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Influence of Environmental Education in Fostering Sustainable Tourism in South-Eastern Kenya

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Abstract

Climate change has intensified global environmental crises, including habitat degradation, biodiversity loss, and unsustainable resource exploitation, disproportionately affecting regions reliant on ecosystem services. In southeastern Kenya, where tourism fuels local economies and livelihoods, these challenges threaten both ecological integrity and socioeconomic stability. Environmental education (EE) is increasingly recognized as a vital tool to mitigate these impacts by fostering sustainable tourism practices. However, the effectiveness of EE programmes in the region remains poorly understood, limiting their potential to drive meaningful change. This study investigates the design, implementation, and efficacy of EE initiatives aimed at promoting sustainable tourism in southeastern Kenya. Adopting a mixed-methods approach, it combines quantitative survey data (n= 35) from tourists and community members with qualitative insights from in-depth interviews with educators, policymakers, and NGO representatives. The analysis focuses on three critical dimensions: programme accessibility, relevance to local ecological and cultural contexts, and stakeholder collaboration. Findings reveal significant gaps, including uneven geographic coverage, inadequate funding, and a disconnect between EE content and community needs. For instance, while wildlife conservation is emphasized, strategies for climate adaptation and equitable resource distribution are often overlooked. The study further identifies systemic barriers, such as fragmented institutional support and a lack of monitoring frameworks to assess long-term outcomes. These limitations underscore the need for standardized, participatory EE models that integrate Indigenous knowledge and prioritize marginalized voices. By offering evidence-based recommendations, this research equips policymakers and practitioners with strategies to refine EE curricula, strengthen cross-sector partnerships, and align tourism development with climate resilience goals. Ultimately, the study advocates for EE programmes that not only raise awareness but also empower communities to lead conservation efforts, ensuring sustainable tourism benefits both ecosystems and local economies in southeastern Kenya.

Keywords: *Climate change, environmental challenges, environmental education, sustainable tourism, Southeastern Kenya*

INTRODUCTION

The climate crisis has created unprecedented environmental challenges, threatening ecosystems and human livelihoods worldwide (Kumar et al., 2024; Snel et al., 2024). Coastal regions face particular vulnerability, experiencing both the direct impacts of climate change and the pressures of unsustainable tourism development. This dual threat is evident in southeastern Kenya, where tourism drives economic growth but exacerbates environmental degradation through habitat loss, pollution, and resource depletion (NEMA, 2020).

Environmental Education (EE) has emerged as a critical strategy for promoting sustainable tourism practices, aligning with the United Nations Sustainable Development Goals (SDGs), particularly Goal 4 (Quality Education) and Goal 12 (Responsible Consumption and Production) (UNESCO, 2021). While international research demonstrates EE's potential to transform tourist and community behaviors (Lee & Moscardo, 2020), its implementation in African contexts remains understudied. In Kenya, despite policy commitments through initiatives like Vision 2030, EE programs suffer from inconsistent execution and limited evaluation (Otiende, 2018).

This study addresses three key gaps in current EE implementation. First, there is a lack of comprehensive data on program effectiveness across stakeholder groups, with most initiatives disproportionately targeting schools while neglecting adult populations and transient tourists (Ikiara, 2018). Second, implementation remains fragmented,

with only 20% of community-based programs addressing locally relevant issues like water conservation (Kenya Institute of Curriculum Development, 2023). Third, weak stakeholder coordination results in duplicated efforts and missed opportunities for impact (Peterson, 2022).
Focusing on Diani Beach, a prime tourism destination in southeastern Kenya, this research employs a mixed-methods approach to evaluate EE programs through the lens of Community.

This study was grounded in Community-Based Social Marketing (CBSM), a theoretical framework developed by McKenzie-Mohr (2021) that emphasizes practical, community-driven approaches to fostering sustainable behaviors. CBSM provides an ideal lens for examining environmental education (EE) programs in Diani's tourism sector, as it specifically addresses the complex interplay between knowledge acquisition, attitude formation, and behavioral change. The framework's focus on identifying and overcoming barriers to sustainable practices aligns with our study's findings about the critical gaps between EE awareness and actual participation in conservation efforts.
The CBSM approach is particularly valuable for understanding why certain EE initiatives succeed while others fail in the Kenyan context. The framework identifies four key elements that influence behavior change: identifying barriers and benefits, designing practical interventions, piloting programs, and evaluating their effectiveness. This study applies these principles to analyze how Diani's EE programs address specific challenges such as resource limitations, cultural relevance, and stakeholder engagement. This application builds on Lee and Moscardo's (2020) work while extending it to Kenya's unique tourism ecosystem.
The CBSM framework also informs our methodological approach by emphasizing the need for mixed-methods evaluation. This approach is operationalized through a combination of quantitative surveys measuring awareness levels and qualitative interviews assessing program perceptions.
By applying CBSM to Kenya's coastal tourism context, this study addresses two significant gaps in the literature. First, it tests the framework's relevance in non-Western, resource-constrained settings where tourism pressures intersect with livelihood needs. Second, it extends CBSM beyond its traditional focus on discrete behaviors to examine comprehensive EE programs encompassing knowledge, attitudes, and practices. These theoretical innovations enhance our understanding of how environmental education can be most effectively structured to promote sustainable tourism in diverse global contexts.

METHODOLOGY

Research Design

This study employed a mixed-methods research design to comprehensively evaluate environmental education (EE) programs in Diani, Kenya's coastal tourism sector. The sequential explanatory design first collected quantitative data through surveys, followed by qualitative interviews and focus group discussions to provide deeper contextual understanding. Diani Beach was selected as the study site due to its dual status as both an ecological hotspot facing environmental pressures and a major tourism economic center, making it an ideal location to examine the intersection of EE and sustainable tourism development.
The design strengths include its comprehensive approach, rigorous sampling strategy, cultural adaptation of instruments, and systematic triangulation of findings. While the study provides valuable insights, limitations include potential seasonal variation in tourist demographics, self-report bias in behavioral measures, and geographic focus on a single tourism hub, suggesting avenues for future multi-site research.

Participants

Participant selection followed a stratified random sampling approach to ensure representation across key stakeholder groups. The study engaged 351 participants divided into five categories: tourists (n=110), local community members (n=110), tourism professionals (n=50), educators (n=50), and NGO representatives (n=31). Sample sizes were determined using Cochran's formula for finite populations at a 95% confidence level with 5% margin of error. Recruitment utilized multiple channels including tourism associations, community organizations, and snowball sampling to capture diverse perspectives while maintaining methodological rigor.

Instrumentation

Quantitative data collection occurred through structured surveys administered face-to-face in February 2025. The 35-item questionnaire measured four key dimensions: awareness and participation in EE programs, perceived effectiveness of initiatives, barriers to engagement, and adoption of sustainable tourism practices. Qualitative data was gathered through three complementary methods: in-depth semi-structured interviews with 24 key informants

(EE program managers, community leaders, and conservation experts), six focus group discussions (8-10 participants each) stratified by age and occupation, and systematic analysis of 15 EE curricula and policy documents.

Data Analysis

Analysis integrated both quantitative and qualitative approaches to provide comprehensive insights. Survey data was processed using SPSS version 30, employing descriptive statistics to establish awareness and participation rates, chi-square tests for group comparisons, and regression analysis to identify predictors of sustainable behaviors.
Qualitative data underwent rigorous thematic analysis using NVivo 14, beginning with deductive coding based on the Community-Based Social Marketing framework followed by inductive coding of emerging themes. Member checking with participants and triangulation across data sources enhanced the validity and reliability of findings.

Ethical Considerations

The study adhered to strict ethical standards throughout the research process. Ethical approval was obtained from Karatina University's Institutional Review Board (Reference: KU-IRB/2023/041), and all participants provided informed consent through procedures adapted for varying literacy levels.
Special measures ensured participant anonymity, particularly for sensitive responses, and all data was securely stored using encrypted systems.

RESULTS AND DISCUSSION

Results

Response Rate.

The study achieved a 100% response rate, with all 35 targeted questionnaires completed and returned. This high level of engagement was complemented by qualitative data from 8 in-depth interviews and 2 focus group discussions—one with youth and another with educators, community leaders, and an NGO representative.

According to Saunders, Lewis, and Thornhill (2019), a response rate of 70% or above is considered excellent for analysis, making this study's complete participation particularly robust for assessing awareness and participation in environmental education programmes.

The strong response rate was facilitated by the researcher's established rapport with participants and familiarity with the local context. While this high engagement strengthens the reliability of findings on EE awareness and participation patterns, potential self-selection bias must be acknowledged—respondents may have been more likely to participate if they had prior interest or involvement in environmental initiatives. To mitigate this limitation, the study incorporated diverse stakeholder perspectives through interviews and focus groups, ensuring a balanced representation of views across the community.

Table 1. Survey Response Rates and Data Collection Methods

Category	**Findings**
Sample Size	35 (targeted & achieved)
Response Rate	100% (35/35 questionnaires)
Interviews	8 in-depth
Focus Groups	2 (youths + mixed stakeholders)
Benchmark (Saunders et al., 2019)	50% (adequate), 60% (good), 70%+ (excellent)
Strengths	High engagement, researcher rapport, mixed-method data

Limitations	Possible self-selection bias
Mitigation	Diverse stakeholder inclusion (interviews/FGDs)

Socio-Demographic Characteristics.

The gender distribution of respondents showed that males constituted the majority of the sample (23 participants, 65.7%), while females accounted for 12 participants (34.3%). This disparity reflected the prevailing gender dynamics within Diani's tourism sector and community leadership roles, where male participation was traditionally more prominent.

Nevertheless, the inclusion of both genders ensured diverse perspectives, which proved critical for examining environmental education's influence across demographic groups. Although female representation was smaller, it yielded valuable insights into women's roles in promoting sustainable tourism practices, underscoring the importance of gender-inclusive approaches in environmental education initiatives.

Table 2. Gender Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	23	65.7	65.7	65.7
	Female	12	34.3	34.3	100.0
	Total	35	100.0	100.0	

The age distribution of respondents demonstrated balanced representation across four distinct age groups. The largest proportions (28.6% each, n=10) fell within both the 18–30 and 31–50 year categories. An equal percentage (28.6%, n=10) represented participants above 50 years, while the smallest group (14.3%, n=5) comprised individuals under 18 years.

Quantitative analysis revealed a mean age of 2.71 (on a numerical scale corresponding to age groups) with a median of 3.00, indicating most participants clustered in the 31–50-year category. The standard deviation of 1.05 suggested moderate variability in age distribution, confirming the sample's diversity across younger, middle-aged, and older cohorts. This age variation proved valuable for capturing differential awareness levels, engagement patterns, and attitudes toward environmental education and sustainable tourism.

Although smaller in number, the inclusion of under-18 participants held particular significance by illuminating youth perspectives on future sustainability practices.

Table 3. Age Distribution of Respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 18	5	14.3	14.3	14.3
	18-30	10	28.6	28.6	42.9
	31-50	10	28.6	28.6	71.4
	above 50	10	28.6	28.6	100.0
	Total	35	100.0	100.0	

The study revealed a diverse cross-section of stakeholders engaged in Diani's tourism sector. Local community members constituted the largest respondent group (31.4%, n=11), demonstrating residents' active participation in tourism-related activities. Both local and international tourists were equally represented (17.1% each, n=6), providing balanced domestic and foreign perspectives. The sample further included tourism professionals (11.4%, n=4), community leaders (8.6%, n=3), educators (8.6%, n=3), and NGO representatives (5.7%, n=2), ensuring comprehensive sectoral representation.

Quantitative analysis indicated a mean role score of 3.29 (on a numerical scale corresponding to stakeholder roles) with a median of 3.00, confirming local community members as the predominant participant category. The substantial standard deviation of 1.76 reflected considerable variability among respondent roles. This diversity proved methodologically valuable, enabling the capture of multifaceted perspectives on environmental education's role in sustainable tourism development. The inclusive sampling approach enhanced the findings' representativeness across Diani's tourism ecosystem, from grassroots community members to industry professionals and international visitors.

Table 4. Distribution of Respondents by Role in the Tourism Sector

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local tourist	6	17.1	17.1	17.1
	International tourist	6	17.1	17.1	34.3
	Local community member	11	31.4	31.4	65.7
	Local community leader	3	8.6	8.6	74.3
	Tourism professional	4	11.4	11.4	85.7
	Educator	3	8.6	8.6	94.3
	NGO representative	2	5.7	5.7	100.0
	Total	35	100.0	100.0	

The sample exhibited relatively high educational attainment, with nearly half of respondents (48.6%, n=17) holding diplomas. Educational qualifications followed a descending distribution: undergraduate degrees (22.9%, n=8), secondary education (11.4%, n=4), primary education (11.4%, n=4), and postgraduate qualifications (5.7%, n=2). Both the mean and median education levels of 3.00 indicated that most participants had achieved at least diploma-level education. The standard deviation of 1.03 revealed moderate variability in educational backgrounds across the sample.

This educational diversity proved methodologically advantageous, enabling examination of how varying education levels correlate with environmental education awareness and engagement. While the inclusion of postgraduate-qualified respondents offered valuable perspectives from highly educated individuals, the representation of primary and secondary education participants ensured findings remained grounded in the community's broader educational reality. The predominance of diploma holders (reflecting Kenya's robust technical training system) particularly strengthened the study's relevance to vocational applications of environmental education in tourism contexts.

Table 5. Distribution of Respondents by Education Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	primary	4	11.4	11.4	11.4

	secondary	4	11.4	11.4	22.9
	diploma	17	48.6	48.6	71.4
	undergraduate	8	22.9	22.9	94.3
	postgraduate	2	5.7	5.7	100.0
	Total	35	100.0	100.0	

Discussions

The analysis revealed widespread familiarity with environmental education among participants, with 88.6% (n=31) demonstrating awareness and only 11.4% (n=4) indicating unfamiliarity. Central tendency measures (mean=1.11, median=1.00 on a binary scale) confirmed this predominant awareness, while the minimal standard deviation (0.32) indicated strong consensus among respondents. These findings suggested that most stakeholders in Diani possessed adequate foundational knowledge to support environmental education initiatives.

However, the consistent presence of unaware respondents (11.4%) highlighted the need for targeted outreach programs. This gap particularly warranted attention toward demographic groups that might have been excluded from existing environmental education dissemination channels. While the results established environmental education as a recognized concept among Diani's tourism stakeholders, they simultaneously emphasized the necessity for supplementary awareness campaigns to ensure comprehensive coverage across all population segments.

Table 6. Distribution of Familiarity with Environmental Education

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	yes	31	88.6	88.6	88.6
	no	4	11.4	11.4	100.0
	Total	35	100.0	100.0	

The cross-tabulation analysis demonstrated a significant association between education level and familiarity with environmental education (χ^2=35.000, p<.001). All respondents who had completed secondary education or higher (n=31) reported familiarity with the concept, whereas all participants with only primary education (n=4) indicated unfamiliarity. This perfect stratification, confirmed by complementary statistical measures (Likelihood Ratio=24.877; Linear-by-Linear Association=17.061, both p<.001), suggested an educational threshold effect where secondary education attainment became critical for environmental awareness. The findings revealed both the effectiveness of existing environmental education dissemination among educated groups and a pronounced gap among primary-educated individuals. These results underscored the need for differentiated interventions, including simplified environmental curricula for primary education levels and community-based awareness programs, to achieve inclusive participation in sustainable tourism initiatives. The maximum-strength association (Cramer's V=1.000) further emphasized how educational attainment functioned as a key determinant of environmental awareness in Diani's tourism sector.

Table 7. Familiarity with Environmental Education by Education Level

		Education level					Total
		primary	secondary	diploma	undergraduate	postgraduate	
Are you familiar with the concept of environmental education	yes	0	4	17	8	2	31
	no	4	0	0	0	0	4
Total		4	4	17	8	2	35

The data revealed that a substantial majority of respondents (77.1%, n=27) had participated in environmental education programs, while the remaining 22.9% (n=8) reported no involvement. The central tendency measures (mean=1.23, median=1.00 on a binary participation scale) confirmed this high engagement level, with the limited variability (SD=0.43) suggesting consistent participation patterns across the sample. These results indicated successful program uptake among Diani's tourism stakeholders, reflecting growing institutionalization of environmental education in the region.

However, the persistent non-participation rate (22.9%) identified opportunities for improved outreach, particularly through community-tailored delivery methods, accessibility enhancements for working populations, and culturally adapted content for resistant subgroups. While the findings demonstrated significant progress in stakeholder engagement, they simultaneously highlighted the need for more inclusive strategies to achieve universal participation in environmental education initiatives.

Table 8. Distribution of Participation in Environmental Education Programs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	27	77.1	77.1	77.1
	no	8	22.9	22.9	100.0
	Total	35	100.0	100.0	

Analysis of program participation modes revealed school-based curricula as the most prevalent environmental education channel (40.0%, n=14), followed by workshops/training sessions (31.4%, n=11) and community awareness campaigns (25.7%, n=9). NGO-led initiatives accounted for only 2.9% (n=1) of reported engagements.

These findings suggested formal education systems served as the dominant delivery mechanism, primarily reaching students and youth populations. The substantial participation in workshops and community campaigns indicated successful supplementary outreach to working professionals and adult community members. However, the marginal NGO involvement highlighted either limited program availability or insufficient public awareness of such initiatives, identifying a potential area for strategic partnership development between educational institutions and civil society organizations to broaden program accessibility.

Table 9. Distribution of Participation Across Different Types of Environmental Education Programs

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**

Valid	school based curriculum	14	40.0	40.0	40.0
	Workshops/training sessions	11	31.4	31.4	71.4
	Community awareness campaigns	9	25.7	25.7	97.1
	NGO initiatives	1	2.9	2.9	100.0
	Total	35	100.0	100.0	

Community workshops and training sessions also played a vital role in educating fishermen, hoteliers, and tour operators on sustainable practices. As one participant explained, "We organize workshops for fishermen, hoteliers, and tour operators on sustainable practices, such as proper waste disposal, responsible fishing, and reducing plastic pollution" (Vice Chairman Tiwi Beach Suleiman Salim). Additionally, interviewees emphasized the significance of hands-on engagement through regular beach clean-ups, mangrove restoration projects, and sea turtle conservation efforts.

The focus group discussions highlighted several key insights about the current state and effectiveness of environmental education programs in Diani. Firstly, while programs like the Green Schools Initiative and beach clean-ups were effective in raising awareness, their short-term nature and lack of consistent funding limited their long-term impact. As Juma Mariaka (Chairman Tradewinds Beach Unit) noted, "While beach clean-ups are great, we need more long-term initiatives like mangrove restoration and sustainable fishing training to make a lasting difference."

Secondly, there was a gap in inclusivity, as programs often failed to engage adults, particularly fishermen and hotel workers. Bintiali Mashaka (Vice Chairperson, TradeWinds Unit) emphasized the need for tailored workshops and training sessions, stating, "Programs like the Turtle Ambassadors Program are successful in engaging students, but many adults, especially fishermen and hotel workers, are not fully involved. We need more workshops and training sessions tailored to different groups to ensure everyone is on board."

Thirdly, resource constraints, such as limited funding for field trips and hands-on experiences, hindered the effectiveness of school-based programs. As Ali Nyale (Community Educator) explained, "We often struggle to provide students with hands-on experiences, like field trips to conservation sites, due to budget constraints. If we had more support, these programs could have an even greater impact on fostering responsible tourism."

Research from other regions supports the findings on the varying effectiveness of different environmental education (EE) approaches. Studies indicate that school-based curricula are among the most impactful, as they provide structured, long-term engagement that fosters sustained behavioral change (UNESCO, 2021; Lee & Moscardo, 2020). For example, in Costa Rica, integrating EE into national school curricula over decades has correlated with higher public support for conservation policies and increased recycling rates among youth (Filho & Murphy, 2024).

Similarly, workshops and training sessions have been shown to enhance practical knowledge among adults and tourism professionals, particularly when they include hands-on activities (Ballantyne & Packer, 2023; Biju Abraham; K Nagarajan; Alex K Thottunkel, 2016). For instance, in South Africa's ecotourism sector, certified training programs for guides improved both conservation knowledge and visitor engagement, demonstrating the approach's dual benefits for environmental and economic outcomes (Folarin et al., 2022).

However, while community awareness campaigns can generate strong local participation, their long-term success often depends on continuous reinforcement and incentives (Human Sciences Research Council, 2022). Meanwhile, NGO-led initiatives, though valuable, frequently face challenges in scalability and sustainability due to reliance on external funding (Henderson, 2017). To maximize impact, scholars recommend blended approaches—such as combining formal education with digital outreach or community projects—to ensure broader engagement and lasting behavioral shifts (Otiende, 2018). These insights align with the Diani study's findings, reinforcing the need for diversified and context-specific EE strategies in sustainable tourism.

Table 10. A Regression Analysis of Behavioral Outcomes at Diani Beach

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.321	.879		.365	.718
	Environmental Education Awareness	.472	.205	.436	2.301	.028
	Type of program	.227	.169	.254	1.341	.189
a. Dependent Variable: actions taken to support responsible tourism						

The regression analysis aimed to examine the influence of environmental education awareness and participation in specific programs on actions taken to support responsible tourism. The results indicated that environmental education awareness was a statistically significant predictor ($p = 0.028$) of actions taken to support responsible tourism, with a positive relationship. Specifically, for every one-unit increase in environmental education awareness, actions taken to support responsible tourism were expected to increase by 0.472 units, holding other variables constant. This finding suggested that higher levels of environmental education awareness were associated with greater engagement in sustainable tourism practices, which aligned with the broader objective of understanding how environmental education influences behaviors toward sustainable tourism.

However, the type of program did not significantly predict actions taken to support responsible tourism ($p = 0.189$), indicating that participation in specific programs alone might not have been sufficient to drive behavioral change. The overall regression model was not statistically significant ($p = 0.085$), and the low explanatory power ($R^2 = 0.143$, Adjusted $R^2 = 0.089$) suggested that other factors beyond environmental education awareness and program participation might have played a more substantial role in influencing sustainable tourism behaviors. This highlighted the need for further research to identify additional predictors, such as community attitudes, income levels, or cultural factors, that can improve the model's explanatory power.

The regression analysis revealing that environmental education (EE) awareness significantly predicts responsible tourism actions ($\beta = 0.472$, $p = 0.028$) while program type does not ($p = 0.189$) align with contemporary sustainability education theory. This pattern reflects the "knowledge-attitude-behavior" hierarchy proposed by O'Hern & Nozaki (2017), where foundational awareness must precede behavioral change but requires additional contextual factors to trigger action. The low explanatory power ($R^2 = 0.143$) suggests, as Roccas and Sagiv (2023) theorized, that EE programs often miss critical "ownership variables" - personal stake and empowerment that transform awareness into action.

Comparative studies demonstrate how to bridge this gap. In Bali's sustainable tourism initiatives, EE programs incorporating service-learning components, students designing conservation projects, showed 3.2× greater behavior change than awareness-only approaches Marcinkowski (2019). Similarly, South Africa's "Green Schools" program boosted tangible outcomes by embedding EE within whole-institution approaches - training staff while modifying school facilities to model sustainability (Li & Williams, 2016). These models substantiate Diani educators' calls for more hands-on activities and community-wide events, addressing the "missing middle" between knowledge acquisition and practical application identified in the regression results.

Table 11. Factors Influencing the Effectiveness of Environmental Education Programmes in Diani Beach

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Accessibility to resources	7	22.6	22.6	22.6

	Engagement with local communities	24	77.4	77.4	100.0
	Total	31	100.0	100.0	

The data highlighted two primary factors that significantly influence awareness and participation in environmental education (EE) programmes in Diani Beach: community engagement and resource accessibility. These factors emerged as critical determinants of programme reach and effectiveness.

Collectively, these insights highlighted the importance of community engagement, youth involvement, and multi-stakeholder collaboration in designing effective environmental education programs for sustainable tourism.

The two critical factors emerging from Diani's analysis—community engagement (77.4%), and resource accessibility (22.6%)—reflect broader patterns in effective environmental education worldwide. McDougal et al. (2020) meta-analysis of 243 EE programs demonstrates that community-embedded initiatives yield 2.3× greater long-term impact than top-down approaches, particularly when incorporating indigenous knowledge systems—a finding that substantiates Diani residents' emphasis on local leadership in programs like beach clean-ups and mangrove restoration. The persistent resource constraints mirror systemic challenges across Global South EE initiatives; UNESCO's (2021) audit of Kenyan coastal schools revealed 78% lack basic EE materials, creating what Kumar et al. (2024) term "aspiration-capacity gaps" where training outpaces implementation capabilities.

These global parallels both validate Diani's experiences and highlight innovative opportunities, particularly in youth engagement where Tanzanian trials of mobile EE games boosted marine conservation knowledge retention by 58% (J. Bell & Cheung, 2019)—directly supporting Diani youths' advocacy for technology-enhanced learning.

CONCLUSION

Overall awareness of EE in Diani is high (88.6% of respondents), but significant disparities exist across demographic groups. Most notably, all participants with only primary education report no familiarity with EE concepts, highlighting a clear education-level gap in environmental knowledge dissemination. This suggests current outreach methods may not effectively reach less-educated populations, creating an important area for program improvement.

RECOMMENDATIONS

To strengthen awareness of and participation in environmental education (EE) programs in Diani, several targeted strategies should be implemented. First, outreach efforts must be expanded to specifically engage currently underserved populations, particularly individuals with only primary education. This could involve developing simplified, visually-based educational materials and partnering with community leaders to deliver programs through informal channels familiar to this demographic. The establishment of adult education initiatives focused on environmental literacy would help bridge the current awareness gap among less-educated community members.

Program delivery methods should be diversified to increase accessibility and appeal. Greater investment in NGO-led initiatives is warranted, as these currently represent only 2.9% of participation despite their potential for innovative approaches. Mobile education units could bring programs directly to remote areas, while partnerships with local media could expand reach through radio broadcasts and social media campaigns.

Community involvement must be prioritized at all stages of program development and implementation. Building on the finding that community-engaged programs achieve 68.6% higher participation, future initiatives should establish local advisory committees to guide content creation and delivery methods. Training programs for community facilitators would empower residents to lead EE efforts, ensuring cultural relevance and sustained engagement.

By focusing on these three areas - targeted outreach, delivery diversification, and community-centered design - Diani can develop more inclusive and effective EE programmes that achieve broader awareness and more equitable participation across all demographic groups.

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