(RESEARCH ARTICLE)

Effects of stakeholder collaboration on environmental conservation in Kanduyi constituency, Bungoma County, Kenya

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Abstract

Environmental conservation is a crucial component of sustainable development, requiring the combined efforts of individuals, communities, government bodies, and non-governmental organizations (NGOs). Globally, countries like Germany and China have demonstrated the importance of public participation in environmental conservation, achieving significant progress through inclusive policies and collaborative efforts. However, little is known about how such collaboration influences conservation efforts in Kanduyi, highlighting the need for this research. This research therefore focused on the role of stakeholders in environmental conservation in Kanduyi Constituency, Bungoma County, Kenya. Respondents included 385 household heads and two National Environmental Management Authority (NEMA) county officers. To increase the generalizability of the findings, a stratified sampling approach was used to include participants from different demographic backgrounds. The findings prove that engagement of stakeholders helps increase the backing of conservation policies, and encourages innovation and coordination of investments in sustainable initiatives. Regression analysis reveals a low, but statistically significant positive correlation between stakeholder collaboration and conservation performance. Therefore, future research should focus on identifying mediating factors that affect practical implementation since perceived high benefits do not guarantee practical implementation.

Keywords: Community Involvement; Environmental Enhancement; Kanduyi Constituency; Stakeholder Engagement; Sustainability.

1. Introduction

Environmental conservation is an essential aspect of sustainable development. Most practical conservation initiatives involve the contribution of individuals and organizations, including the community, government, and NGOs. This study aimed to evaluate the effectiveness of stakeholder collaboration in environmental conservation in Kanduyi Constituency, Bungoma County, Kenya. This research compared the stakeholders' roles and perceived responsibilities to determine collaboration efficiency in protecting the environment.

Environmental conservation plays a critical role in safeguarding natural resources globally. Developed countries have made significant strides in environmental protection, heavily relying on public participation and non-governmental organizations (NGOs). For instance, Germany has long prioritized environmental issues, implementing policies to address climate change and environmental degradation. Research by Drazkiewicz, Challies and Newig (2015) highlights Germany's success in participatory environmental planning, which has led to the development of measures to conserve natural resources and manage waste.

China has also focused on environmental conservation over the past two decades. Despite its population of over 1.4 billion, the country continues to grapple with developmental challenges linked to resource consumption and

environmental degradation (Schroeck, 2016). Foggin (2018) underscores the importance of public participation in China's environmental efforts, particularly in protected areas. The study recommends further stakeholder involvement in these initiatives to improve conservation efforts.

Africa, like many regions globally, faces substantial environmental challenges. In Nigeria, women play an active role in environmental management and conservation. However, their contributions often go unrecognized by policymakers. Awire and Nyakwara (2019) and Kandie (2020) both point out the need for greater inclusion of women in environmental policymaking. Raimi et al. (2019) define environmental conservation as the protection of forests, waste management, and the control of industrial emissions, noting that stakeholder involvement is crucial to sustainable environmental practices. These challenges highlight the necessity of comprehensive public participation in environmental initiatives across Africa.

Kenya faces similar environmental issues, especially in urban areas like Nairobi. Studies such as Winter et al. (2022) emphasize the poor waste management practices in informal settlements, which significantly contribute to environmental degradation. Despite the country's commitment to sustainable development goals, there is still much work to be done to improve environmental conditions.

In Bungoma County, environmental conservation efforts have been hindered by limited public participation and poor waste management practices. Makanda (2015) explored these issues, revealing that cultural factors and a lack of awareness around public-private partnerships contribute to the county's environmental challenges. Kanduyi Constituency, located within Bungoma County, has not escaped these issues. Public involvement in waste management remains low, and environmental degradation persists.

Stakeholder collaboration is a key factor in addressing these environmental challenges (Nyaraga et al., 2019). Research has demonstrated that stakeholder engagement leads to more effective environmental policies and improved natural resource management (Maynard, Jacobson, & Kamanga, 2020). In Kenya, game scouts have recognized the importance of stakeholder participation in environmental conservation. Despite this, research gaps remain in understanding the full effects of collaboration in conservation efforts within the country.

In Kanduyi, involving stakeholders in environmental conservation is vital for creating sustainable practices. Public participation, coupled with government and private sector collaboration, will be crucial in addressing the environmental issues facing the constituency. Comprehensive awareness campaigns and stronger partnerships can drive change, ensuring that environmental conservation becomes a shared responsibility among all stakeholders.

Despite Kenya's increasing focus on sustainable development goals, many regions still lag in public involvement in environmental preservation. The capital, Nairobi, continues to experience waste management issues, as noted by Winter et al. (2022), and Kanduyi Constituency shares similar challenges. Stakeholder collaboration has the potential to mitigate environmental issues, but research in this area is scarce, particularly in Kanduyi.

1.1. Stakeholder Collaboration and Environmental Conservation

Stakeholders should be considered when it comes to development of policies on environmental conservation. For example, Wang (2022) points out that public participation and stakeholder participation are essential for the functioning of conservation policies in the United States and China. The increase in stakeholders' involvement has promoted the development and enactment of effective environmental policies to enhance conservation standards in the countries (Schroeck, 2016). Wang's study also posits that stakeholder collaboration is generic, which supports the notion that similar gains can be achieved in any setting, including Kenya.

Erhabor and Don (2016) also argue that environmental education is crucial in promoting support for conservation among students in Nigeria. Their observations stated that awareness and knowledge of environmental issues enhance the students' conservation attitudes. Aminrad et al. (2013) also established the relationship between education and stakeholder collaboration. Secondary school students in Malaysia exhibited a positive attitude towards environmental conservation with increased awareness and understanding of environmental issues.

In line with Ajzen (2020), the theory of planned behavior describes how stakeholder collaboration can impact environmental conservation. This theory postulates that attitude, subjective norms, and perceived behavioral control predict the intention to perform pro-environmental behaviors. These factors can be enhanced by stakeholders promoting a positive social context, procuring the needed resources, and raising the perceived personal effectiveness

of the individuals on conservation work. This theoretical perspective aligns with the research as it elaborates the extent of collaboration activities and community and stakeholder involvement in environmental conservation.

However, Ardoin et al. (2020) did a systematic review that supports the argument of environmental awareness for conservation. According to their observations, educational intervention can enhance environmental knowledge attitudes and promote pro-environmental behavior. This corresponds with the assumption that stakeholder engagement can be vital in responding to environmental concerns with an emphasis on education.

The tangible advantages of engaging stakeholders are also seen in using different examples. For instance, Drazkiewicz, Challies, and Newig (2015) investigated citizen participation in local environmental management in Germany. They also found that engaging stakeholders in decision-making resulted in better decisions and better implementation of environmental policies.

In the Bungoma County scenario, the County Government of Bungoma (2020) has noted the importance of public involvement and awareness in environmental conservation. The policy framework also aims to involve the people in environmental policy formulation to make them feel that they are also involved in environmental conservation. This is consistent with the extant literature on stakeholder collaboration, which asserts that management of the environment must be a collective affair.

Although stakeholders' collaboration is deemed beneficial, there are several challenges related to its adoption. Resources are absent, and there is weak support from players and stakeholders and self-centeredness. These challenges are described by Emerson and Nabatchi (2015) as they examine collaborative governance regimes: Collaboration requires good coordination, trust and communication among the collaborators. Alleviating these factors is crucial in facilitating collaborative conservation programs in Kanduyi Constituency. Therefore, the literature review finds that the engagement of stakeholders plays a vital role in environment conservation. The findings from various studies suggest that the public should be engaged, informed, and incorporated for better conservation.

1.2. Problem statement

Environmental conservation is an urgent global concern, driven by climate change, deforestation, and unsustainable resource exploitation. While developed nations like Germany and China have adopted participatory approaches in environmental planning (Zhu & Hu, 2023), many developing countries, including Kenya, still struggle with effective public participation in conservation efforts (Drazkiewicz et al., 2015; Foggin, 2018). Public participation is essential for successful conservation, as it promotes local ownership and sustainable practices. However, in Kenya, particularly in Bungoma County's Kanduyi Constituency, there is a significant gap in the involvement of local stakeholders in environmental conservation.

Kanduyi faces severe environmental degradation, including deforestation, poor waste management, and loss of biodiversity (Makanda, 2015). Although Kenya has policies promoting public participation, their implementation at the sub-national level remains weak. As highlighted by Awire and Nyakwara (2019) and Kandie (2020), marginalized groups such as women, who are instrumental in conservation, are often excluded from decision-making processes, thereby weakening the effectiveness of local conservation efforts. Despite the Kenyan government's commitment to sustainable development goals, Kanduyi continues to experience environmental challenges exacerbated by limited stakeholder collaboration and minimal community involvement.

This problem is particularly concerning because stakeholder collaboration has significantly enhanced conservation efforts in other regions, such as the Maasai Mara in Kenya and the Serengeti in Tanzania, where local communities actively participate in wildlife and forest conservation (Winter et al., 2022). In these regions, inclusive participation has led to improved biodiversity conservation, reduced deforestation, and more sustainable land-use practices (Oduor, 2020; Chinyele & Lwoga, 2019). However, in Kanduyi, there is little research on how public participation specifically influences environmental conservation, creating a critical research gap. Without addressing the lack of public engagement, environmental degradation in Kanduyi is likely to persist, threatening long-term sustainability efforts such as forest preservation, soil conservation, and water resource management. This could further exacerbate issues like soil erosion, loss of biodiversity, and reduced agricultural productivity, undermining the constituency's ability to achieve sustainable development goals.

This study, therefore, seeks to analyze the effects of public participation in environmental conservation within Kanduyi Constituency, addressing the gap in knowledge and practice. The findings will contribute to developing more inclusive and effective conservation strategies in Kenya.

1.3. Objective

To assess the effect of stakeholder collaboration on environmental conservation in Kanduyi Constituency, Bungoma County, Kenya.

2. Material and Methods

2.1. Research Design

This study used a descriptive research design, to describe the population and phenomenon being investigated. Descriptive research gives a clear record of events unfolding in the study. It is useful when establishing relationships between variables within the study. This design was appropriate for this study because it established and described the level and effect of stakeholders' engagement in environmental conservation within Kanduyi Constituency.

2.2. Study Location

The study was carried out in Kanduyi Constituency, Bungoma County, in the western part of Kenya. Kanduyi is markedly heterogeneous regarding land use, including the urban and rural areas, and suffers from environmental problems like deforestation, soil erosion, and poor disease control. The selection of Kanduyi for this study was informed by the fact that it is a representative spatial setting for addressing the environmental challenges and evaluating the efficiency of stakeholder participation in the given community setting that comprises both urban and rural settings.

2.3. Target Population

The target population measures 43,210 Household heads in Kanduyi Constituency with a population estimate of 172,000 persons, with an average household size of 3.9. Household heads are selected for this study because they are masters of the house and exercise power on matters concerning management of the compound, hence, control environment conservation. Also, two National Environment Management Authority (NEMA) officers were interviewed because they have technical know-how in environmental matters, hence, they advised on legislation and policies.

2.4. Sample Techniques and Sample Size

2.4.1. Sample Techniques

Systematic random sampling was used in this study to include people of all ages and other demographic variables in the constituency. The samples were stratified according to geography (rural and urban) and income level (low, middle, and high). This approach helps make the study more inclusive to ensure that all the possible angles give the best results, making it more reliable and valid. In the case of NEMA officials, purposive sampling was employed to capture their specialized knowledge and unique stakeholder perspectives on environmental conservation, which are vital in identifying the overall regulatory and policy framework.

2.4.2. Sample Size

Using a confidence level of 95% and an error margin of ±5, a sample size of 385 household heads was determined using the formula:

2.4.3. Sample size

$$N = \frac{(\text{Z-score})2 \times \text{Standard deviation (SD)} \times (1\text{-SD})}{(\text{Confidence interval})2}$$

Where; Confidence level = 95% (1.96 z-score): Error Margin = ± 5: Standard deviation = 95%: Therefore;

$$\frac{1.962 \times 0.5(0.5)}{0.052} = 384.1$$

Final total (N)= 385. Therefore, the researcher randomly selected 385 household heads, and a census of the 2 NEMA officials.

2.5. Research Instruments

Semi-structured questionnaires with open-ended questions were used to collect quantitative and qualitative data from household heads, while interview schedules were used for NEMA officers. A five-point Likert scale was employed to gauge opinions on public participation and environmental conservation issues.

2.6. Pre-testing/Piloting Study

A pilot study was conducted in Bumula Constituency, involving 39 individuals (10% of the total sample size) to test the reliability and validity of the research instruments.

2.7. Validity and Reliability

Validity was ensured by including only relevant questions and clearly defining variables. Reliability was measured using Cronbach's alpha coefficient, with a minimum value of 0.7 deemed acceptable.

2.8. Data Collection Techniques

Questionnaires were used to collect data from household heads, and interviews were conducted with NEMA officers. The diverse nature of the target population necessitated the use of both methods.

2.9. Data Analysis and Presentation

Data was analyzed with the aid of the Statistical Package for Social Sciences (SPSS). Quantitative and qualitative data was analyzed using descriptive statistics. Findings were presented using tables, graphs, and themes.

2.10. Logistical and Ethical Considerations

The researcher obtained authorization from relevant authorities, including Kenyatta University Graduate School, NACOSTI, and local government offices. Participants were assured of confidentiality and anonymity.

3. Results and Discussion

3.1. Stakeholder Collaboration

Table 1 Findings on stakeholder collaboration

Statement	Mean	Standard Deviation
Stakeholder collaboration results in increased support for environmental conservation policies.	4.623	0.567
Stakeholder collaboration creates an environment for innovations and the development of effective environmental conservation solutions.	4.789	0.621
Collaboration among stakeholders fosters coordination and investment in sustainable projects.	4.356	0.543
How would you rate the overall effectiveness of environmental conservation efforts in your community?	4.421	0.612

Table 1 summarizes the findings on stakeholder collaboration, showing high mean scores for its impact on environmental conservation policies, innovations, coordination, and community effectiveness.

3.1.1. Support for Environmental Conservation Policies

The study data shows that collaboration with stakeholders is central to ensuring support for policies on environmental conservation in the Kanduyi Constituency. This indicates that the respondents generally agreed on the positive effects of collaboration on policy support, as indicated by the mean score of 4.623, supported by the low standard deviation of 0.567. This finding is supported by Wang (2022), who emphasized the role of stakeholders in the success of environmental policies. Wang's study done in China and the United States showed that for the success of conservation, the countries had to involve the public and the stakeholders. The same applies to Kanduyi, where engagement of all the

stakeholders, such as the community, government, and NGOs, raises support for environmental policies. This collective effort not only justifies policy outcomes but also makes these outcomes more sensitive to local demands and fears. Collaborative approaches produce more holistic and effective policies that reflect the specific environmental conditions in Kanduyi Constituency because of the inclusion of multiple stakeholders with different knowledge and experiences.

3.1.2. Innovation and Effective Solutions

The engagement of stakeholders in the innovation process and the creation of good solutions for the conservation of the environment is also deemed influential. The study results show that the mean score was 4.789, and the standard deviation was 0.621, indicating that all the participants agreed that multi-stakeholder cooperation is important in driving innovation in conservation. This opinion corresponds to the study by Erhabor and Don (2016), which noted that developing environmental solutions implies cooperation. They also demonstrated how awareness of the environment and cooperation among the students of Nigeria improved the level of support for new conservation activities. The same kind of dynamics is also observed in Kanduyi Constituency, where stakeholders collectively share ideas, resources, and expertise in the development of new techniques in environmental conservation. For example, interactions between the locals and environmental NGOs have resulted in agroforestry practices, which not only assist in halting deforestation but also improve soil fertility and food production.

Further, partnerships with academic institutions and researchers have seen the adoption of pilot initiatives geared at controlling soil erosion through practices like terracing and other sustainable land management practices. Such solutions, which have emerged from stakeholder collaborations, show that stakeholder engagement can be effective in achieving environmental benefits. Secondly, the participation of multiple stakeholders ensures that the solutions are not only creative but also culturally sensitive and applicable to the local environment, making them efficient and sustainable.

Consequently, the results of this research underscore the centrality of stakeholder involvement in the implementation of environmental conservation policies, coupled with the encouragement of innovation. Such high levels of agreement imply the need for people to act in unison in order to overcome various environmental issues. The findings of this study are not only informative for future studies but also offer policy implications on sustainable environmental management for policymakers and practitioners who are involved in the management of Kanduyi Constituency and similar regions.

3.1.3. Coordination and Investment in Sustainable Projects

The study findings demonstrate the importance of stakeholders' collaboration in enhancing coordination and investment in environmental sustainability projects in Kanduyi Constituency. When analyzing the gathered data and computing the mean with a value of 4.356 and a standard deviation of 0.543, it can be stated that respondents acknowledged stakeholder collaboration as an essential factor influencing sustainable project development. This is demonstrated by the fact that the standard deviation is not very high, bearing testimony to the fact that there is a lot of agreement among the participants. Thus, community members view collaboration as being beneficial across the board. This perception is in conformity with the standard literature on stakeholder management where it is seen that when stakeholders such as government departments, NGOs, communities, and businesses combine themselves, they are in a better position to share resources, knowledge and to coordinate their activities for environment related objectives (Emerson & Nabatchi, 2015). It therefore becomes a rich environment for the creation of investment in sustainability since there is the likelihood that individuals will fund projects that have the support of multiple stakeholders as provided by Drazkiewicz, Challies, and Newig (2015). These are essential policy collaborations that aid the efficiency of environmental conservation measures, especially in regions like Kanduyi, where resources might be scarce, but collective efforts can bring about a huge difference.

3.1.4. Overall Effectiveness of Environmental Conservation Efforts in the Community

Respondents' perception of the conservation efforts of the environment in Kanduyi Constituency was also measured; the mean score was 4.421 and a standard deviation of 0.612. This suggests a relatively favorable view towards the success of conservation measures. However, some variation was noted. The standard deviation shows that although most of the community members agree with the current efforts as being effective, there are still slightly divergent opinions on the effectiveness of these efforts. The relatively high mean score is because stakeholder collaboration has positive effects on environmental conservation. The harmonized efforts and resources created by collaborative approaches might explain why the community perceives conservation actions as effective. However, the variation in responses also suggests other issues that may hinder the effectiveness of these efforts. As for the effectiveness, the factors may include resource limitations, the divergence of interests among the stakeholders, and the lack of public engagement (Zhu & Hu, 2023). Thus, while the community has recognized the improvements, there is an understanding

that additional research is necessary to strengthen conservation management, especially in terms of multi-stakeholder collaboration.

Table 2 Regression Coefficient: Stakeholder Collaboration

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	11.077	0.716		4.031	0.000
	Stakeholder Collaborations	0.139	0.038	0.148	11.001	0.003

Dependent Variable: Environmental Conservation ; (Study findings, 2024)

Table 2 provides the regression analysis, indicating a significant positive relationship between stakeholder collaboration and environmental conservation efforts.

3.1.5. Stakeholder Collaboration on Environmental Conservation

The examination of the relationship between the independent and dependent variables demonstrated a statistically significant positive correlation, albeit with a smaller magnitude. The unstandardized coefficient (B) of 0.139 signifies that for each unit increase in stakeholder collaboration, there is a corresponding 0.139 unit increase in environmental conservation outcomes, assuming other factors remain constant. The standardized coefficient (Beta) of 0.148 suggests a weak to moderate positive effect size. Despite the smaller coefficient, the high t-value (11.001) and low p-value (0.003) indicate statistical significance at the 0.01 level. The constant term (11.077) represents the baseline level of environmental conservation when stakeholder collaboration is absent.

While these findings indicate a positive impact, they contrast with the favorable descriptive statistics and high mean scores for collaboration-related statements (4.789 for innovation and 4.623 for policy support). This discrepancy implies that although stakeholders perceive collaboration as highly beneficial, its quantitative impact on environmental conservation outcomes may be more complex than initially presumed. Further investigation into potential mediating or moderating factors is warranted.

4. Conclusion

The findings suggest that stakeholders' involvement is crucial in enhancing environmental conservation within Kanduyi Constituency. Coordinated efforts have been proven to increase backing for environmental policies, spur innovation, and foster green project investment. While these are positive outcomes, the rather limited quantitative effects indicate that the practical utilization of collaboration is not as simple as it may seem when considering the perceived advantages. Analyzing the data, the authors found out that although the stakeholders believe that collaboration is very useful, its impact on the conservation outcomes is not very significant. This disparity calls for additional studies to determine other moderating variables that could affect the success of cooperative endeavours. Thus, addressing such factors may help future initiatives enhance the benefits of stakeholder engagement for environmental conservation. A better understanding of these dynamics will be important for designing better strategies to address environmental issues in Kanduyi Constituency and other similar settings.

4.1. Future Research

Further research should focus on the challenges that prevent collaboration with stakeholders and, thereby, improve the collaboration processes. This paper identified the barriers to stakeholder engagement so as to come up with strategies for addressing them. For example, some of the barriers highlighted in the literature include resource limitation, conflict of interest, and communication issues. Studying these barriers in depth will assist in developing better collaboration frameworks and interventions.

Furthermore, more longitudinal studies will be essential in establishing the effects of stakeholder collaboration on environmental conservation in the long run. Such studies will enable noting of trends over time and evaluate the impact of partnerships on conservation in the long run. They can also offer a richer insight into the sustainability and long-term impact of collaborative efforts and their legacies on environmentalism. This way, future research can take into consideration both short-term and long-term approaches to improve the effectiveness of environmental conservation

with the help of stakeholders. Such an approach will be crucial for solving multifaceted environmental problems and ensuring long-term positive impact.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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