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Research article

CONSERVATION, LIVELIHOODS AND SUSTAINABLE FUTURES: EVALUATING THE ENVIRONMENTAL AND SOCIOECONOMIC CONTRIBUTIONS OF ECOTOURISM IN CROSS RIVER STATE, NIGERIA

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ABSTRACT
This study evaluates the environmental and socioeconomic contributions of ecotourism to sustainable development in Cross River State, Nigeria, with particular attention to Obudu Mountain Resort, Cross River National Park and associated host communities. The study adopted a mixed-method design anchored on structured questionnaire data, key informant insights and secondary sources. A total of 150 tourists, residents and tourism stakeholders were selected through simple random and purposive sampling. Data were analysed using descriptive statistics, one-sample t-tests, Pearson correlation and linear regression. Findings indicate that ecotourism contributes to habitat protection, biodiversity conservation, environmental awareness, employment generation, income diversification, infrastructure improvement and cultural preservation. Environmental impact was positively associated with socioeconomic impact ($r = .682$, $p < .001$), and regression analysis showed that environmental impact significantly predicted socioeconomic outcomes ($R^2 = .465$, $F = 67.45$, $p < .001$). The study contributes empirical evidence from a Nigerian rainforest destination and concludes that ecotourism can support sustainable development when conservation governance, community participation, benefit-sharing, infrastructure and destination monitoring are strengthened.

KEYWORDS
Ecotourism; sustainable development; biodiversity conservation; socioeconomic impact; community participation; Cross River State; protected areas; Nigeria

Introduction

Sustainable development has become a central organising principle in contemporary environmental policy, tourism planning and community development because it requires economic growth to be pursued without degrading the ecological and social systems on which that growth depends. Tourism is one of the clearest sectors in which this balance can either be achieved or lost. Properly planned tourism can create employment, diversify rural income, strengthen local enterprise, finance conservation and promote intercultural understanding. Poorly planned tourism can also accelerate habitat degradation, increase waste generation, displace local priorities and deepen inequality where benefits are captured by external operators. This dual character explains why ecotourism has become a prominent theme in debates on conservation, livelihoods and sustainable destination governance.

Ecotourism is commonly understood as responsible travel to natural areas that conserves the environment, sustains the wellbeing of local people and involves interpretation or education. This definition

separates ecotourism from general nature-based tourism, which may take place in forests, mountains, parks or wildlife landscapes without necessarily producing conservation or community benefits. Recent scholarship stresses that ecotourism should not be accepted as a promotional label alone; it must be evaluated through evidence of environmental protection, community participation, fair benefit distribution and governance capacity (Torsney et al., 2025). The relevance of this distinction is strong in developing destinations where natural assets are often marketed as tourism products, yet institutional systems for monitoring ecological and socioeconomic outcomes remain weak.

In Africa, ecotourism is frequently promoted as a pathway for linking biodiversity conservation with local development. Protected areas, forest reserves, mountain landscapes, waterfalls, wildlife habitats and cultural landscapes attract visitors and can create revenue streams that support conservation agencies and host communities. However, protected-area communities often face poverty, infrastructural deficits and restrictions on access to land and forest resources. Ecotourism therefore becomes meaningful only when it helps convert conservation from a perceived burden into a shared development opportunity. Where residents are excluded from planning or where revenue leaks away from host settlements, ecotourism can reproduce the same inequalities it claims to address (Gidebo, 2023; Ngongolo & Kyando, 2025).

Nigeria possesses substantial ecological and cultural assets that can support ecotourism development, but the sector remains underdeveloped relative to its potential. Cross River State is especially important because its tourism identity is closely tied to rainforest ecosystems, wildlife habitats, mountain scenery, waterfalls, cultural festivals and protected landscapes. Destinations such as Obudu Mountain Resort, Cross River National Park and their surrounding communities give the state a distinctive position in Nigeria's ecotourism geography. These destinations are not merely recreational spaces; they are socio-ecological systems in which conservation, livelihoods, infrastructure, safety, cultural identity and governance interact.

The environmental contribution of ecotourism is usually expressed through habitat protection, biodiversity conservation, wildlife protection, anti-poaching support, environmental awareness, waste management, reduced deforestation and habitat restoration. In principle, tourism revenue and visitor interest can strengthen conservation by making forests and wildlife more valuable when protected than when degraded. In practice, this relationship is complex. Increased visitation may create pressure through litter, noise, water demand, trail erosion, traffic, unregulated construction and disturbance of sensitive species. Ecotourism must therefore be assessed empirically rather than assumed to be automatically beneficial.

The socioeconomic contribution of ecotourism is equally important. Host communities may benefit through employment, guiding services, transport services, craft production, hospitality work, food supply, cultural performance, infrastructure improvement and small enterprise development. These benefits can diversify livelihoods and strengthen the economic justification for conservation. Yet tourism income may be seasonal, unevenly distributed and concentrated among groups with better access to capital, education or destination networks. The question is not simply whether ecotourism produces benefits, but whether those benefits are sufficiently broad, inclusive and durable to support sustainable development.

This study evaluates the environmental and socioeconomic contributions of ecotourism to sustainable development in Cross River State. It focuses on major ecotourism destinations and stakeholder groups including tourists, local residents, tourism officials, park management authorities and community leaders. The study pursues four objectives: to examine the environmental contributions of ecotourism; to assess its socioeconomic contributions to host communities; to identify challenges constraining ecotourism development; and to test the statistical relationship between environmental and socioeconomic outcomes. The study is significant because it integrates descriptive and inferential evidence within a sustainability framework suitable for international tourism and environmental scholarship.

The research is also timely because the international tourism literature increasingly rejects the assumption that all nature-based visitation is ecotourism. A destination may attract visitors to forests, mountains

or wildlife areas and still fail to conserve biodiversity or support host communities. For this reason, the present study treats ecotourism as an empirical question. It asks what kinds of contributions stakeholders can identify, how strong those contributions are, what constraints limit the sector and whether environmental outcomes are statistically linked with socioeconomic outcomes. Such evidence is essential for strengthening policy and management decisions in Cross River State and comparable rainforest destinations.

Literature review

Ecotourism rests on three connected principles: low-impact visitation, environmental education and local benefit. These principles distinguish it from mass tourism and from nature tourism that only uses natural landscapes as attractions. The conceptual value of ecotourism lies in its attempt to convert the attractiveness of natural environments into incentives for conservation and community welfare. Cossengue et al. (2025) describe ecotourism as a transformative pathway with economic, social, cultural and environmental dimensions, while Torsney et al. (2025) argue that the term requires clearer governance metrics to prevent misuse. This means that ecotourism should be judged by outcomes rather than by destination branding.

A major environmental contribution of ecotourism is the protection of habitats. Forests, wetlands, mountains and wildlife corridors become tourism assets when visitors value them for scenery, biodiversity, recreation and learning. This can create an economic argument for conserving ecosystems that might otherwise be converted to farming, logging, quarrying or settlement expansion. In Cross River State, this argument is highly relevant because rainforest and montane ecosystems are part of the state's competitive tourism identity. Ecotourism can therefore strengthen conservation only if destination revenue, local attitudes and institutional planning all support the protection of ecosystem integrity.

Biodiversity conservation is another core theme in ecotourism literature. Protected areas can generate conservation benefits when tourism income supports patrols, interpretation centres, trail maintenance, habitat restoration and environmental monitoring. Ecotourism also increases public awareness of threatened species and the value of ecosystem services. However, biodiversity gains are not automatic. Visitor behaviour, facility development and transport access must be managed to avoid disturbance, habitat fragmentation and pollution. This is why the Limits of Acceptable Change framework is important for ecotourism planning: it requires managers to define the maximum level of environmental and social change that a destination can tolerate before intervention becomes necessary (Stankey et al., 1985).

Environmental education is central to the ecotourism promise because tourism encounters can become learning experiences. Trained guides, visitor centres, interpretive signage, community storytelling and school outreach can help tourists and residents understand the ecological value of forests and wildlife. Environmental education can also influence responsible visitor behaviour, including waste control, respect for wildlife, adherence to trails and support for local conservation rules. Silva et al. (2023) note that nature-based tourism can strengthen environmental awareness when destination experiences are designed deliberately rather than left to chance. For Cross River State, interpretation is especially important because biodiversity conservation must be communicated in ways that are meaningful to both visitors and host communities.

From a socioeconomic perspective, ecotourism can contribute to employment, income generation and livelihood diversification. Tourism creates direct jobs in guiding, accommodation, park services, transport, restaurant operations and cultural performances. It also creates indirect opportunities for farmers, artisans, traders and local service providers who supply tourism businesses. The Sustainable Livelihoods Framework explains these effects through livelihood assets: financial capital through income, human capital through skills, social capital through networks, physical capital through infrastructure and natural capital through protected ecosystems (Department for International Development, 1999). When ecotourism strengthens several of these assets at the same time, it has a stronger chance of supporting sustainable development.

Community-based ecotourism is particularly relevant in protected-area settings because local residents often bear the opportunity costs of conservation. Gidebo (2023) shows that community-based tourism can link livelihood improvement with biodiversity conservation where it provides alternative income to communities near protected areas. Kim et al. (2019) also emphasise that community-based ecotourism can improve economic opportunities and encourage natural-resource conservation when local households participate in decision-making and enterprise ownership. These insights are important for Cross River State because communities around ecotourism sites may support conservation more actively when they perceive clear and fair benefits.

Infrastructure is another important pathway through which ecotourism affects socioeconomic welfare. Access roads, electricity, water supply, communication facilities, signage, visitor centres, trails, waste facilities and safety systems influence both tourist satisfaction and community wellbeing. Corbos et al. (2024) argue that tourism infrastructure can support regional development when it is integrated into sustainability planning. Nevertheless, infrastructure can also create new environmental pressures. Roads may increase illegal extraction, poorly designed facilities may generate waste, and accommodation expansion may alter landscapes. Sustainable ecotourism therefore requires infrastructure that improves access and service quality without undermining the ecological resource base.

Cultural preservation is another socioeconomic dimension of ecotourism. Ecotourism destinations often combine natural landscapes with indigenous knowledge, local food, storytelling, festivals, craft production and community identity. When managed ethically, cultural experiences can generate income and strengthen pride in local heritage. When poorly managed, they can commodify culture, exclude community custodians or present simplified versions of local life for visitor consumption. The challenge is to ensure that cultural components of ecotourism are community-led, respectfully interpreted and connected to broader local development goals.

Governance is a recurring condition for sustainable ecotourism. Destination governance involves tourism agencies, park authorities, local government, traditional institutions, community groups, private operators, researchers and visitors. Panagiotopoulou and Skoultsos (2025) emphasise that sustainable destination management requires multi-stakeholder collaboration and frameworks that translate participation into practical decision-making. In the absence of coordination, ecotourism may suffer from weak policy implementation, duplicated responsibilities, revenue leakage, poor visitor management and conflict over land or benefits. Governance quality therefore shapes whether ecotourism becomes a conservation-development strategy or merely a tourism label.

Benefit-sharing is especially important in destinations where conservation limits access to natural resources. Host communities may accept restrictions on farming, hunting, logging or settlement expansion when they see tangible benefits from tourism and conservation. Benefit-sharing can take the form of employment, community development funds, enterprise support, training, infrastructure, revenue-sharing agreements or participation in park management. Without such arrangements, conservation may be interpreted as an external project that prioritises wildlife and visitors over local welfare. Ecotourism policy must therefore make benefit distribution visible, accountable and locally meaningful.

Carrying capacity and impact monitoring are central to the environmental integrity of ecotourism. Traditional planning often focuses on the number of visitors a destination can accommodate, but the Limits of Acceptable Change approach shifts attention to the conditions that must be maintained. For example, managers should monitor trail erosion, litter, wildlife disturbance, noise, crowding, water use, community satisfaction and distribution of benefits. This approach is relevant to Cross River State because flagship destinations may experience seasonal peaks, uneven visitor distribution and infrastructure pressure. Without monitoring, small but repeated impacts may accumulate into long-term degradation.

The literature also identifies several challenges that limit ecotourism in developing economies. These include inadequate infrastructure, weak funding, poor marketing, insecurity, low professional capacity, limited community participation, weak policy enforcement and environmental degradation. Forje et al. (2021) found

that sustainable ecotourism in protected areas requires institutional support, community participation, infrastructure and conservation-oriented management. De Zoysa (2022) similarly shows that forest-based ecotourism depends on governance, transparency, livelihood outcomes and conservation safeguards. These challenges mirror many of the practical issues reported in Nigerian tourism studies.

Despite the growing literature, there remains a gap in empirical studies that examine environmental and socioeconomic contributions together. Many studies describe conservation and livelihood outcomes separately, but sustainable development requires the two to reinforce each other. If environmental contributions predict socioeconomic benefits, then conservation is not simply an ecological obligation; it becomes part of the development value chain. This study addresses that gap by linking stakeholder perceptions of environmental impact with perceived socioeconomic impact in Cross River State. Figure 1 presents the conceptual logic guiding the study.

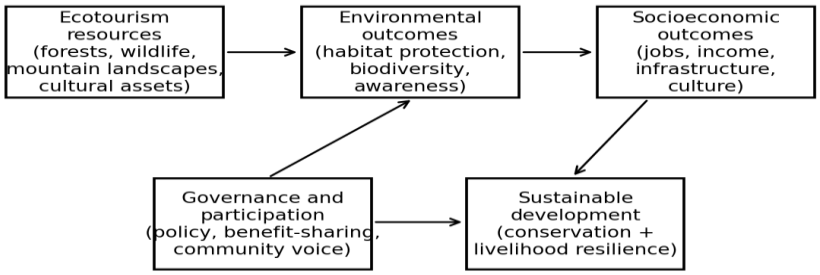

Figure 1. Conceptual framework linking ecotourism, conservation and livelihoods.

Methodology

The study adopted a mixed-method research design with a quantitative core. Structured questionnaire data provided measurable evidence on stakeholder perceptions, while key informant insights and secondary materials supplied contextual interpretation. The design was appropriate because the study examined both perceived contributions and statistical relationships among ecotourism variables. Quantitative analysis enabled the testing of relationships between environmental and socioeconomic impact, while qualitative insights helped explain the institutional and community realities behind the figures. The study was conducted in Cross River State, Nigeria, with attention to major ecotourism destinations such as Obudu Mountain Resort, Cross River National Park and surrounding host communities. These sites were selected because they represent the state's flagship ecotourism assets and combine natural landscapes, biodiversity, recreation, conservation and community interfaces. Cross River National Park is significant as a rainforest protected area, while Obudu Mountain Resort is associated with mountain scenery, leisure tourism and destination branding. The inclusion of surrounding communities was necessary because ecotourism sustainability cannot be assessed from the visitor perspective alone.

The target population comprised tourists, host community members, tourism agency officials, park management authorities and community leaders. These categories were selected because they represent the principal groups that experience, manage or influence ecotourism outcomes. Tourists assess destination experience and environmental quality; residents observe livelihood and community effects; tourism officials interpret policy and planning; park authorities understand conservation and visitor management; and community leaders provide insights into participation, benefit distribution and local acceptance. A total of 150 respondents participated in the study. Simple random sampling was used for domestic tourists, international tourists and host community members where broad participation was required. Purposive sampling was used for tourism agency officials, park management authorities and community leaders because these respondents possessed specialised knowledge of ecotourism planning, conservation and community relations. The sampling distribution is shown

in Table 1. The combination of random and purposive sampling was appropriate for balancing representativeness with expert insight in a destination-based study.

Table 1. Sampling distribution of respondents by category.

Respondent category	Sampling technique	No. selected	Percentage (%)
A. Tourists			
Domestic tourists	Simple random sampling	25	16.7
International tourists	Simple random sampling	25	16.7
B. Local residents			
Host community members	Simple random sampling	50	33.3
C. Tourism stakeholders			
Tourism agency officials	Purposive sampling	20	13.3
Park management authorities	Purposive sampling	15	10.0
Community leaders	Purposive sampling	15	10.0
Total		150	100

The research instrument was a structured questionnaire organised around four main components: demographic information, perceived environmental contributions, perceived socioeconomic contributions and challenges facing ecotourism development. Items were derived from the research objectives and from the literature on ecotourism, sustainable livelihoods, protected-area governance and sustainable destination management. Environmental indicators included habitat protection, biodiversity conservation, wildlife protection, environmental awareness, reduced deforestation, waste management, sustainable use of natural resources and habitat restoration. Socioeconomic indicators included employment, income generation, infrastructure development, poverty reduction, cultural preservation, community participation, standard-of-living improvement and local entrepreneurship. Key informant interactions were used to deepen the interpretation of questionnaire findings. These interactions helped clarify issues such as weak infrastructure, community participation, policy implementation, destination safety and environmental management. Secondary data were obtained from academic literature, policy materials and tourism-related reports relevant to Cross River State and sustainable ecotourism. The combination of primary and secondary sources strengthened the analysis by placing local stakeholder perceptions within wider debates on ecotourism governance and sustainable development.

Data were analysed using IBM SPSS Statistics. Descriptive statistics were used to summarise the demographic profile of respondents, environmental contributions, socioeconomic contributions and challenges. One-sample t-tests were applied to determine whether the mean ratings of environmental contributions, socioeconomic contributions and challenges were statistically significant. Pearson correlation was used to examine the relationship between environmental impact and socioeconomic impact. Linear regression was then used to determine the extent to which environmental impact predicted socioeconomic outcomes. Statistical significance was interpreted at $p < .05$, while $p < .001$ was treated as very strong evidence of statistical significance. Validity was strengthened by aligning questionnaire items with the research objectives, the theoretical framework and relevant literature. The use of multiple respondent categories improved the breadth of perspectives included in the study. Reliability was supported through structured administration and consistent response categories. Ethical considerations were observed by informing respondents of the purpose of the study, ensuring voluntary participation and presenting results in aggregate form. The study did not disclose personal identifiers, and the analysis was limited to patterns relevant to ecotourism planning and sustainable development.

The analysis was interpreted through two complementary theoretical lenses. The Sustainable Livelihoods Framework was used to understand how ecotourism influences financial, human, social, physical and natural assets. The Limits of Acceptable Change framework was used to interpret the environmental management implications of tourism activity. Together, these frameworks helped avoid a narrow business interpretation of ecotourism. Instead, the study treated ecotourism as a socio-ecological system in which conservation, institutions, livelihoods, visitor behaviour and community participation interact. The study has limitations. The sample size of 150 provides useful empirical evidence but cannot represent every ecotourism

actor in Cross River State. The findings are based largely on stakeholder perceptions, although they are supported by statistical tests. Seasonal variation in tourism activity may also influence respondent experiences. Despite these limitations, the study provides a structured evidence base for understanding the environmental and socioeconomic contributions of ecotourism in a Nigerian rainforest destination.

Results and discussion

The results are presented in line with the objectives of the study. The analysis first describes the respondent profile, then examines perceived environmental contributions, socioeconomic contributions and challenges. It then presents inferential results on the significance of the contribution variables, the correlation between environmental and socioeconomic impact and the predictive effect of environmental impact on socioeconomic outcomes. This sequence enables the discussion to move from descriptive evidence to explanatory interpretation. The demographic profile in Table 2 shows that the study included a diverse group of respondents. Males represented 58.7% of the sample, while females represented 41.3%. Respondents within the age brackets of 18-30 years and 31-45 years accounted for the majority of the sample, indicating that many participants were within active travel, work and enterprise age groups. Occupationally, the sample included tourism staff, business owners, farmers and other respondents. This diversity is important because ecotourism affects several livelihood sectors beyond formal tourism employment.

Table 2. Demographic profile of respondents.

Variable	Category	Frequency	Percentage (%)
Gender	Male	88	58.7
	Female	62	41.3
Age	18-30 years	54	36.0
	31-45 years	63	42.0
	46 years and above	33	22.0
Occupation	Tourism staff	40	26.7
	Business owner	35	23.3
	Farmer	28	18.7
	Others	47	31.3
Total		150	100

Environmental contributions were reported across eight categories, as shown in Table 3. Protection of natural habitats recorded the highest frequency (28; 18.7%), followed by biodiversity conservation (25; 16.7%), wildlife protection and anti-poaching efforts (22; 14.7%) and environmental awareness and education (20; 13.3%). These results show that respondents understand ecotourism primarily through its conservation function. In a state where rainforest, wildlife and mountain landscapes form the core of tourism appeal, habitat protection and biodiversity conservation are foundational to destination sustainability.

Table 3. Environmental contributions of ecotourism to sustainable development.

S/N	Environmental contribution	Frequency	Percentage (%)
1	Protection of natural habitats	28	18.7
2	Biodiversity conservation	25	16.7
3	Wildlife protection and anti-poaching efforts	22	14.7
4	Environmental awareness and education	20	13.3
5	Reduction of deforestation activities	18	12.0
6	Waste management and pollution control	15	10.0
7	Sustainable use of natural resources	12	8.0
8	Reforestation and habitat restoration activities	10	6.6
	Total	150	100

The relatively lower frequencies for waste management and pollution control (15; 10.0%), sustainable use of natural resources (12; 8.0%) and reforestation or habitat restoration activities (10; 6.6%) suggest that practical environmental management activities are less visible to stakeholders than general conservation benefits. This does not mean that such activities are absent, but it indicates that they may require stronger communication,

funding and institutionalisation. For ecotourism to meet international expectations, destination managers must move beyond broad conservation claims and demonstrate concrete systems for waste control, habitat restoration, visitor regulation and environmental monitoring. Figure 2 summarises the leading perceived contributions of ecotourism by comparing major environmental and socioeconomic indicators. The figure reinforces the evidence in Tables 3 and 4 by showing that respondents placed habitat protection, biodiversity conservation, environmental awareness, employment, income and infrastructure among the most visible outcomes. This pattern supports the argument that ecotourism in Cross River State functions as both a conservation instrument and a livelihood opportunity.

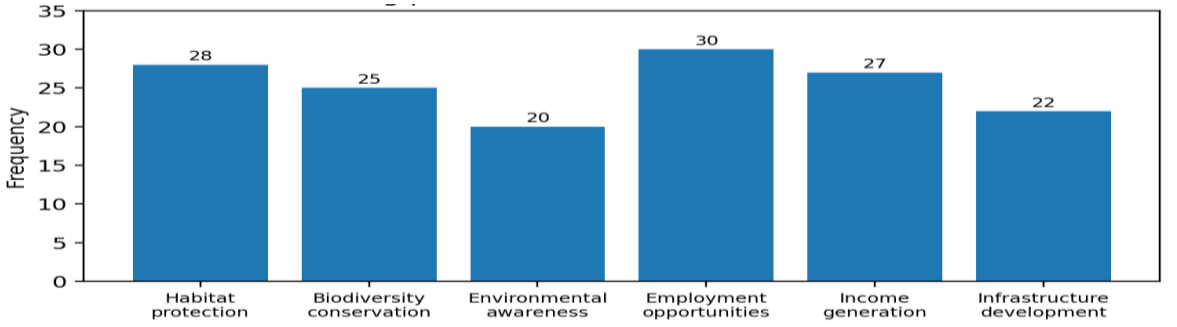

Figure 2. Leading perceived environmental and socioeconomic contributions of ecotourism.

Table 4. Socioeconomic contributions of ecotourism to host communities.

S/N	Socioeconomic contribution	Frequency	Percentage (%)
1	Employment opportunities	30	20.0
2	Income generation	27	18.0
3	Infrastructure development	22	14.7
4	Poverty reduction	20	13.3
5	Cultural preservation	18	12.0
6	Community participation in tourism activities	15	10.0
7	Improvement in standard of living	10	6.7
8	Development of local entrepreneurship	8	5.3
	Total	150	100

The socioeconomic contributions in Table 4 reveal that employment opportunities ranked highest (30; 20.0%), followed by income generation (27; 18.0%), infrastructure development (22; 14.7%), poverty reduction (20; 13.3%) and cultural preservation (18; 12.0%). These findings are consistent with the Sustainable Livelihoods Framework because ecotourism appears to support financial capital through income, human capital through work experience, physical capital through infrastructure and social or cultural capital through community participation and cultural preservation. However, community participation in tourism activities (15; 10.0%), improvement in standard of living (10; 6.7%) and development of local entrepreneurship (8; 5.3%) recorded lower frequencies. This pattern is important. Employment and income may be present, but enterprise ownership and deeper community empowerment appear less developed. In sustainable ecotourism, communities should not only work for tourism; they should also participate in planning, management and ownership. The low frequency for local entrepreneurship suggests the need for training, microfinance, cooperative structures, craft markets, guiding associations and digital promotion support for community-based tourism enterprises.

The challenges identified in Table 5 show that the benefits of ecotourism are constrained by structural and institutional weaknesses. Inadequate infrastructure recorded the highest frequency (28; 18.7%), followed by poor funding and investment (25; 16.7%), low community participation (22; 14.7%), weak government policy implementation (20; 13.3%), environmental degradation (18; 12.0%), insecurity in tourist areas (15; 10.0%), lack of skilled personnel (12; 8.0%) and poor marketing (10; 6.6%). Figure 3 illustrates this pattern. The most urgent constraints are therefore not isolated problems; they form a chain in which weak infrastructure reduces visitor satisfaction, limited funding weakens management, low participation reduces local ownership and weak policy implementation permits environmental pressure.

Table 5. Challenges constraining ecotourism development in Cross River State.

S/N	Challenge	Frequency	Percentage (%)
1	Inadequate infrastructure	28	18.7
2	Poor funding and investment	25	16.7
3	Low community participation	22	14.7
4	Weak government policy implementation	20	13.3
5	Environmental degradation	18	12.0
6	Insecurity in tourist areas	15	10.0
7	Lack of skilled personnel	12	8.0
8	Poor marketing and promotion of ecotourism sites	10	6.6
	Total	150	100

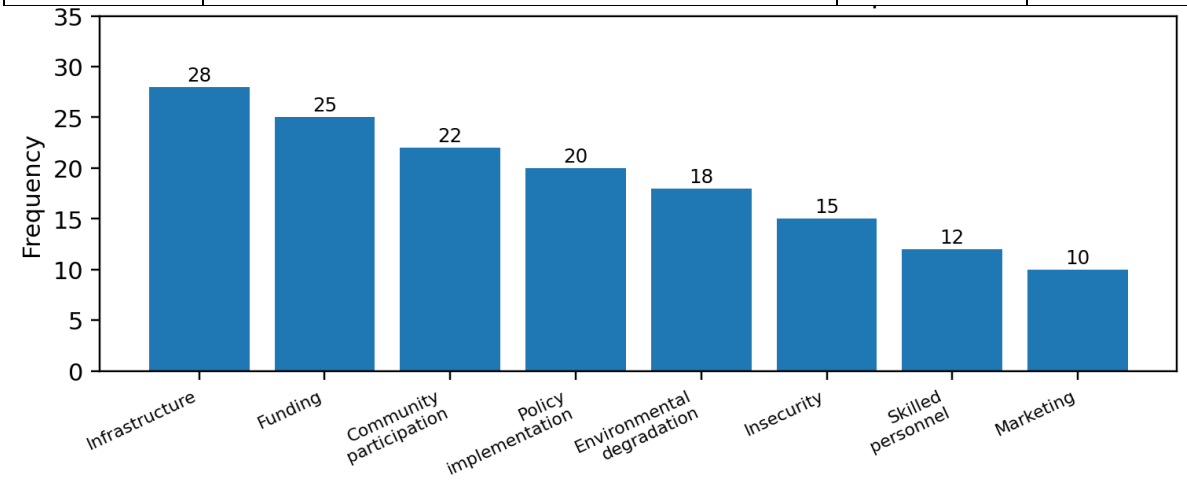

Figure 3. Main constraints on ecotourism development in Cross River State.

Table 5 and Figure 3 show that inadequate infrastructure was the most frequently reported challenge (28; 18.7%), followed by poor funding and investment (25; 16.7%), low community participation (22; 14.7%) and weak government policy implementation (20; 13.3%). These constraints are connected. Weak infrastructure reduces visitor satisfaction, poor funding limits conservation and maintenance, low participation reduces community ownership, and weak policy implementation permits environmental pressure. Addressing them requires coordinated destination governance rather than isolated interventions. The one-sample t-test results in Table 6 show that environmental contributions, socioeconomic contributions and challenges were all statistically significant. Environmental contributions had a mean score of 3.84, socioeconomic contributions had a mean score of 3.72 and challenges had a mean score of 3.91. The significance values were all below .001. These results indicate that respondents did not view ecotourism as a neutral activity. They perceived it as producing meaningful conservation and livelihood effects, while also recognising that substantial constraints limit its performance.

Table 6. One-sample t-test results for ecotourism contribution variables.

Variable	Mean	N	Std. dev.	t	Sig.
Environmental contributions of ecotourism	3.84	150	0.621	16.59	0.000
Socioeconomic contributions of ecotourism	3.72	150	0.574	14.87	0.000
Challenges facing ecotourism development	3.91	150	0.648	17.21	0.000

The high mean score for challenges deserves particular attention. It suggests that stakeholders recognise both the promise and the unfinished work of ecotourism in Cross River State. A destination may possess strong natural attractions and still fail to achieve sustainability if roads, signage, safety, interpretation, conservation financing and community benefit systems are weak. The result therefore supports a balanced interpretation: ecotourism is making positive contributions, but those contributions require stronger institutional systems if they are to become durable and internationally competitive. The correlation matrix in Table 7 shows a positive relationship between environmental impact and socioeconomic impact ($r = .682$, $p < .001$). This means that respondents who perceived stronger environmental benefits also tended to perceive stronger socioeconomic

benefits. The relationship supports the core argument of ecotourism: conservation and development are not separate outcomes but mutually reinforcing dimensions. Where habitat protection, biodiversity conservation and environmental awareness are visible, residents and stakeholders are more likely to recognise livelihood and community benefits. Conversely, environmental degradation may weaken the social legitimacy of tourism development.

Table 7. Pearson correlation matrix for environmental and socioeconomic impacts.

Variables	Environmental impact	Socioeconomic impact
Environmental impact	1.000	0.682**
Socioeconomic impact	0.682**	1.000

The regression results presented in Tables 8, 9 and 10 further show that environmental impact significantly predicted socioeconomic impact. The model produced R = .682 and R^2 = .465, indicating that environmental impact explained 46.5% of the variance in socioeconomic outcomes. The ANOVA result was significant (F = 67.45, p < .001), and the coefficient for environmental impact was positive and significant (B = .643, beta = .682, t = 8.21, p < .001). In practical terms, the results suggest that improved environmental management may strengthen the socioeconomic value of ecotourism.

Table 8. Regression model summary.

Model	R	R^2	Adjusted R^2	Std. error
1	0.682	0.465	0.458	0.52

Table 9. ANOVA for the regression model.

Source	Sum of squares	df	Mean square	F	Sig.
Regression	45.23	1	45.23	67.45	0.000
Residual	52.11	148	0.35		
Total	97.34	149			

Table 10. Regression coefficients for environmental impact predicting socioeconomic impact.

Variable	B	Std. error	Beta (β)	t	Sig.
Constant	1.215	0.312	-	3.89	0.000
Environmental impact	0.643	0.078	0.682	8.21	0.000

This finding is important for policy because it challenges the idea that conservation and local development compete for resources. In the context of ecotourism, conservation quality is part of the economic value proposition. Tourists visit natural destinations because of scenic quality, biodiversity, tranquillity, cultural meaning and environmental authenticity. If these assets deteriorate, visitor satisfaction and destination competitiveness decline. Therefore, investment in habitat protection, waste management, interpretation, anti-poaching and restoration is not merely an environmental expense; it is an investment in the socioeconomic sustainability of tourism. The findings align with international literature showing that ecotourism can contribute to conservation and development when governance, community participation and benefit-sharing are strong (Cossengue et al., 2025; Panagiotopoulou & Skoultsos, 2025). They also support Torsney et al.'s (2025) argument that ecotourism requires measurable governance standards and clear distinction from generic nature-based tourism. For Cross River State, the evidence indicates that ecotourism can support sustainable futures, but only if destination management moves from attraction promotion to systematic sustainability governance.

The results also have implications for equity. The strongest socioeconomic indicators were employment and income generation, while entrepreneurship and standard-of-living improvement were weaker. This suggests that current benefits may be more immediate than transformative. Employment can reduce poverty, but without enterprise ownership, skills development and revenue-sharing, communities may remain dependent on low-paid or seasonal roles. Sustainable ecotourism should therefore build pathways from participation to empowerment, from employment to ownership and from occasional income to resilient livelihood systems. The environmental findings require a similarly cautious interpretation. Habitat protection and biodiversity conservation ranked highly, but waste management and restoration ranked lower. This suggests that conservation benefits may be understood broadly rather than as fully institutionalised practices. International journal standards require that ecotourism claims be supported by measurable indicators. Future monitoring in Cross River State should

therefore include biodiversity indicators, waste volume, trail condition, visitor density, water use, community satisfaction and revenue distribution. Such data would strengthen adaptive management and help the state demonstrate credible ecotourism performance. The results show that ecotourism in Cross River State has measurable environmental and socioeconomic value. The positive correlation and regression evidence demonstrate that these two dimensions are linked. The challenge is to convert this linkage into policy, investment and management systems that make benefits more inclusive and environmental safeguards more operational. The findings therefore support the development of an integrated ecotourism strategy that treats conservation quality, community welfare and destination competitiveness as interdependent priorities.

Implications/conclusion

The findings have important policy implications for Cross River State and similar destinations. First, ecotourism policy should integrate conservation planning with community development planning. Environmental protection should not be treated as a separate technical activity undertaken only by park authorities. Communities living close to ecotourism assets need clear benefit-sharing mechanisms, employment pathways, enterprise support and participation in decision-making. When local people perceive that conservation improves livelihoods, they are more likely to support rules that protect forests, wildlife and destination landscapes. Second, infrastructure investment should be designed around sustainability rather than access alone. Roads, visitor centres, signage, trails, accommodation, water systems, communication facilities and waste-management systems should improve tourist experience and community welfare while reducing ecological pressure. Infrastructure planning should also consider maintenance, visitor safety, drainage, waste disposal and the prevention of uncontrolled extraction. Inadequate infrastructure was the strongest reported challenge in the study, making it a priority for state tourism agencies, conservation institutions and private partners.

Third, destination managers should adopt a carrying-capacity and Limits of Acceptable Change approach. Visitor growth should be matched with evidence on waste generation, habitat disturbance, trail erosion, water use, noise, congestion and community tolerance. This requires regular monitoring, clear indicators and transparent reporting. Without such systems, tourism expansion may gradually undermine the natural assets on which the destination depends. Ecotourism should therefore be evaluated through environmental and social thresholds, not only through visitor numbers and revenue. Fourth, community-based enterprise development should be strengthened. The low frequency recorded for local entrepreneurship indicates that communities may not yet be capturing enough value from the tourism chain. Training in guiding, hospitality, customer care, craft design, food services, digital marketing, financial management and cooperative governance would help communities move from passive participation to active ownership. Small grants, market spaces and partnerships with tour operators can also reduce benefit leakage and make ecotourism more inclusive.

Fifth, conservation education should be expanded for tourists and residents. Interpretation materials, trained guides, signage, school outreach and digital communication can explain the ecological significance of Cross River's rainforest ecosystems, the rules of responsible visitation and the link between conservation and future livelihoods. Education should not be limited to awareness campaigns; it should be connected to practical behaviours such as litter control, trail use, respect for wildlife, support for local products and reporting of harmful activities. The study also has managerial implications. Tourism agencies, park authorities, local governments, traditional institutions and private operators should coordinate more closely. Transparent revenue-sharing arrangements and community development funds can increase trust. Marketing should present Cross River State not only as a scenic destination but as a conservation and community development landscape. This positioning would align the state with international demand for responsible tourism and would help distinguish genuine ecotourism from ordinary nature-based recreation.

The study contributes to knowledge by providing empirical evidence on the relationship between environmental and socioeconomic outcomes in a Nigerian ecotourism destination. The positive correlation and

regression results show that conservation benefits and livelihood benefits are linked in stakeholder perceptions. This supports an integrated sustainability perspective and reinforces the usefulness of combining the Sustainable Livelihoods Framework with the Limits of Acceptable Change approach. The study also demonstrates the value of assessing ecotourism through multiple stakeholder groups rather than relying on official destination narratives alone. The study concludes that ecotourism contributes meaningfully to environmental conservation and socioeconomic development in Cross River State, but its potential is constrained by infrastructure deficits, funding limitations, weak policy implementation, low community participation, insecurity, limited professional capacity and environmental management gaps. The statistical evidence shows that environmental impact significantly predicts socioeconomic impact, indicating that conservation and livelihood outcomes can reinforce each other. Ecotourism should therefore be developed as an integrated sustainability strategy rather than as a stand-alone tourism product.

Future research should combine perception data with ecological and economic indicators. Longitudinal studies should track visitor numbers, household income, enterprise survival, biodiversity condition, waste volume, trail impact, gender participation and revenue distribution. Destination-specific studies are also needed because Obudu Mountain Resort, Cross River National Park and surrounding communities differ in ecological conditions, infrastructure levels and market profiles. Such evidence would improve adaptive management and help Cross River State move from promotional ecotourism to accountable, evidence-based ecotourism governance.

Declarations

Ethics approval and consent to participate: The study was conducted in line with accepted ethical principles for social and environmental research. Respondents participated voluntarily where human participants were involved, and information was treated confidentially.

Consent for publication: All authors approved the manuscript for journal submission and publication.

Availability of data and materials: The datasets used for the analysis are available from the corresponding author on reasonable request.

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Authors' contributions: The authors contributed to the conception, fieldwork, data analysis, manuscript drafting and final approval of the article.

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