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Community Perceptions and Eco-tourism Potentials of Rainbow crabs (*Cardisoma armatum*) in coastal communities of Lagos, Nigeria and Cotonou, Republic of Benin

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Abstract

This study examined community perceptions and the ecotourism potentials of rainbow crabs (*Cardisoma armatum*) in selected coastal communities of Lagos, Nigeria and Cotonou, Republic of Benin. The study explored the relationship between local awareness, socio-demographic characteristics, and support for community-based tourism (CBT) centered on rainbow crabs and mangrove ecosystems. Data were collected from 79 respondents across four coastal communities using structured questionnaires and analyzed using descriptive statistics and regression analysis.

The socio-demographic results revealed that respondents were predominantly male (70.9%), economically active, and largely dependent on fishing and other coastal livelihood activities. The findings showed strong community support for rainbow crab-based CBT development, particularly regarding its potential to promote local businesses (Mean = 4.52), increase environmental awareness (Mean = 4.46), attract government support (Mean = 4.44), and enhance conservation of crabs and mangrove habitats (Mean = 4.39). Respondents also expressed high support for the development of rainbow crab tourism in their communities (Mean = 4.28).

Regression analysis further revealed that education significantly influenced perception toward CBT development ($\beta = 0.249$, $p = 0.028$), indicating that respondents with higher educational attainment demonstrated more positive attitudes toward ecotourism and conservation initiatives.

The study highlights the considerable ecotourism potential of rainbow crabs as biodiversity resources capable of supporting sustainable livelihoods, environmental education, and mangrove conservation in coastal West Africa. The findings emphasize the importance of integrating indigenous ecological knowledge, community participation, and conservation-oriented tourism planning into sustainable coastal development strategies.

Keywords: Community-based tourism, ecotourism, rainbow crabs, *Cardisoma armatum*, indigenous knowledge, mangroves, coastal communities, Nigeria, Benin Republic.

Introduction

Coastal ecosystems are among the most productive and biologically diverse environments globally, providing essential ecological services and supporting the livelihoods of millions of people (Barbier et al., 2011). Mangrove forests, estuaries, wetlands, and coastal plains serve as habitats for numerous aquatic and semi-terrestrial organisms, including crustaceans such as rainbow crabs (*Cardisoma armatum*). In West Africa, particularly along the coastal regions of Nigeria and the Republic of Benin, rainbow crabs are ecologically significant species associated with mangrove ecosystems and indigenous livelihood systems.

Rainbow crabs (*Cardisoma armatum*) are semi-terrestrial crabs widely distributed across the Gulf of Guinea and other coastal regions of West Africa (Cumberlidge, 1999). The species is recognized for its striking coloration, burrowing activities, and ecological role in nutrient cycling and sediment modification within mangrove ecosystems (Kristensen, 2008). Beyond their ecological importance, rainbow crabs contribute significantly to food security, traditional medicine, local trade, and cultural practices in many coastal communities (Berkes, 2012).

In recent years, ecotourism and community-based tourism (CBT) have emerged as sustainable development strategies that combine biodiversity conservation with livelihood diversification (Scheyvens, 1999; Tosun, 2006). Community-based tourism emphasizes local participation, empowerment, and equitable sharing of tourism benefits while promoting environmental sustainability and cultural preservation (Okazaki, 2008). In coastal ecosystems, ecotourism increasingly utilizes biodiversity resources such as mangroves, fisheries, birds, and unique species like rainbow crabs to attract visitors and support conservation initiatives.

The growing global interest in biodiversity-based tourism has created opportunities for local communities to develop alternative livelihoods through ecotourism activities such as wildlife observation, guided mangrove tours, environmental education, cultural performances, and traditional ecological demonstrations (UNWTO, 2023). Rainbow crabs possess considerable ecotourism potential due to their visibility, ecological uniqueness, and cultural relevance within coastal communities. Their association with mangrove ecosystems also provides opportunities for conservation education and ecosystem interpretation.

However, the success of community-based tourism initiatives depends largely on local awareness, participation, and perception toward tourism development (Aref et al., 2010). Communities that possess positive perceptions of tourism are more likely to support conservation-oriented tourism activities and participate actively in tourism management. Conversely, limited awareness, weak institutional support, and inequitable benefit-sharing may undermine tourism sustainability (Blackstock, 2005).

In Nigeria and the Republic of Benin, research on rainbow crabs has focused primarily on ecology, biodiversity, and indigenous knowledge systems, while limited attention has been given to their ecotourism potential and community perceptions regarding tourism development. Understanding how local communities perceive rainbow crab-based tourism is essential for developing sustainable and culturally appropriate tourism strategies in coastal regions.

Therefore, this study investigated community perceptions and the ecotourism potentials of rainbow crabs (*Cardisoma armatum*) in selected coastal communities of Lagos, Nigeria and Cotonou, Republic of Benin. Specifically, the study examined socio-demographic characteristics of respondents, assessed community

perceptions toward rainbow crab-based CBT development, and evaluated the influence of education on tourism perception. The study also explored the implications of rainbow crab ecotourism for sustainable livelihoods, indigenous knowledge preservation, and mangrove ecosystem conservation.

Materials and Methods.

Study Area.

The study was conducted in four coastal communities located in two West African countries: Nigeria and the Republic of Benin. Two communities were selected from each country based on proximity to water bodies, mangrove ecosystems, and the presence of the study species (*Cardisoma armatum*).

In the Republic of Benin, the selected communities were Gbedjromede (Cotonou) and Djèrègbé (Sèmè-Kpodji commune). In Nigeria, the selected communities were Ibon (Epe Local Government Area) and Badagry (Badagry Local Government Area), Lagos State.

Gbedjromede is a densely populated urban settlement in Cotonou, characterized by active markets and proximity to coastal water bodies (6°37'94.48"N, 2°45'13.24"E). Djèrègbé is a semi-urban coastal community with a population of approximately 10,527 (2002 census), located in Ouémé Department (6°27'1.54"N, 2°37'2.47"E).

In Nigeria, Badagry is an historical coastal town situated along the Gulf of Guinea (6.4183°N, 2.8901°E), characterized by lagoon systems, mangroves, and fishing activities. Ibon, located in Epe, lies along the Lekki Lagoon (6.5455°N, 3.7420°E) and is predominantly a fishing community with significant mangrove ecosystems.

These areas were selected due to their ecological suitability for *C. armatum* and the dependence of local communities on coastal resources.

Research Design

The study adopted a descriptive cross-sectional survey design involving the use of structured questionnaires to obtain information from respondents regarding community perceptions and ecotourism potentials of rainbow crabs. The design was considered appropriate because it enabled the collection of quantitative data relating to socio-demographic characteristics, awareness, and attitudes toward community-based tourism development.

Population of the study

The target population comprised local residents, fishers, farmers, crab harvesters, traders, and other coastal resource users residing within the selected communities of Nigeria and Benin Republic.

Sampling Procedure and Sample Size

A purposive sampling technique was employed to select respondents who possessed knowledge of rainbow crabs and coastal livelihood activities. A total of 80 respondents participated in the study, distributed across the four communities but 79 were only retrieved back.

Method of Data Collection

Primary data were collected through the administration of structured questionnaires. The questionnaire consisted of sections on:

- socio-demographic characteristics;
- community perceptions toward rainbow crab-based CBT;
- ecotourism awareness and conservation attitudes;
- indigenous knowledge and livelihood relationships.

Responses relating to perception were measured using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5).

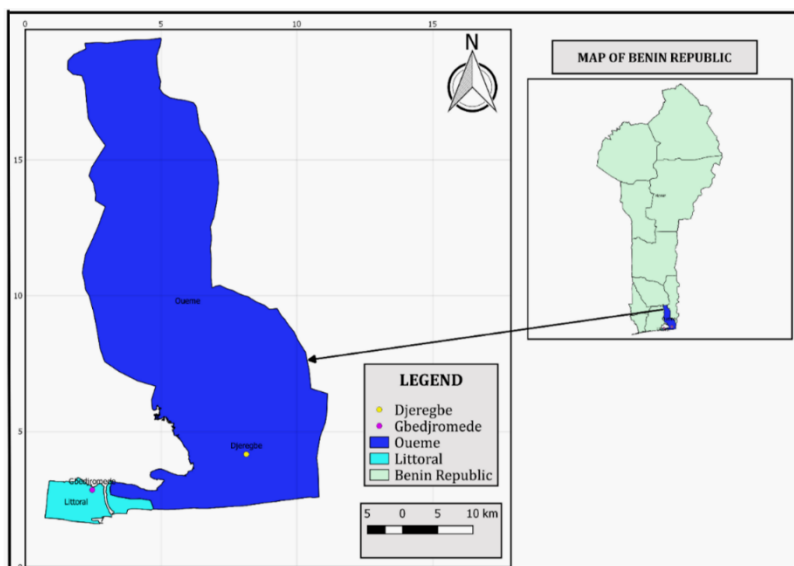
Method of Data Analysis

Data collected were analyzed using descriptive statistics including frequencies, percentages, weighted means, and standard deviations. Multiple regression analysis was further used to determine the influence of education on community perception toward CBT development.

The weighted mean was interpreted using the following scale:

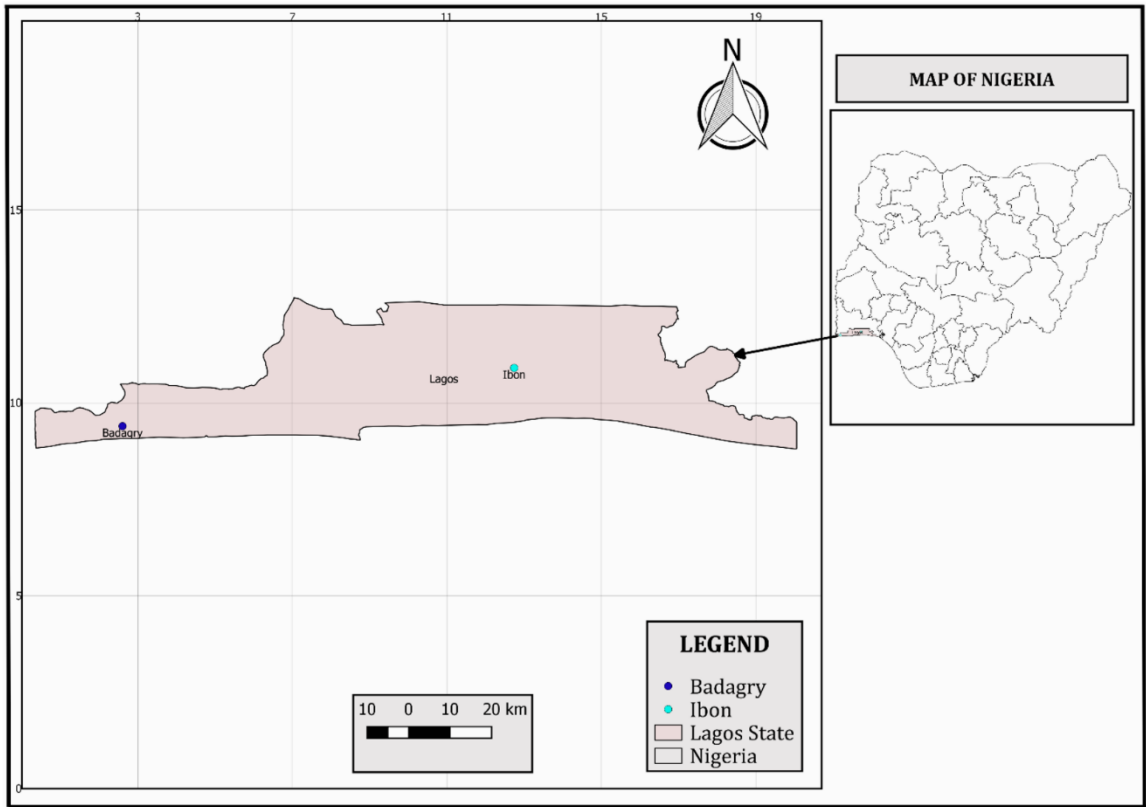
- 1.00–1.49 = Strongly Disagree
- 1.50–2.49 = Disagree
- 2.50–3.49 = Neutral
- 3.50–4.49 = Agree
- 4.50–5.00 = Strongly Agree

Results.



Source: (Field survey, 2024)

Figure 1: Map showing the two study sites (Djeregbe and Gbejromede) in cotonou, republic of benin.



Source: (Field survey, 2024)

Figure 2: Map showing the two study sites (Ibon and Badagry) in lagos, nigeria.

Table 1: Socio-Demographic Characteristics of Respondents (n = 79)

Variables	Categories	Frequency	Percentage
Community	Badagry	20	25.3%
	Ibon	19	24.1%
	Gbedjeromede	20	25.3%
	Djeregbe	20	25.3%
Gender	Male	56	70.9%
	Female	23	29.1%
Age	21-30	28	35.4%
	31-40	23	29.1%
	41-50	20	25.3%
	51-60	5	6.3%
	61-70	3	3.8%

Marital Status	Single	20	25.3%
	Married	42	53.2%
	Engaged	10	12.7%
	Divorced/Widowed	7	8.9%
Religion	Christianity	38	48.1%
	Islam	37	46.8%
	Others	4	5.1%
Education	None	13	16.5%
	Primary	10	12.7%
	Secondary	42	53.2%
	Tertiary/Graduate	14	17.7%
Occupation	Fishing	28	35.4%
	Farming	18	22.8%
	Student	10	12.7%
	Others	23	29.1%
Monthly Income (₦)	Below 50,000	2	2.5%
	50,000–100,000	33	41.8%
	100,001–200,000	32	40.5%
	200,001–300,000	11	13.9%
	Above 300,000	1	1.3%

Source: Field Survey, 2024.

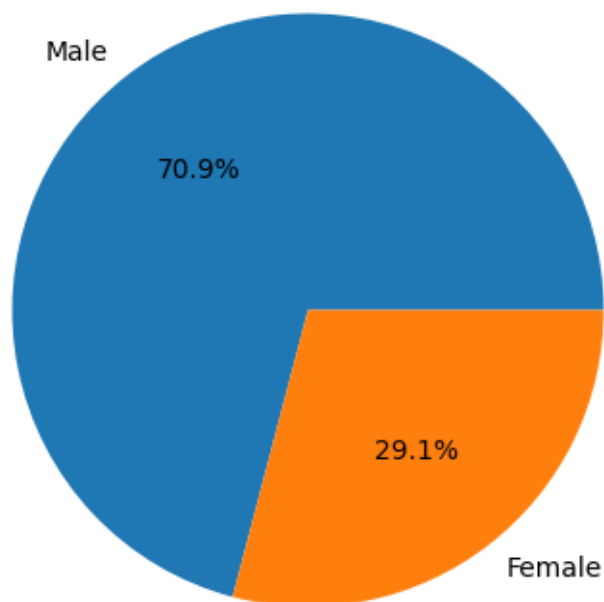


Figure 3. Showing the Gender Distribution of Respondent.

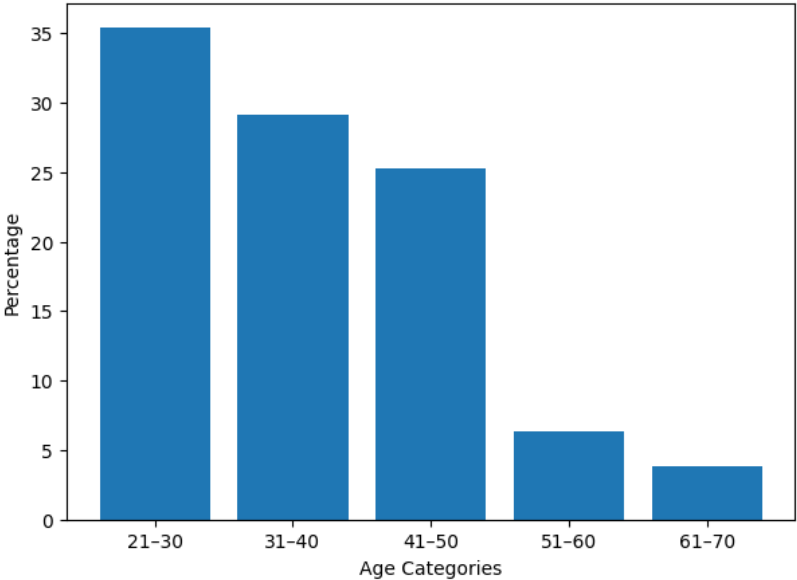
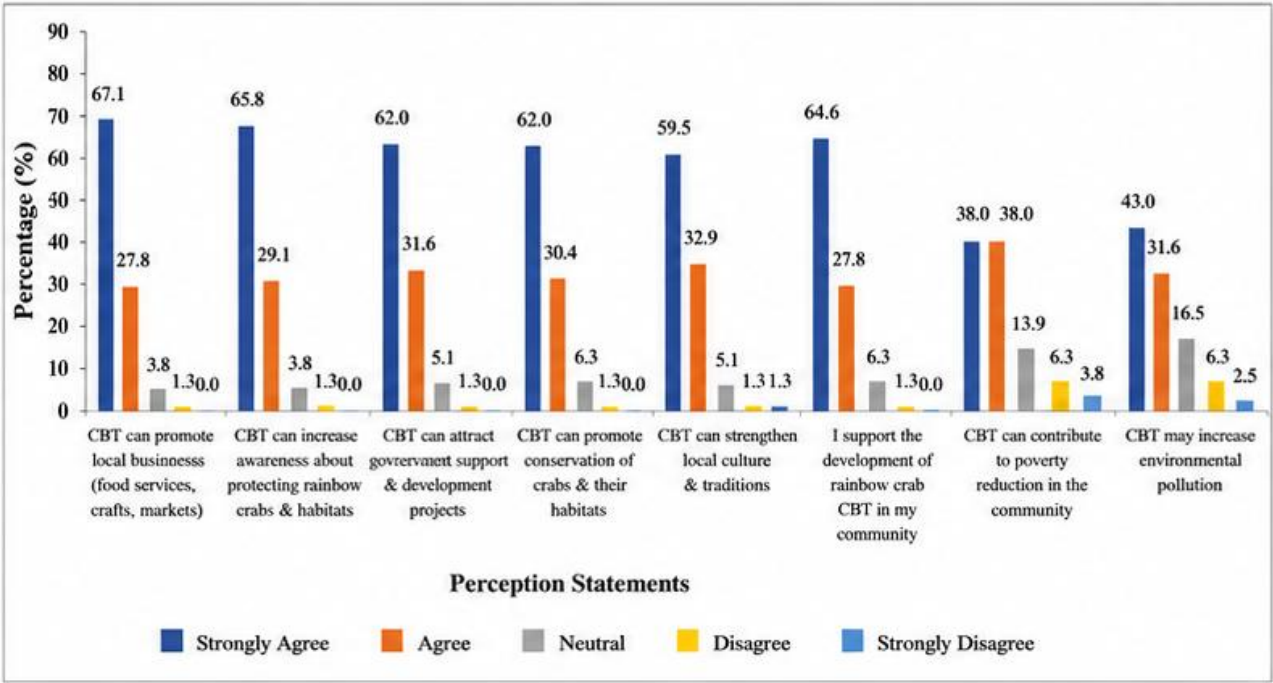


Figure 4. Showing the Age Distribution of Respondent.



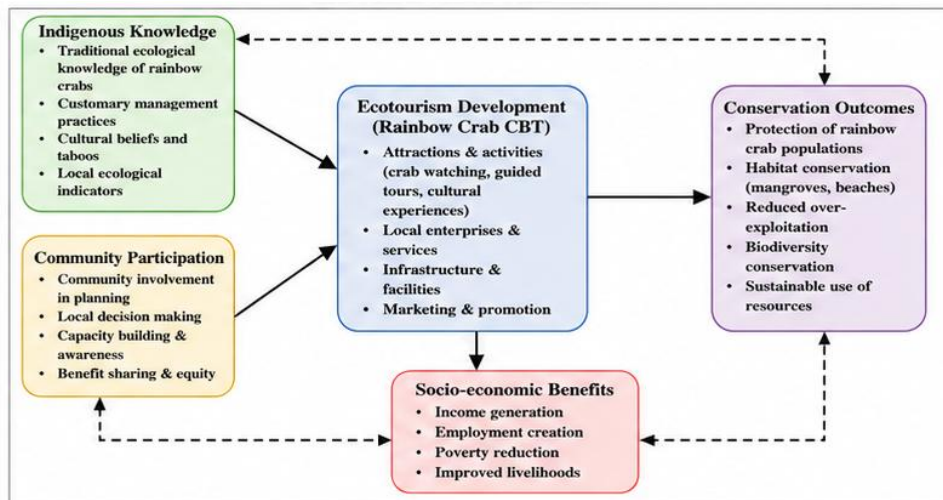
Source: Field Survey, 2024.

Figure 5. Showing Clustered bar chart illustrating Community Perception toward
Rainbow Crab Community-Based Tourism (CBT) (n =79).

Table 2: Community Perception on Community-Based Tourism (CBT) Development (n = 79)

Variables	Weighted Sum	Weighted Mean	SD	Interpretation
CBT can contribute to poverty reduction in community	297	3.76	1.263	Agree
CBT may increase environmental pollution	308	3.90	0.778	Agree
Rainbow crabs tourism should be developed here	338	4.28	0.861	Agree
CBT can attract visitors and generate revenue	343	4.34	0.503	Agree
CBT can promote local culture and traditions	347	4.39	0.517	Agree
CBT can promote conservation of crabs and habitats	347	4.39	0.517	Agree
I support the development of rainbow crab CBT	350	4.43	0.692	Agree
CBT can attract government support & development projects	351	4.44	0.693	Agree
CBT can increase awareness about protecting rainbow crabs	352	4.46	0.526	Agree
CBT can promote local businesses (food, craft, markets)	357	4.52	0.528	Strongly Agree

Source: Field Survey, 2024.



Source: Authors' Conceptualization, 2024.

Figure 6. Conceptual Framework Linking Indigenous Knowledge, Community Participation, Ecotourism, and Conservation.

Table 3: Regression Analysis Showing Influence of Education on CBT Perception

Variable	β	p-value	Adjusted R ²	Interpretation
Education Level	0.249	0.028	0.203	Significant Positive Relationship

Source: Field Survey, 2024.

Discussion

Socio-Demographic Characteristics of Respondents

The socio-demographic characteristics of respondents revealed important insights into the composition of the study population and the potential implications for community-based tourism (CBT) development in the coastal communities of Nigeria and the Republic of Benin. The respondents were evenly distributed across the four study communities, namely Badagry (25.3%), Ibon (24.1%), Gbedjeromede (25.3%), and Djeregebe (25.3%), indicating balanced representation across the study areas.

The study population was predominantly male (70.9%), while females accounted for 29.1% of respondents. This gender distribution reflects the male-dominated nature of coastal livelihood activities such as fishing and crab harvesting commonly practiced in West African coastal communities. Similar observations have been reported in studies on artisanal fisheries and coastal resource utilization, where men are more involved in extractive activities while women often participate in processing and marketing activities (Béné et al., 2007; FAO, 2020).

The age structure showed that most respondents were economically active adults, with 35.4% aged between 21–30 years and 29.1% between 31–40 years. This suggests that younger and middle-aged individuals are actively engaged in coastal livelihood systems and may play important roles in tourism development initiatives. The dominance of economically active age groups is advantageous for CBT because younger populations are often more adaptable to innovation, conservation awareness, and tourism-related entrepreneurship (Scheyvens, 1999; Tosun, 2006).

Marital status data revealed that the majority of respondents were married (53.2%), followed by single individuals (25.3%). Married respondents are more likely to depend on local natural resources for household livelihoods and may therefore support sustainable tourism initiatives that generate additional income opportunities.

Regarding religion, Christianity (48.1%) and Islam (46.8%) were the dominant religions across the study areas, indicating a culturally diverse but relatively balanced religious composition. Religious and cultural diversity may influence local perceptions toward environmental stewardship, traditional beliefs, and participation in ecotourism activities.

Educationally, over half of the respondents (53.2%) had secondary education, while 17.7% possessed tertiary education. Only 16.5% had no formal education. The relatively moderate level of education among respondents may positively influence awareness and participation in CBT initiatives. Education has been identified as an important determinant of environmental awareness and support for conservation-oriented tourism development (Gursoy et al., 2002; Andereck et al., 2005).

Occupation data showed that fishing was the dominant livelihood activity (35.4%), followed by farming (22.8%), while 29.1% engaged in other occupations. This confirms the dependence of the communities on natural coastal resources, including fisheries and mangrove ecosystems. Such dependence creates opportunities for integrating biodiversity-based tourism into local livelihood systems.

Monthly income distribution indicated that most respondents earned between ₦50,000–100,000 (41.8%) and ₦100,001–200,000 (40.5%), suggesting relatively low to moderate household income levels. This finding supports previous studies that coastal households in developing countries often rely on diversified livelihood systems due to economic vulnerability (Allison & Ellis, 2001). Consequently, ecotourism development centered on rainbow crabs may provide supplementary income opportunities and improve livelihood resilience.

Community Perception on Community-Based Tourism (CBT) Development

The findings revealed a highly positive perception of community-based tourism (CBT) development centered on rainbow crabs (*Cardisoma armatum*) among respondents in the study areas. Overall, respondents expressed strong support for the development of rainbow crab-based tourism as a strategy for livelihood improvement, environmental awareness, and conservation.

The highest mean score was recorded for the statement that “CBT can promote local businesses (food, craft, markets)” (Mean = 4.52 ± 0.528), which was interpreted as “Strongly Agree.” This indicates that respondents strongly believed that tourism associated with rainbow crabs could stimulate local economic activities and create opportunities for small-scale enterprises. This finding aligns with previous studies that community-based tourism enhances rural economies through employment generation, local entrepreneurship, and value-chain development (Mitchell & Ashley, 2010; UNWTO, 2023).

Similarly, respondents strongly agreed that CBT can increase awareness about protecting rainbow crabs (Mean = 4.46 ± 0.526) and attract government support and development projects (Mean = 4.44 ± 0.693). These findings suggest that local communities perceive tourism not only as an economic opportunity but also as a platform for environmental education and infrastructural development. Environmental awareness is a major outcome of ecotourism initiatives because tourism activities often encourage conservation-oriented attitudes and promote ecosystem stewardship (Berkes, 2012; Cinner et al., 2012).

Respondents also agreed that CBT can promote conservation of rainbow crabs and their habitats (Mean = 4.39 ± 0.517), as well as promote local culture and traditions (Mean = 4.39 ± 0.517). This indicates recognition of the interconnectedness between biodiversity conservation and cultural heritage preservation. In many indigenous coastal communities, local ecological knowledge and traditional practices are closely tied to natural resource management and cultural identity (Reyes-García et al., 2019).

Support for the development of rainbow crab CBT was also very high (Mean = 4.43 ± 0.692), suggesting broad community acceptance of ecotourism initiatives. This finding corroborates earlier studies which observed that local participation and positive perception are essential determinants of sustainable tourism development (Okazaki, 2008; Sebele, 2010).

The perception that CBT can attract visitors and generate revenue (Mean = 4.34 ± 0.503) further highlights the tourism potential of rainbow crabs within mangrove ecosystems. Rainbow crabs are visually distinctive species whose ecological behavior and habitat characteristics make them attractive for ecotourism interpretation, wildlife observation, and environmental education (Newsome et al., 2012).

Respondents also agreed that rainbow crab tourism should be developed in their communities (Mean = 4.28 ± 0.861), reflecting willingness to embrace tourism diversification strategies. This is particularly important in coastal communities where livelihoods are heavily dependent on fisheries and other climate-sensitive activities.

However, respondents also agreed that CBT may increase environmental pollution (Mean = 3.90 ± 0.778). Although this perception was lower compared to other variables, it indicates awareness of potential negative environmental impacts associated with tourism development. Similar concerns have been reported in ecotourism studies where unmanaged tourism activities contribute to habitat degradation, waste generation, and ecosystem disturbance (Blackstock, 2005; Saarinen, 2010).

The least mean score was recorded for the statement that "CBT can contribute to poverty reduction in the community" (Mean = 3.76 ± 1.263), although respondents still agreed with the statement. The relatively lower score may indicate uncertainty regarding equitable benefit distribution and long-term economic sustainability. Previous studies have shown that while CBT can improve livelihoods, benefits are not always equally distributed due to weak governance structures and external domination of tourism enterprises (Goodwin & Santilli, 2009).

Influence of Education on CBT Perception

The regression analysis examining the relationship between education and CBT perception showed a positive and statistically significant relationship ($\beta = 0.249$, $p = 0.028$; Adj. $R^2 = 0.203$). This suggests that respondents with higher educational attainment were more likely to have positive perceptions toward rainbow crab-based community tourism.

The positive influence of education on tourism perception may be attributed to increased environmental awareness, better understanding of conservation principles, and greater exposure to sustainable development concepts among educated individuals. Education enhances people's capacity to appreciate the socio-economic and ecological benefits of ecotourism and biodiversity conservation (Gursoy et al., 2002; Andereck et al., 2005).

The adjusted R^2 value of 0.203 indicates that approximately 20.3% of the variation in CBT perception was explained by educational status, suggesting that education plays an important role in shaping attitudes toward tourism development. Similar findings have been reported in community-based tourism literature, where education significantly influences local participation, support for tourism initiatives, and conservation behavior (Tosun, 2006; Aref et al., 2010).

The scatter plot further revealed that respondents with tertiary education generally exhibited higher CBT perception scores compared to respondents with no formal education. This reinforces the importance of environmental education and awareness programs in promoting sustainable tourism development in coastal communities.

Ecotourism Potentials of Rainbow Crabs (*Cardisoma armatum*)

The strong positive perceptions recorded in this study demonstrate that rainbow crabs possess considerable ecotourism potential in the coastal communities of Nigeria and Benin Republic. The species' ecological uniqueness, striking coloration, and association with mangrove ecosystems make it suitable for biodiversity-based tourism initiatives.

Rainbow crabs can support ecotourism through guided mangrove tours, environmental interpretation, wildlife observation, traditional harvesting demonstrations, and cultural tourism activities. Their ecological role as ecosystem engineers further enhances their educational value within coastal tourism systems (Kristensen, 2008).

The integration of indigenous ecological knowledge into tourism activities also provides opportunities for preserving local traditions and strengthening cultural identity. Indigenous knowledge systems relating to crab harvesting, habitat management, and seasonal patterns can enrich tourist experiences while promoting conservation awareness (Berkes, 2012; Reyes-García et al., 2019).

Furthermore, the positive community support observed in this study suggests favorable conditions for participatory tourism planning and community-based conservation initiatives. Community participation is widely recognized as a critical factor for successful and sustainable ecotourism development (Scheyvens, 1999; Tosun, 2006).

Nevertheless, sustainable management strategies are necessary to prevent potential negative impacts such as environmental pollution, habitat degradation, and over-commercialization. Conservation-oriented tourism planning, environmental education, and effective stakeholder collaboration are essential for ensuring long-term sustainability.

Conclusion

The study demonstrated that coastal communities in Nigeria and Benin Republic possess strong positive perceptions toward community-based tourism development centered on rainbow crabs (*Cardisoma armatum*). Respondents believed that rainbow crab-based CBT could promote local businesses, increase environmental awareness, attract government support, and enhance biodiversity conservation.

Socio-demographic characteristics such as education significantly influenced perception toward CBT development, with more educated respondents exhibiting more positive attitudes. The findings further revealed that rainbow crabs possess substantial ecotourism potential due to their ecological significance, cultural relevance, and visibility within mangrove ecosystems.

Overall, the study highlights the importance of integrating indigenous ecological knowledge, community participation, and environmental conservation into ecotourism development strategies. Sustainable rainbow crab-based tourism could contribute to livelihood diversification, cultural preservation, and mangrove ecosystem conservation in coastal communities of West Africa.

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship and publication of this article.

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