing coastal resilience in Badagry, Nigeria. The objectives are to: (i) determine the most prevalent Ecosystem-based Adaptation approaches in the chosen coastal communities; (ii) evaluate the perceived efficacy of EbA

approaches in mitigating flooding, erosion and ecologically degraded ecosystems; (iii) evaluate the extent and nature of community involvement in planning and executing EbA programs and (iv) determine how the governance and local funding situation affect the efficacy and sustainability of EbA approaches.

2. Literature Review

Ecosystem-based Adaptation (EbA) is a new idea that is increasingly becoming the approach of choice due to its nature-based approach, which is very effective in reducing climate change impacts, particularly in climate-susceptible regions, such as coastal areas. The concept of EbA is described in many ways as the consumption of biodiversity and ecosystem services as a part of the overall adjustment strategy, which will help people to overcome the deleterious effects of climate change (Chou & Sovann, 2019). The approach centers on protecting, restoring, and managing ecosystems sustainably to make them less vulnerable and more ecologically sound, and to improve the well-being of human society. EbA contrasts with the traditional engineering-based adaptation, which focuses on ecological processes and long-term sustainability rather than short-term physical protection (Keke et al., 2023).

Mangroves, wetlands, salt marshes, dunes, and estuaries are among the most important coastal ecosystems that provide key ecosystem services at the heart of coastal resilience. These ecosystems are useful for attenuating wave energy, stabilizing shorelines, regulating hydrological flows, reducing the intensity of floods, and supporting biodiversity and fisheries (Alongi 2008; Cahoon et al. 2021). Climate change, urbanization, pollution, and the unappealing exploitation of natural resources have greatly contributed to the vulnerability of coastal communities worldwide. The research findings are consistently that coastal systems with preserved or rebuilt ecosystems incur less flood damage and shore erosion than those that entirely depend on hard engineering structures like sea walls and groynes (Yletyinen, O. 2024; Hueslen et al. 2023).

Besides physical protection, EbA also helps improve coastal resilience by sustaining ecologically dependent livelihoods and enhancing socio-economic adaptive capacity. Developing countries depend on tourism, which is often based on fisheries, agriculture, and other activities that rely on natural resources. EbA enhances food security, income diversification, and livelihood stability as key components of resilience, as it improves ecosystem health (Masselink & Lazarus, 2019). In this regard, EbA is a form of environmental and development policy that connects the idea of climate adaptation with poverty reduction and sustainable livelihoods (Chou & Sovann, 2019).

Community engagement is typically viewed as a resolute determinant of the sustainability and existence of Ecosystem-based Adaptation initiatives. Large-scale communities possess place-based knowledge and historical and cultural backgrounds that may be used to support the planning and implementation of adaptation plans (Keke et al., 2023). The participatory EbA practices enhance ownership, stewardship, and local responsibility, which are essential to the long-term management of restored ecosystems. Conversely, top-down adaptation initiatives are not necessarily accompanied by high local acceptance and yield low long-term results (Yletyinen 2024). The governance systems needed for innovative EbA, therefore, include participatory decision-making, effective resource management, and communication among government agencies, societies, non-governmental entities, and development partners (Akamani, 2023).

Empirical research across different world zones demonstrates that EbA can effectively improve coastal resilience. In Southeast Asia, re-establishment of the mangroves in Indonesia and the

Philippines has had a strong effect on storm surge, coastal erosion, and flood risks, and also boosts fisheries production and ecotourism development (Hestningsih et al., 2026; Alongi, 2008). Mangrove systems managed by communities in South Asia have enhanced coastal resilience in Bangladesh and India, while also improving the livelihood security of vulnerable individuals (Maltby et al., 2023). On the same note, wetland restoration and coral reef conservation in Latin America and the Caribbean have stabilized shorelines, conserved biodiversity, reduced the risks of climate change, and provided co-benefits such as carbon sequestration and improved water quality (Smith et al. 2018).

EbA has become a popular adaptation strategy advocated in the African context to address coastal erosion, floods, and livelihoods penetration. In countries like Senegal, Ghana, and Kenya, research shows that mangrove regeneration and community-based coastal management can enhance shoreline stability and ecosystem services, and support local economies (Awazi 2025; Tiwari et al. 2022). Nevertheless, EbA initiatives are often limited by financial resources, poor technical ability, and fragmented institutional systems to be effective in Africa. Consequently, most projects of EbA are small-scale and require the support of external donors, bringing about questions of sustainability in the long term (Mhlanga, 2024).

The application of ecosystem-based Adaptation in Nigeria has included mangrove restoration, wetland conservation, and ecosystem rehabilitation, especially in the Niger Delta and the Lagos Coastal areas. The available literature indicates that the interventions can be used to decrease coastal erosion, alleviate flooding, and increase biodiversity (Inácio et al. 2020). The restoration of Mangroves in Lagos State has been reported to enhance shoreline stability and sustain fisheries-based livelihoods, as well as support wetland conservation, which has helped control flooding and recharge groundwater (Davies-Vollum et al., 2025). These positive results notwithstanding, a significant part of the literature on Nigeria is dedicated to ecological effects, yet little attention has been given to governance, community participation, and socio-economic performance.

Moreover, the EbA application in Nigeria remains characterized by persistent governance, policy coherence, and enforcement issues. The lack of institutional coordination among government agencies, insufficient funding, tenure disputes, and explosive urbanization remain among the factors that detract from the efficiency of EbA programs (Nyathi et al., 2024; Masselink and Lazarus, 2019). Monitoring and evaluation systems also tend to lack the capacity to record the long-term ecological, social, and economic consequences of EbA interventions, and thus struggle to determine their role in long-term coastal resilience (Akamani, 2023).

The literature review has shown that Ecosystem-based Adaptation has the potential to strengthen the resilience of coastal areas through the combination of ecological protection and socio-economic development. Nevertheless, significant gaps remain. Empirical studies on the effectiveness of EbA practices at the community level, especially regarding the impact of community involvement, governance institutions, and local sources of finance, are limited in the Nigerian coastal environment. The majority of the research available is geared toward short-term ecological benefits and does not address the socioeconomic and institutional dimensions of resilience. The gaps addressed in this paper are a comprehensive community-level assessment of EbA practices within the Badagry community in Nigeria, with clear references to participation, the limits of governance, and sustainability implications. The conceptual framework was developed based on the reviewed literature on ecosystem-based adaptation, community participation, governance, and coastal resilience to demonstrate the relations between these variables. The framework presents a summary of the theoretical and empirical evidence on the interactions between EbA strategies and social and institutional

processes that influence coastal resilience outcomes. This conceptual framework is represented in Figure 1.

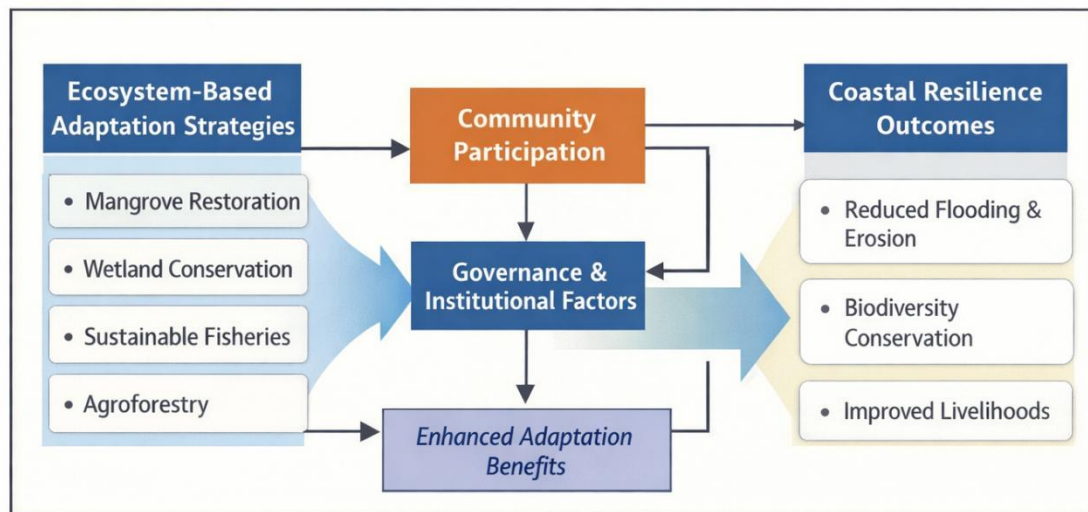


Figure 1: Conceptual framework linking Ecosystem-based Adaptation, participation, governance, and coastal resilience.

Source: Author's conceptualisation based on Mhlanga. (2024)

3. Research Hypotheses

As a result of the analyzed literature and gaps identified in community engagement, the government, and the potential success of Ecosystem-based Adaptation strategies in Nigerian coastal environments, the study hypothesized the following:

- **H₁:** The level of community participation is significantly related to the perceived effectiveness of the Ecosystem-based strategies of Adaptation in Badagry.
- **H₂:** The higher the communities are engaged in the practice of the Ecosystem-based Adaptation initiatives, the more likely they will achieve improved results of coastal resiliency, as compared to those less engaged.
- **H₃:** Governance and institutional barriers are very important in determining the sustainability of Ecosystem-based Adaptation in Badagry.

4. Methodology

This research design was a mixed-methods study to assess the effectiveness of Ecosystem-based Adaptation (EbA) in enhancing the resilience of the coastal area in Badagry, Lagos State, Nigeria. A mixed-methods approach was also found to be suitable, as the household-level qualitative data can be integrated with qualitative information on community stakeholders' opinions, thereby offering a complete picture of the EbA practices, outcomes, and challenges within the study area. The researcher covered seven coastal communities in Badagry Local Government Area, which were Badagry Town, Ajido, Gberefun, Seme Border, Gbanko, Agorin Sea Beach, and Topo, which were chosen based on their vulnerability to coastal flooding and erosion, and interventions aimed at mitigating the impact of EbAs.



Figure 2. Location of Badagry Local Government Area, Lagos State, Nigeria.
Source: (Adapted from Afolabi & Afolabi, 2022).

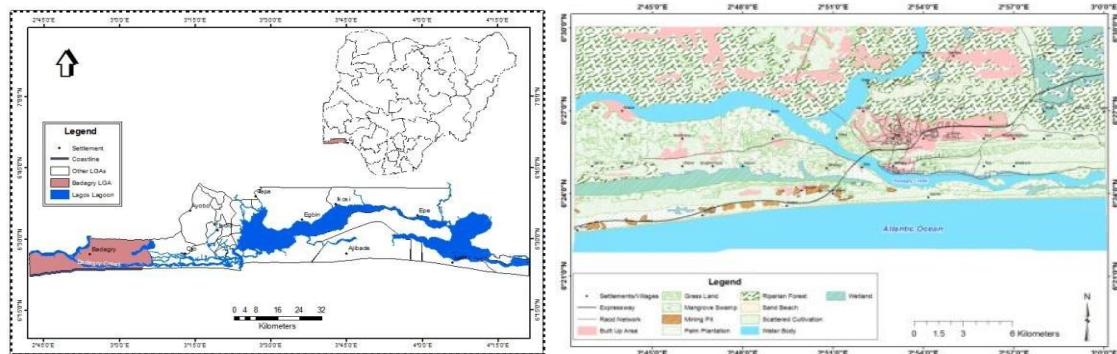


Figure 3 & 4: Selected coastal communities in Badagry Local Government Area, Lagos State, Nigeria.
Source: (Adapted from Lagos State Ministry of Physical Planning and Urban Development base map, 2022).

A structured questionnaire was used to collect primary data, administered to household heads and adult residents in the sampled communities. A sample size of 350 was used, with 50 respondents selected in each community to ensure balance. The sample size is about 0.1 per cent of an estimated population of 2024 in Badagry, as per the sampling method used in the paper submitted. The stratified random sampling was intended to reflect variation in livelihood activities, settlement characteristics, and exposure to climate-related risks within the communities.

The questionnaire was designed to elicit information on socio-economic status, awareness, and participation in Ecosystem-based Adaptation programs, the perceived success of EbA plans, and implementation challenges among the respondents. The significant EbA actions identified in the study communities include mangrove restoration, wetlands, sustainable fisheries, agroforestry, dune stabilisation, and community-based early warning systems. The responses to effectiveness and their involvement were measured using structured response categories that allowed comparisons across communities.

Key informant interviews and informal discussions with community leaders, local environmental stakeholders, and those involved in the management of fishing, farming, and coastal resources, in addition to the household survey, were also used to gather qualitative data. These qualitative contributions provided contextual insight into governance structures,

institutional functions, and community views on EbA sustainability. Field observations were also conducted to confirm the reported EbA practices and to record conspicuous environmental changes, such as shoreline shifts, changes in mangrove cover, and flood-prone zones.

The quantitative data were analysed using descriptive statistics to generalise on socio-economic factors, the strategies of EbA adopted, community involvement levels, and perceived activity among the seven communities. The relationships among community participation, governance conditions, and perceived EbA effectiveness were analyzed using inferential methods, as described in the submission. The analysis was based on finding patterns and associations and not causality, as the available data were within its scope. Thematic analysis of qualitative information on interviews and observations was used to support and describe the quantitative results.

Ethical issues were monitored during the research. The respondents were volunteers; all were informed, and all gave their consent regarding the confidentiality of their responses. The research process was carried out in accordance with the research ethics accepted for studies involving human subjects and vulnerable coastal communities.

5. Results

This section presents the empirical results of the study, based on data from the household survey questionnaire, interviews with key informants, and field observations conducted in the seven coastal communities of Badagry. The outcomes include the nature of Ecosystem-based Adaptation (EbA) strategies used, their perceived effectiveness in managing coastal hazards, the extent of community involvement, and the issues threatening implementation. The presentation is factual and descriptive, with the explanation and connection to the preexisting studies being left to the Discussion section.

The paper reveal that a variety of Ecosystem-based Adaptation strategies are already in practice among the communities of Badagry Town, Ajido, Gberefun, Seme Border, Gbanko, Agorin Sea Beach, and Topo. Such plans include mangrove reconstruction, beach feeding, effective fisheries management, floodplain management, agroforestry and coastal agriculture, community-based early warning systems, and dune stabilisation through vegetative cover.



Figure 5.: Marine Border at Badagry, Lagos State.
Source: Field Survey, 2024

The allocation of these strategies and their forms of implementation, whether formulated by government or non-governmental organisations, or informally through community-based programs, is presented in Table 1, which follows this paragraph. The most common EbAs approach was mangrove restoration, specifically in Ajido, Gberefun, Gbanko, and Topo, although beach nourishment was also mainly reported in Badagry Town and Seme Border.

Table1: EbA Strategies Implemented in Coastal Communities of Badagry

EbA Strategy	Communities Implementing the Strategy	Formal or Informal Implementation
Mangrove Restoration	Gberefun, Ajido, Gbanko, Topo	Formal (Govt./NGOs) & Informal (Local)
Beach Nourishment	Badagry Town, Seme Border	Formal (Govt.)
Sustainable Fisheries	Agorin sea beach, Ajido, Gberefun	Informal (Local)
Floodplain Protection	Badagry Town, Gbanko	Formal (Govt.) & Informal (Community)
Agroforestry & Coastal Farming	Agorin sea beach, Topo, Ajido	Informal (Local)
Community-Based Early Warning Systems	Badagry Town, Seme Border, Gberefun	Informal (Local)
Dune Stabilization & Vegetative Cover	Gberefun, Topo, Ajido	Formal (Govt./NGOs)

Source: Field Survey, 2024

The field observations conducted during the study revealed several Ecosystem-based Adaptation practices in the Badagry coastal communities, including mangrove restoration, wetland conservation, and ecosystem-based livelihood practices. Figure 4 shows the selected field photographs to depict these observations.



Figure 6-8: Selected field observations of Ecosystem-based Adaptation practices in coastal communities of Badagry Local Government Area, Lagos State, Nigeria (Ajido and Agorin Sea Beach).

Source: Author's field survey, 2024.

Community involvement in the Ecosystem-based Adaptation program was evaluated through respondents' self-reported involvement in EbA activities. These activities involve participation in planning meetings, implementation activities such as mangrove planting or wetland protection, and monitoring and decision-making. The level of participation was divided into low, moderate, and high based on the reported level. The findings indicate that participation

levels varied across the seven communities, suggesting discrepancies in how residents in the research area participate in EbA initiatives.

Perceived effectiveness of Ecosystem-based Adaptation strategies was determined by respondents based on their observations of improvements in the main outcome areas, including mitigation of flooding and erosion, conservation of biodiversity, and livelihoods. The summary of these effectiveness indicators for each study community is shown in Table 2, which follows this paragraph. According to the findings, the reported level of improvement in flood mitigation ranged from 60 per cent to 74 per cent among respondents in the communities, and the reported level of erosion control ranged from 48 per cent to 62 per cent. Conservation of biodiversity was reported by 55-69 per cent of respondents. Such variations indicate that although there are EbA strategies within the study area, communities have different perceptions of their outcomes, which vary spatially.

Table 2: Effectiveness of EbA

Community	Flood Mitigation (% of respondents who observed improvement)	Erosion Control (% reporting reduced shoreline loss)	Biodiversity Conservation (% noticing ecosystem recovery)	Community Involvement (% participating in EbA projects)
Badagry Town	68	55	62	47
Ajido	72	59	67	52
Gberefun	65	48	60	40
Seme Border	70	53	64	45
Gbanko	63	51	58	42
Agorin sea beach	74	62	69	54
Topo	60	50	55	38

Source: Field Survey, 2024

Subsequent findings indicate that the degree of community participation is associated with differences in perceived effectiveness across communities. Societies with higher levels of participation also reported more respondents who had noticed environmental and livelihood impacts. On the other hand, communities that reported lower participation levels had comparatively lower perceived effectiveness across several outcome indicators. These trends form the empirical foundation for analyzing the role of involvement in EbA performance, as discussed in the Discussion section.

The paper has also explored the issues that impact the adoption of Ecosystem-based Adaptation strategies in Badagry. Lack of financing, low local participation rates, poor policy implementation, land-use issues, and the escalating impact of climate change were cited by respondents as limitations. All these challenges and descriptions are indicated in Table 3, which follows this paragraph. Most communities reported funding limitations and poor policy implementation, indicating that systemic constraints hinder the sustainability of EbA. Conflicts involving land use, especially those related to urban development and shoreline encroachment, were more pronounced in communities experiencing active physical growth.

Table 3: Challenges Faced in Implementing EbA Strategies

Challenge	Description
Funding Constraints	Limited financial resources hinder the implementation and maintenance of Ecosystem-based Adaptation (EbA) projects, particularly those aimed at mangrove restoration and beach nourishment efforts. Participants highlighted the inadequacy of governmental support and the dependence on external funding sources.
Low Local Engagement	A considerable portion of community members demonstrates a lack of awareness and training concerning EbA strategies, leading to restricted participation. Conventional beliefs and doubt surrounding modern conservation techniques lead to limited involvement.
Weak Policy Implementation	Despite the existence of environmental policies in Nigeria, the enforcement at the local level continues to be inadequate. Respondents often highlighted the issues of regulatory gaps and inadequate coordination among government agencies.
Land Use Conflicts	Conflicting land uses, including urban development and agricultural activities, pose significant challenges to the restoration of mangroves and the conservation of wetlands. Some individuals within the community emphasize immediate financial benefits rather than focusing on sustainable resilience for the future.
Climate Change Effects	The challenges posed by rising sea levels, frequent flooding, and coastal erosion significantly obstruct the sustainability of ecosystem-based adaptation initiatives. Several participants observed that earlier restoration initiatives were eroded by severe weather occurrences.

Source: Field Survey, 2024

Community engagement in Ecosystem-based Adaptation initiatives was also further analyzed across the seven coastal communities, with the findings presented in Table 4. Ajido and Gbanko had comparatively better participation, especially in the wetland conservation and flood mitigation activities. Conversely, participation was lower in Gberefun and Agorin Sea Beach because they were most often involved in awareness or externally driven interventions. The level of participation in Badagry Town, Seme Border, and Topo was moderate, indicating involvement in specific EbA activities but less in decision-making processes.

Table 4: Community Involvement in EbA

Community	Level of Involvement	Findings
Badagry Town	Moderate	Approximately 56% of those surveyed engaged in EbA planning meetings, yet merely 30% possessed decision-making authority. Essential activities encompassed the restoration of mangroves and initiatives aimed at flood control. Nonetheless, particular residents observed limited financial incentives, which diminished the likelihood of long-term commitment.
Ajido	High	72% of respondents engaged in EbA activities, particularly emphasizing community-led wetland conservation initiatives. Traditional ecological knowledge informed the development of adaptation strategies, involving collaboration between governmental entities and community leaders.
Gberefun	Low	Community engagement was under 40%, with Ecosystem-based Adaptation programs predominantly begun by non-governmental organisations. Many residents articulated apprehensions regarding insufficient awareness and training. Nevertheless, youth-led coastal conservation programs demonstrated potential.

Seme Border	Moderate	Participation was recorded at 50%, significantly affected by cross-border environmental policies. Nevertheless, insufficient funding and governmental red tape obstructed community-driven initiatives. Interventions primarily targeted coastal erosion control and reforestation efforts.
Gbanko	High	68% of residents engaged in wetland preservation and flood mitigation initiatives. Community-based organizations were instrumental in mobilizing resources and sustaining the implementation of Ecosystem-based Adaptation (EbA) initiatives.
Agorin sea beach	Low	Only 38% of respondents participated in EbA activities. Numerous EbA projects were implemented by external organisations lacking present local involvement. Land tenure issues and political interference have constrained engagement.
Topo	Moderate	Community involvement was recorded at 55%, demonstrating significant interest in mangrove afforestation and sustainable fishing practices. Nonetheless, insufficient technical expertise impeded the project's long-term sustainability.

Source: Field Survey, 2024

These findings indicate clear spatial differences in the use, perceived efficacy, level of participation, and challenges of Ecosystem-based Adaptation strategies across the coastal communities of Badagry. These results can be used to establish empirical data on the evaluation of community involvement, governance environment, and institutional limitations on the local level to determine the effects of EbA. The implications of these results are discussed in greater detail in the next Discussion section.

6. Discussion

The results of the present research will be empirical evidence that Adaptation strategies based on the ecosystem enhance the resilience of the coast in Badagry. Still, the effectiveness of these strategies varies widely across communities. The different levels of community participation, the state of governance, and institutional support are observed to differ in flood mitigation, erosion control, biodiversity conservation, and livelihood outcomes. This aligns with past literature that emphasises the ecological intervention's strength in understanding the effectiveness of EbA, rather than the social and institutional environment surrounding its implementation (Chou & Sovann, 2019; Akamani, 2023).

The relatively high performance of the EbA strategies in locations such as Ajido and Gbanko can be compared with the literature that underscores the defence qualities of mangrove restoration and the protection of wetlands in coastal zones. It has also been reported that natural buffers, particularly mangroves and wetlands, can reduce wave energy, stabilise shorelines and control flooding (Alongi, 2008; Cahoon et al., 2021). Southeast Asia and South Asia have also experienced similar outcomes, with restored mangrove ecosystems significantly mitigating coastal flooding and erosion and enhancing fisheries production (Hestningsih et al. 2026; Maltby et al. 2023). These Badagry results thus agree with global data that EbA can provide quantifiable resilience benefits when systems are restored and preserved.

Nevertheless, the inequalities in the results across all the study communities also reflect the issues in the literature regarding the drawbacks of EbA without well-developed social and institutional underpinnings. The other communities with lower participation, such as Gberefun and Agorin Sea Beach, also reported lower perceived outcomes. This supports the idea that

top-down adaptation tactics may not work, as Yletyinen (2024) and Keke et al. (2023) found they diminish local knowledge and restrict community agency. The case of Badagry indicates that ecological interventions cannot be successful when communities contribute little to planning, implementation, and monitoring.

Community involvement appeared to be an important predictor of EbA outcomes in this study, and this finding is consistent with findings in African and Nigerian shoreline environments. Studies in Ghana, Senegal, and Kenya have shown that when implemented through community-based coastal management, EbA projects become more sustainable, as communities can take control and be held accountable (Awazi 2025; Tiwari et al. 2022). Similar evidence was also found in Nigeria, where Davies-Vollum et al (2025) found that community involvement in mangrove restoration and wetland conservation projects may significantly enhance their effectiveness. The fact that participation levels in Ajido and Gbanko were higher would explain the relatively better results registered in these communities, supporting the relevance of participatory adaptation models.

The governance and institutional constraints observed in Badagry are also indicative of broader issues documented in the literature on EbA. The most significant barrier to successful implementation was identified as poor policy implementation due to weak enforcement, insufficient funding, land-use conflicts, and fragmented institutional functions. This fact is consistent with the literature, which deems governance failures as one of the primary limitations to the EbA implementation in developing countries (Akamani, 2023; Mhlanga, 2024). The high urbanisation rate and conflicting land use in Nigeria's coastal areas are more likely to undermine ecosystem restoration due to inefficient spatial planning controls that are less effective in the long term (Nyathi et al., 2024). Such matters have persisted in Badagry, indicating that, in the absence of a consistent set of administrative arrangements and institutional coordination, the resilience advantages of EbA are fragile.

The discussed land-use conflicts and urban pressure in Badagry are not new, and literature suggests the need to include EbA into the broader land-use and development models and concepts. As Hueslen et al. (2023) insist, nature-based solutions can be effective only when supported by the possibility of planning and regulating space.. Without such integration, the ecosystems restored remain susceptible to degradation, as has been the case in certain Badagry communities, where shoreline encroachment and sand mining continue to affect the areas. This highlights the need to incorporate EbA strategies into local planning systems to protect ecological investments.

Social-economic outcomes related to the implementation of EbA in Badagry also support the thesis that EbA is an adaptive and developmental strategy. These improved fisheries and alternative livelihoods lead some communities to agree with research that ecosystem restoration is associated with livelihood diversification and income stability (Masselink and Lazarus, 2019; Tiwari et al., 2022). But as the uneven distribution of these benefits amongst communities points out, participation and governance play a critical role in determining who benefits from the outcomes of EbA interventions. This result is reflective of the inequalities raised in the literature that EbA may reproduce when inclusive governance mechanisms are absent (Yletyinen 2024).

The discussion has shown that the global and regional EbA scholarship reflects the patterns of Ecosystem-based Adaptation strategies in Badagry. The results confirm that EbA can boost the resilience of the coast, provided that ecological interventions are complemented by meaningful community involvement, coherent governance, and long-lasting financial systems. This study contributes to the existing body of literature by describing the interactions among participation,

governance, and ecological processes to determine the impacts of these relationships on EbA in a Nigerian coastal setting, using Badagry as a case study at the community level.

7. Recommendation

The results of the current research suggest that the set of Ecosystem-based Adaptation approaches could be effectively used to enhance coastal resilience in Badagry, provided that robust social and institutional systems support ecological interventions. On these grounds, it is suggested that future EbA projects in Badagry and other coastal communities focus more on extensive and formal community involvement throughout adaptation planning and implementation. The results of this study demonstrate that communities with higher levels of participation reported better environmental and livelihood outcomes. This is consistent with current research highlighting the importance of participatory governance in improving the sustainability and performance of nature-based adaptation by promoting long-term ownership and stewardship of recovered ecosystems (Malik et al. 2024; Parmesan et al. 2022).

The institutional coordination and policy enforcement that local governments and other relevant agencies need to enhance should help address the governance gaps that hinder the efficiency of EbA. Laxity in enforcing environmental laws and the institutional division of roles were cited as crucial limitations across various Badagry communities. The implementation of Ecosystem-based Adaptation into the current framework of land-use planning and coastal zone management would help safeguard restored ecosystems against the intrusion of land use and urban development, as well as land loss and degradation.

The new policy-related studies underline the idea that the outcomes of the use of EbA may be significantly improved when the process of adaptation strategies is incorporated into the systems of spatial planning and the control of the development instead of being pursued as an independent project (Johnstone 2023; Collins et al. 2025).

Various financing approaches for sustainable development should be developed to minimise the use of EbA for short-term financing. The analysis found that the biggest limitation to the upkeep and development of ecosystem restoration initiatives in Badagry was the lack of funding. Other possible solutions to improve long-term sustainability include generating community-controlled conservation funds and eco-tourism funds, and incorporating EbA funds with community development funds. The latest studies on climate funding focus on the topicality of locally based financing options to support the conservation of nature-based solutions in new coastal areas (Pettinotti and Quevedo 2023; Mantlana et al.). (2024).

There should be increased capacity-building efforts to fill technical and knowledge gaps at the community level. In Badagry, there is the presence of EbA strategies, but this is limited by those with limited technical capacity to monitor and maintain, as well as scale interventions effectively. Ecosystem restoration techniques, community-based monitoring, and climate risk awareness training programmes would help empower local adaptive capacity. The recent literature stresses that long-term capacity should be developed to make EbA project-based interventions translated into long-term resilience strategies (Angioni et al 2023; Malik et al 2024).

There should also be efforts to reinforce the livelihood diversification and ecological rehabilitation. The results indicate that EbA programs promoting sustainable fisheries, agroforestry, and alternative means of earning have positive impacts on enhanced socio-economic resilience. The EbA programs that focus on livelihoods through interventions would decongest the coastal ecosystems and increase household incomes. According to recent studies,

the combination of EbA and livelihood diversification is critical for achieving equal adaptation outcomes and reducing vulnerability among residents of coastal areas (Parmesan et al. 2022; Collins et al. 2025).

Lastly, the EbA initiatives should enhance their monitoring and evaluation systems to not only identify environmental outcomes but also the long-term socio-economic benefits. The research demonstrates that perceived improvements are reported, but systematic measures of long-term effects are under-evaluated. Learning and adaptive management would be enhanced by integrated monitoring systems that include ecosystem health, levels of involvement, and livelihoods. Evidence-based monitoring in refining EbA strategies and policy-making for coastal areas is also emphasized in the recent literature on adaptation (Johnstone 2023; Mantlana et al. 2024).

8. Conclusion

This paper assessed the effectiveness of Ecosystem-based Adaptation initiatives in enhancing the resilience of seven coastal communities in Badagry, Lagos State, Nigeria. The results show that EbA interventions, including mangrove restoration, wetland protection, sustainable fisheries, and other nature-related actions, are present throughout the study area and help achieve better flood mitigation, erosion control, biodiversity conservation, and improved livelihoods. The success of such strategies across different communities, however, varies widely, as they exhibit different levels of participation, governance, and institutional backing.

The fact that EbA performance was measured at the community level is one of the strengths of the current study, as higher community participation is associated with higher perceived outcomes. Neighbourhoods where citizens initiated, executed, and supervised these processes had better environmental and socio-economic outcomes than regions with low involvement. The relevance of these findings to the broader research topic of the role of participatory methods in the translation of ecosystem restoration into the measurable benefits of resilience is self-evident.

Other underlying governance and institutional issues, such as funding constraints, poor policy implementation, land-use inconsistency and lack of coordination among the concerned actors, are also noted by the research. These sustainability constraints discourage the long-term use of EbA programs and reduce their capacity to deliver consistent resilience outcomes. The results, therefore, show that ecological interventions cannot be effective without supportive governance structures and long-term financing strategies.

This paper is a review of empirical evidence on a Nigerian coastal setting, in the context of the constantly increasing body of Ecosystem-based Adaptation and coastal resilience literature. The paper provides substantial information that can be adopted by policymakers, planners, and practitioners in the field of development who are keen on developing better, more sustainable adaptation policies in coastal territories, given the interplay between ecological policies and social and institutional interests at the community level. Greater involvement, greater consistency in governance, and the integration of EbA into broader planning and development frameworks are among the steps that can help ensure Badagry and other vulnerable coastal regions are more resilient.

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