International Journal of Social and Development Concerns

ISSN 2524-1478 (Online)

Vol. 24 | Post COVID-19 Recovery and Sustainable development
Vol. 25 Article 1 | August 9, 2025

Evaluating Climate Change Resilient Approaches to Reduce Human-Wildlife Conflicts in Tana River County, Kenya

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Cite as: *Chikandah, D. F., Ngutu, M., & Mailu, S. (2025). Evaluating Climate Change Resilient Approaches to Reduce Human-Wildlife Conflicts in Tana River County, Kenya. International Journal of Social and Development Concerns, 25(1), 1–15.*
https://doi.org/10.5281/zenodo.16788043

Abstract: *Human-wildlife conflict remains a persistent challenge in Kenya's Tana River County, exacerbated by the impacts of climate change, including erratic rainfall patterns, prolonged droughts, and shrinking natural habitats. This journal evaluates the effectiveness of climate change resilient strategies in mitigating such conflicts by examining local perceptions, institutional interventions, and ecological impacts. Adopting a mixed methods research (MMR) design, the study collected data from a total of 399 participants, including 183 household representatives selected through simple random sampling and 216 key informants comprising 113 wildlife officers, 45 government officials, 34 conservationists, and 24 community leaders selected through purposive sampling. Data collection tools included structured questionnaires, interviews, and secondary sources. The findings reveal that climate variability has intensified competition over water and pasture between communities and wildlife, increasing incidences of crop destruction, livestock predation, and human injuries or deaths. While several mitigation strategies such as early warning systems, community-based wildlife management, and climate-smart land use planning have been initiated, their implementation remains inconsistent and under-resourced. The journal underscores the need for integrated, locally grounded, and climate-resilient approaches that engage multiple stakeholders. It recommends enhancing institutional coordination, promoting sustainable livelihoods, and investing in climate data infrastructure as critical pathways to reduce human-wildlife conflicts and enhance ecological and community resilience in Tana River County.*

Key Words: *Climate Resilience, Human-Wildlife Conflict, Adaptation Strategies, Natural Resource Management*

1.1 Introduction

Human-wildlife conflict (HWC) in Kenya's Tana River County has intensified due to climate change, population growth, and habitat loss, resulting in increased crop destruction, livestock loss, and human-wildlife confrontations. This ecologically rich but vulnerable region illustrates the urgent need to integrate climate resilience into conflict mitigation efforts. Despite existing interventions, most remain fragmented and disconnected from local realities. This journal explores the effectiveness of climate-resilient strategies including land use planning, community-based resource management, and alternative

livelihoods in addressing the underlying causes of HWC. By combining empirical data and theoretical insights, the study seeks to inform more sustainable, locally grounded policies for human-wildlife coexistence in the face of climate change.

1.2 Background Information

Human-wildlife conflict (HWC) is an escalating global issue that poses serious challenges to biodiversity conservation, sustainable development, and human security. Climate change has intensified these conflicts by disrupting ecosystems, altering migration patterns, and degrading habitats, especially in areas where human and wildlife territories overlap (IPCC, 2022). In India, for instance, habitat fragmentation and erratic rainfall patterns have led to frequent elephant incursions into farmlands, resulting in significant human and wildlife casualties. Measures such as drone surveillance and local volunteer groups have been adopted to mitigate these conflicts (Purathekandy et al., 2024). Similarly, in Brazil's Pantanal, extreme drought and fire linked to climate change have pushed jaguars to prey on livestock, prompting communities to adopt non-lethal deterrents and education campaigns to promote coexistence (Barros et al., 2022).

In Australia, climate variability has led to overpopulation and mass movements of kangaroos into farmlands, resulting in significant crop damage. Government responses have included controversial licensed culling, although public pressure is mounting for more sustainable solutions like wildlife corridors and the incorporation of indigenous knowledge systems (Australian Government, 2023). Across Africa, HWC is further intensified by socio-economic vulnerabilities such as poverty and population growth. Kenya's Laikipia, Narok, and Taita Taveta counties have recorded rising conflict events due to drought-induced resource scarcity. In Narok, elephants alone accounted for nearly half of the conflict cases, predominantly involving crop destruction and livestock predation. Restoration projects in the Chyulu Hills and national strategies, such as Kenya's 2024–2033 Human-Wildlife Coexistence Strategy, are showing positive results in reducing these conflicts (Kenya Wildlife Service, 2024).

In Zimbabwe, climate-induced migrations of elephants from the Hwange ecosystem into communal lands have led to hundreds of fatalities, sparking controversial proposals like elephant culling. Conservationists have instead promoted GPS-collaring to alert communities and prevent violent encounters. Tanzania faces similar HWC challenges in regions like Tarangire and Serengeti, where prolonged dry seasons have increased elephant crop raids and predator attacks on livestock. Weak compensation schemes have fueled retaliatory killings, while researchers call for more inclusive wildlife governance, better water infrastructure, and habitat restoration (The Conversation, 2023).

Tana River County in southeastern Kenya exemplifies the intersection of climate stress and HWC in semi-arid environments. Droughts, rising temperatures, and flooding have degraded essential grazing and water resources, pushing elephants, crocodiles, and hippos into villages and farmlands. This has led to rising tensions and damage, exacerbated by poor land-use planning and insufficient compensation (National Drought Management Authority, 2023). This journal article seeks to assess climate-resilient solutions for Tana River County, focusing on adaptive land-use practices, early warning systems, ecosystem restoration, and community-based natural resource management, thus contributing to broader debates on environmental governance and resilience in climate-vulnerable African regions.

1.3 Central Argument

This journal contends that climate change is a central catalyst for the rising intensity and frequency of human-wildlife conflict in Tana River County, Kenya, as environmental disruptions such as prolonged droughts, unpredictable rainfall, increasing temperatures, and periodic flooding degrade natural habitats, dry up water sources, and force wildlife into human-inhabited areas in search of food, water, and pasture. These incursions often lead to the destruction of crops, livestock losses, and threats to human safety, thereby deepening local tensions and undermining both conservation efforts and community livelihoods. The situation is worsened by weak land-use governance, limited institutional capacity, and high dependency on natural resources among local communities. However, the paper argues that this conflict is not an inevitable outcome of climate change but rather a challenge that can be mitigated through the adoption of integrated climate-resilient strategies. These include climate-smart agriculture, ecosystem restoration, early warning systems, community-led conservation efforts, and participatory land-use planning. Additionally, investing in water harvesting technologies, securing wildlife corridors, and promoting alternative livelihoods can enhance both ecological integrity and human well-being. By aligning environmental management with adaptive development goals and empowering local communities with knowledge and resources to manage climate risks, Tana River County has the potential to transform its vulnerability into a model of climate-resilient human-wildlife coexistence within Kenya and across East Africa.

1.4 Problem Statement

Human-wildlife conflict in Tana River County, Kenya, continues to escalate despite national and regional commitments to biodiversity conservation and climate adaptation. The county's fragile semi-arid ecosystem is increasingly impacted by climate-induced challenges such as prolonged droughts, erratic rainfall, seasonal flooding, and rising temperatures. These environmental shifts are degrading wildlife habitats and pushing animals like elephants, crocodiles, and hippos into human settlements in search of food and water, leading to frequent and sometimes fatal interactions with communities. This problem is further intensified by unsustainable land-use practices such as deforestation, overgrazing, and agricultural expansion into wildlife corridors, all of which threaten the livelihoods of local populations who largely depend on farming, fishing, and livestock. Institutional responses to these conflicts have been inadequate, reactive, and poorly coordinated. While Kenya has supportive policy frameworks like the Wildlife Conservation and Management Act (2013) and the Climate Change Act (2016), implementation at the county level is hindered by weak governance, limited funding, and lack of stakeholder collaboration. Compensation for wildlife-related damage is often delayed or inconsistent, fueling resentment toward conservation initiatives and discouraging community cooperation. Socio-economic vulnerabilities including poverty, limited education, and dependence on natural resources further undermine the adoption of sustainable climate adaptation strategies. This journal, therefore, explores the root causes and consequences of climate-related human-wildlife conflict in Tana River County and assesses adaptive, community-based solutions aimed at fostering coexistence, enhancing environmental resilience, and supporting sustainable development.

1.5 Methodology

This study employed a mixed-methods approach to comprehensively examine the effectiveness of climate-resilient strategies in mitigating human-wildlife conflicts in Tana River County, Kenya. By integrating both qualitative and quantitative research methods, the study captured the multifaceted nature

of climate-induced conflicts. The target population included 399 participants, comprising wildlife officers, conservationists, government officials, community leaders, and local residents. Household data was collected using simple random sampling, involving 183 participants who completed structured questionnaires addressing the frequency and nature of wildlife encounters and local adaptation strategies. For key informant interviews, purposive sampling was used to select 113 wildlife officers, 45 government officials, 34 conservationists, and 24 community leaders who provided expert insights into policy implementation and conflict mitigation. A pilot study with 15 individuals helped refine the research instruments for clarity and relevance. Data collection methods included structured questionnaires for households and semi-structured interviews for key informants. Quantitative data was analyzed using SPSS or STATA, applying descriptive and inferential statistical methods to explore trends and correlations between climate variables and conflict incidents. Qualitative data underwent thematic and narrative analysis to identify patterns in community responses and perceptions of human-wildlife conflict. Secondary data sources, including government reports, academic publications, and environmental assessments, were also reviewed to support and contextualize findings. The use of diverse data sources and analytic tools ensured the credibility and depth of the study, with results presented through tables, graphs, and narrative summaries. This comprehensive methodology provided critical insights into the drivers, impacts, and solutions to human-wildlife conflicts in the face of climate change, offering evidence-based recommendations for more inclusive and sustainable interventions in Tana River County.

1.6 Literature Review

In this section, theoretical and empirical reviews will be presented.

1.6.1 Theoretical Framework

This study is grounded in two complementary theoretical frameworks Ecological Systems Theory and Resilience Theory which together provide a comprehensive lens for analyzing climate-induced human-wildlife conflicts in Tana River County, Kenya. Ecological Systems Theory, introduced by Urie Bronfenbrenner (1979), emphasizes that human-environment interactions are influenced by multiple, interconnected systems ranging from individual and community levels (microsystem) to broader policy and ecological environments (macrosystem). In Tana River, climate change manifests through prolonged droughts, floods, and shifting vegetation patterns, which directly impact both wildlife behavior and human settlement dynamics. Wildlife, driven by scarcity of resources, often invades human settlements, while people, due to land pressures and changing agricultural zones, encroach on wildlife habitats. This theory helps to unpack the multilayered causes of conflict, highlighting that effective mitigation must consider environmental changes alongside socio-political, behavioral, and institutional dimensions. It advocates for holistic interventions that integrate ecological knowledge with local governance, land-use planning, and community engagement.

Resilience Theory complements this by focusing on the adaptive capacity of socio-ecological systems to absorb shocks and transform in response to stressors such as climate variability (Holling, 1973). It frames resilience as the ability of both human communities and ecosystems to adjust and thrive amid disruptions, promoting long-term coexistence between people and wildlife. In the Tana River context, this theory supports the adoption of climate-resilient practices such as ecosystem restoration, protection of riparian buffers, and diversified livelihoods like agro-pastoralism. It also encourages the integration of early warning systems, indigenous knowledge, and community-led conservation initiatives, which

enhance both ecological integrity and social cohesion. Together, these frameworks provide a robust theoretical foundation for understanding the climate-conflict nexus and for designing adaptive, inclusive, and sustainable strategies to mitigate human-wildlife conflict in vulnerable regions like Tana River County.

1.6.2 Empirical review

Human-wildlife conflict (HWC) remains a critical impediment to sustainable development, biodiversity conservation, and human security in Sub-Saharan Africa. In arid and semi-arid lands (ASALs) such as Tana River County, Kenya, climate change has significantly amplified these conflicts, especially through environmental stressors like prolonged droughts, erratic rainfall, and resource scarcity. These climate-induced shifts disrupt ecological balances, intensify competition for resources, and exacerbate socio-economic vulnerabilities. This section explores the scholarly discourse on HWC under four key themes: climate change as a driver, existing mitigation interventions, climate-resilient conservation strategies, and identified research and policy gaps.

Climate Change as a Driver of Human-Wildlife Conflict

Climate change has emerged as a key driver of human-wildlife conflict (HWC) in Kenya, particularly in regions like Tana River County. Rising temperatures, erratic rainfall, and prolonged droughts are degrading ecosystems and forcing wildlife such as elephants and hippos to move beyond their natural habitats in search of water and food, often into human settlements (Gichohi et al., 2022). These incursions, especially during dry seasons, have led to crop destruction, livestock predation, and threats to human safety. Mutinda and Wahome (2021) highlight that about 65% of wildlife incursions in the Tana Delta occurred during extreme droughts from 2018 to 2021, establishing a clear link between climate variability and the frequency of HWC. Similarly, Ngene et al. (2020) observed a 45% rise in human-elephant conflict in Samburu County during years with rainfall deficits, emphasizing the role of water scarcity in driving wildlife movement and conflict.

In addition to droughts, increased seasonal flooding along the Tana River also attributed to climate change has displaced both human and wildlife populations, forcing them into shared, often contested spaces and intensifying land-use disputes (Kenya Red Cross Society, 2020). The resulting habitat fragmentation, especially in regions like the Athi-Kapiti plains, has also led to a surge in livestock predation by predators such as lions and hyenas, who are pushed closer to human settlements due to changing weather patterns and land use (Ogutu et al., 2023). These trends illustrate how climate-induced ecological stressors not only disrupt wildlife habitats but also deepen the socio-economic vulnerabilities of agro-pastoral communities dependent on natural resources.

Existing Mitigation Interventions and Institutional Responses

Kenya has adopted several mitigation strategies to address human-wildlife conflict (HWC), primarily led by the Kenya Wildlife Service (KWS) and supported by NGOs and local communities. These interventions include compensation schemes, fencing of wildlife-protected areas, translocation of problem animals, and early warning systems in hotspot regions like Tana River County (KWS Annual Report, 2021). NGOs such as Nature Kenya and WWF have also trained local communities in coexistence strategies. Despite these efforts, the effectiveness of such interventions is hindered by underfunding, weak institutional capacity, and poor accessibility for rural populations. Njogu (2022) points out that compensation programs are inefficient, and the Auditor General (2023) reported that only

40% of reported cases in Tana River received compensation within two years, undermining trust in government responses.

Furthermore, KWS faces logistical challenges, particularly in responding to incidents in remote or flood-affected areas. While community-based conservation models have shown success in counties like Laikipia and Narok where organizations such as the Northern Rangelands Trust (NRT) have implemented benefit-sharing frameworks and empowered community rangers these models remain underdeveloped in Tana River (Northern Rangelands Trust, 2021). Strengthening such local initiatives could enhance wildlife monitoring, reduce retaliatory killings, and promote local ownership of conservation efforts, offering a more sustainable and inclusive approach to mitigating HWC.

Opportunities for Climate-Resilient Conservation Strategies

Recent studies underscore the importance of incorporating climate resilience into human-wildlife conflict (HWC) mitigation strategies. Climate-smart land use planning, including the creation of buffer zones, wildlife corridors, and sustainable fencing, can significantly reduce the spatial overlap between humans and wildlife, as seen in Amboseli where elephant corridors combined with fencing lowered conflicts by over 30% (Ogutu et al., 2023). Additionally, Indigenous Knowledge Systems (IKS) offer valuable, locally grounded approaches to conflict prevention. In Tana River, traditional practices such as using wildlife calendars, natural repellents like chili and smoke, and strategic grazing have historically helped communities manage wildlife interactions effectively (Gikonyo & Mutua, 2019). Beyond land use and traditional knowledge, promoting alternative livelihoods such as beekeeping, solar-powered irrigation, and eco-tourism has proven effective in regions like Isiolo and Kajiado in enhancing household income and reducing dependence on ecologically sensitive resources (UNDP Kenya, 2021). These livelihood models could be adapted to Tana River to foster more positive attitudes toward conservation. Moreover, improving climate information services through mobile platforms has shown promise; real-time alerts via SMS and radio in Garissa and Turkana have enabled communities to better prepare for extreme weather, suggesting similar systems could be beneficial in Tana River when linked with localized weather monitoring (NDMA, 2022).

Identified Gaps

Although innovative approaches to human-wildlife conflict (HWC) have emerged, critical gaps in knowledge and policy remain, particularly in regions like Tana River. Existing studies often adopt broad national perspectives, neglecting localized analyses of how climate change uniquely influences wildlife behavior and conflict patterns. There is a pressing need for longitudinal research that captures these local dynamics over time. Additionally, many current interventions are designed through top-down processes, lacking meaningful community involvement, which creates a misalignment between policy intent and the lived experiences of affected populations. As Wanyama et al. (2020) highlight, integrating participatory planning and culturally sensitive, incentive-based conservation approaches is essential for sustainable outcomes. Furthermore, despite the existence of supportive legal instruments like the Climate Change Act (2016) and Wildlife Conservation and Management Act (2013), the operationalization of climate adaptation within wildlife policies is still weak. Strengthening inter-agency collaboration among institutions such as the National Drought Management Authority (NDMA), Kenya Wildlife Service (KWS), and Kenya Meteorological Department is vital to ensure climate data informs conflict mitigation and planning efforts at all governance levels.

1.7 Findings and Discussions

Response Rate

Out of the targeted sample size of 399, a total of 338 respondents successfully participated in the study, yielding an overall response rate of 84.7%. Specifically, 183 household representatives, including local farmers and community members, were targeted for the questionnaire, with 134 successfully completing it. Additionally, 113 wildlife officers were invited for key informant interviews, out of which 108 participated. Similarly, 45 government officials were invited, with 42 responding, while 34 conservationists were targeted, with 31 participating. The research included 24 community leaders for interviews but 23 leaders participated. The high overall response rate provides strong and representative data for analysis despite some non-responses. The response rate is summarized in Table 1 below:

Table 1: ***Response Rate***

Category	Sample Size	Responded	Response Rate (%)
Household Representatives	183	134	73.2
Wildlife Officers	113	108	95.6
Government Officials	45	42	93.3
Conservationists	34	31	91.2
Community Leaders	24	23	95.8
Total	399	338	84.7

Source: ***Field Data, 2025***

Demographic Characteristics of Respondents

Gender of Respondents

The survey revealed that males made up 60% of the respondents while females comprised 40% of the participants. The gender breakdown mirrors the traditional responsibilities of men and women in Tana River County regarding climate change adaptability and human-wildlife conflicts. Men lead the frontlines of human-wildlife interactions because they primarily practice livestock herding, wildlife conservation and resolve conflicts. Women serve as essential figures in subsistence farming, water resource management and community-based conservation programs, which makes them vital for climate change adaptation strategies. The knowledge of gendered roles helps explain how different community members face and react to climate-related human-wildlife conflicts throughout the region.

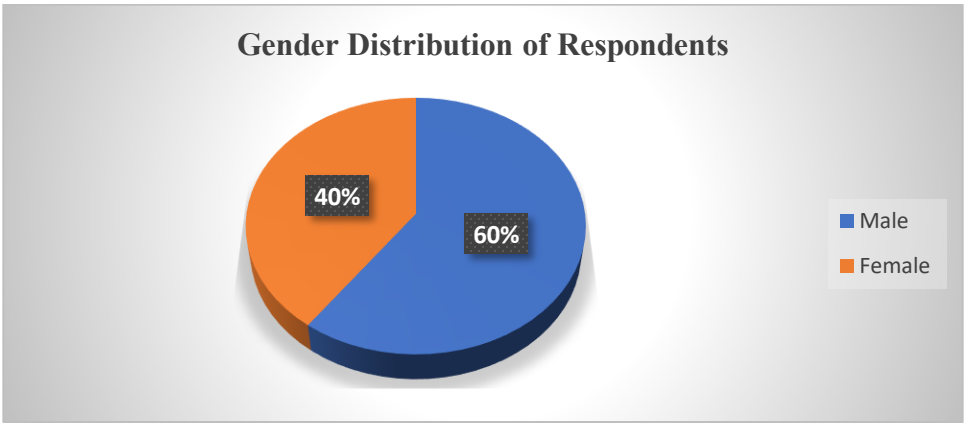

Figure 1: ***Gender Distribution of Respondents***
Source: Field Data, 2025

Age of Respondents

The survey participants spanned five different age groups. The survey results showed that 40% of participants belonged to the 28–37 years age group while 30% fell within the 38–47 years range. The age group of 18–27 years made up 20% of the respondents while those aged 48–57 years and above 58 years comprised 7% and 3% respectively. The 70% of respondents who are economically and socially engaged belong to the 28–47 years age range which includes 40% in the 28–37 years bracket and 30% in the 38–47 years bracket. The study focuses on this age group because they actively work and make decisions while participating in agricultural activities and wildlife conservation and community leadership roles.

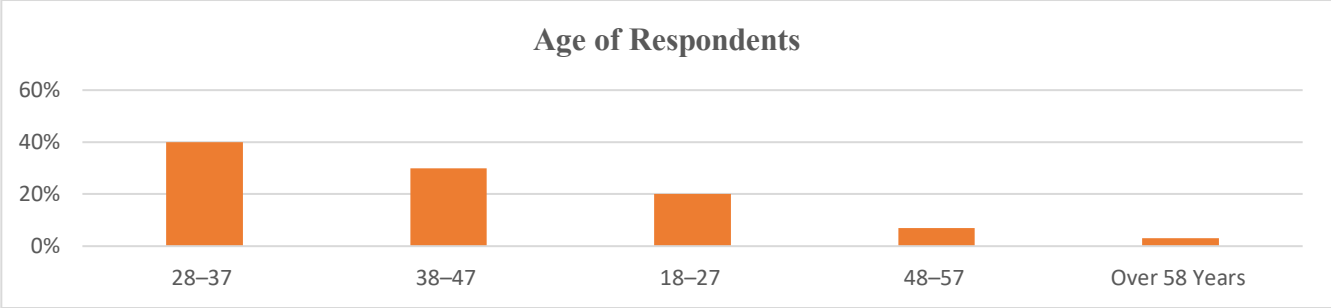

Figure 2: ***Age Distribution of Respondents***
Source: Field Data, 2025

Religious Affiliation

The survey results showed that Muslims made up 55% of the respondents while Christians comprised 40% and other religious groups including traditional beliefs made up 5%. The religious diversity of the area mirrors the cultural makeup of the region, because religious beliefs determine social organization and resource distribution and decision processes. Religious beliefs in Tana River County determine farming practices, community leadership and environmental conservation methods which directly relate to this research study.

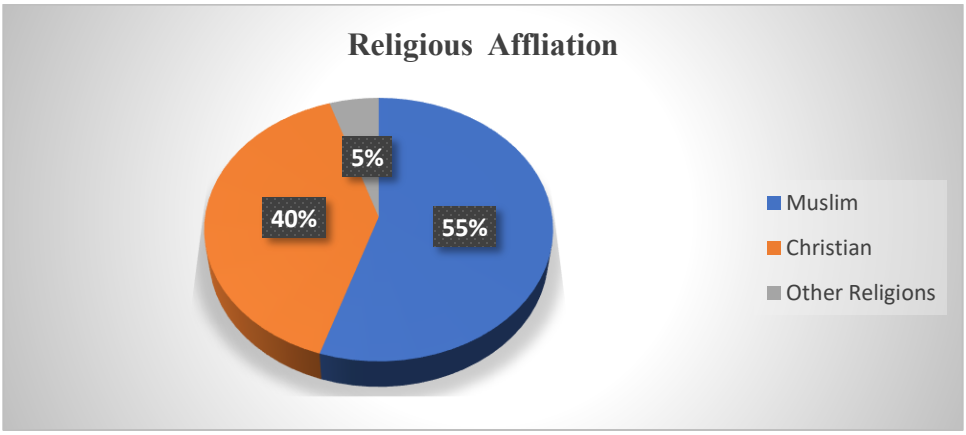

Figure 3: ***Religious Affiliation of Respondents***
Source: Field Data, 2025

Level of Education

The survey results showed that 35% of participants completed their education at the secondary level while 30% earned college diplomas. The educational distribution showed that 20% of respondents held undergraduate degrees while 10% had primary education and 5% had postgraduate qualifications. The educational distribution shows a high level of education which supports public understanding and participation in climate change and wildlife management discussions.

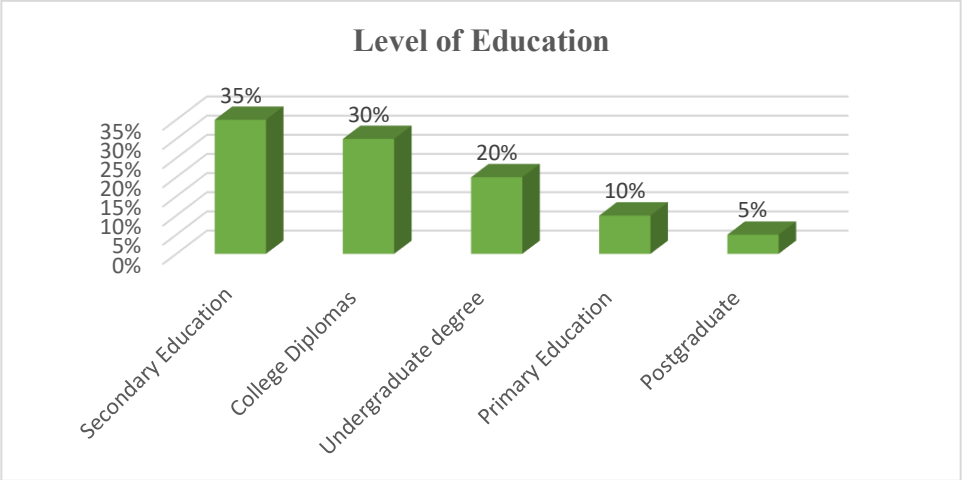

Figure 4: *Education Levels of Respondents*
Source: Field Data, 2025

Climate Change Resilient Approaches to Reduce Human-Wildlife Conflicts

This section discusses the findings related to the study objective on examining the effectiveness of adaptive measures that would minimize human-wildlife conflicts in Tana River County, with an analysis based on respondents' feedback from questionnaires and in-depth interviews. These methods deal with both the environmental challenges and the economic factors that worsen these conflicts. The respondents were asked to suggest which adaptive measures they thought could reduce human-wildlife conflicts most effectively, under the environmental stressors and the socio-economic conditions. The results indicate that, successful strategies must be holistic and include training, planning, community participation and

income diversification. Among the key strategies identified were improved education and awareness on wildlife behavior, effective land-use planning, development of community-based wildlife conservation initiatives, support for alternative livelihoods, and training on climate-resilient practices.

The most popular adaptive measures suggested included education and awareness programs (82%), community-based initiatives (77%) and support for alternative livelihoods such as eco-tourism and sustainable agriculture (74%). The results show that, human-wildlife conflict management should be community-based, with local knowledge and participation being essential for conservation success.

As one of the community leaders put it;

> *"The majority of the time people do not know why wildlife enters their farms. With more education on animal behavior, we can avoid clashes (KII # 8)."*

Also, a farmer pointed out;

> *"If we could plan better and stop clearing forests near our farms, we would have fewer encounters with wildlife. We need to take charge of conservation efforts. (Survey Respondent # 5)."*

Moreover, during an interview with one of the Wildlife Officers he pointed out;

> *"Eco-tourism offers a way for the local communities to get income from wildlife while protecting it. This can reduce the dependency on land that causes wildlife encroachment (KII # 9)."*

These findings support climate change adaptation theory, which proposes that, building community resilience through education, livelihood diversification and sustainable practices reduces exposure to environmental stressors (Adger, 2013). These measures can help reduce human-wildlife conflicts while allowing communities to adapt to climate change.

Survey participants were asked to rate the effectiveness of various approaches to human-wildlife conflict reduction from "1-very effective" to "5-very ineffective" as shown in table 2 below.

Table 2: *Effectiveness of Conflict Mitigation Strategies*

Strategy	Very Effective (%)	Effective (%)	Neutral (%)	Ineffective (%)	Very Ineffective (%)
Community-led wildlife management programs	60	25	10	5	0
Sustainable agricultural practices	55	30	10	5	0
Collaboration between communities and conservation authorities	70	20	5	5	0
Technological solutions (e.g., wildlife monitoring)	45	35	15	5	0
Youth engagement in conservation initiatives	50	35	10	5	0
Compensation schemes for affected communities	65	20	10	5	0

Source: Field Data, 2025

The survey results showed that most participants considered community-led wildlife management programs (85%) and working with conservation authorities (90%) to be highly effective. The results indicate that local people's involvement in conservation decisions and decision-making processes is

essential for resolving conflicts. Compensation schemes received substantial backing from the participants (85%) because they understand the need to reduce the financial impact of wildlife damage. The effectiveness of technological solutions for wildlife monitoring received varied responses from participants who rated them between 80% effective to neutral. The human-wildlife conflict theory supports these findings because participatory management combined with proactive mitigation strategies, including compensation and sustainable practices effectively reduce conflict impacts (Hill, 2014). The research findings match the Adger *et al.,* (2015) study on community-based conservation which demonstrates the importance of local participation in natural resource management.

The survey participants evaluated the significance of local community involvement in wildlife conflict reduction through conservation efforts using a rating system from 1 (Very Important) to 5 (Not at All Important). The study results appear in the following table 3.

Table 3: *Local Community Involvement in Conservation Efforts*

Statement	1 (Very Important)	2 (Important)	3 (Neutral)	4 (Not Important)	5 (Not at All Important)
Local involvement improves conservation outcomes	90%	8%	2%	0%	0%
Community engagement builds trust between wildlife and people	85%	10%	4%	1%	0%
Participation in decision-making fosters sustainable practices	92%	6%	2%	0%	0%

Source: Field Data, 2025

Local community involvement stands as an essential factor which experts agree will minimize human-wildlife conflicts. Most participants in the findings survey highlighted the essential role of local community involvement in conservation initiatives. A high number of participants rated local involvement in improving conservation outcomes as "very important" at 90% and 85% confirmed that, community engagement leads to trust development between wildlife and humans. A total of 92% of participants agreed that, being part of decision-making processes leads to the development of sustainable practices. The research also confirms that, local people must take ownership of conservation work, since their active participation leads to better conservation results while building mutual trust with wildlife. The concept of co-management in natural resource management supports these findings, because shared authority between communities and conservation authorities produces superior results (Berkes, 2019).

The study investigated the resources along with support needed to execute effective strategy implementation effectively. Survey participants named financial support as their top priority, because it enables conservation programs and community initiatives together with training and compensation programs. The respondents identified technical training as a priority need to teach communities about modern wildlife monitoring and climate-resistant methods at a 70% level. The respondents supported government policies that integrate climate resilience into wildlife management at a rate of 60%. According to 55% of respondent's, government policies should establish partnerships between local communities, conservation organizations and the government. The findings indicate that, human-wildlife

conflicts in environmentally stressed areas need a multifaceted solution which unites financial support with expert training, official backing and collaborative alliances.

The survey participants were asked to explain how environmental stressors together with socio-economic conditions make human-wildlife conflicts worse in Tana River County. The respondents indicated that, the rising human population combined with expanding water and land requirements creates greater competition between humans and wildlife. The worsening environmental stressors like droughts together with habitat destruction force wildlife into human settlements thus, causing more dangerous wildlife-human interactions. Research by Nyhus (2016) demonstrates that, habitat encroachment becomes more frequent due to population expansion and agricultural development, which results in elevated wildlife interactions with human settlements. The expansion of human settlements into wildlife areas results in unavoidable conflicts between humans and wildlife for space and resources. The respondents in this study named droughts and habitat loss as primary environmental stressors which worsen human-wildlife conflicts. Research by Ogutu *et al.,* (2017) demonstrates that, East African droughts triggered by climate change have pushed wildlife towards human settlements, thus creating more human-wildlife conflicts to obtain food and water. The researchers Pettorelli *et al.,* (2019) explain how habitat destruction and fragmentation because of deforestation and agricultural expansion cause wildlife stress and force them to inhabit human-dominated areas.

Recent studies have extensively documented the repeated violent confrontations which occur between humans and wildlife. Mkonyi *et al*., (2017) explain that conflicts are occurring more often and leading to worse outcomes, including wildlife killings and wildlife-caused property destruction. Lindsey et al., (2022) support the research findings by demonstrating that, integrated conservation programs which include community-based conservation initiatives and sustainable land-use planning represent essential solutions for conflict resolution. Majority of the survey participants (77%) believed that, climate-resilient farming practices alongside community-based wildlife management systems, offer a solution to achieve environmental conservation alongside economic development. The respondents recommended improved wildlife damage compensation for affected communities, together with enhanced law enforcement and alternative livelihood support as solutions to reduce human-wildlife conflicts. The findings from this research support Madden's (2014) recommendations for handling climate change adaptation and human-wildlife conflict, through integrated and participatory natural resource management practices.

1.8 Conclusion

Addressing human-wildlife conflict (HWC) in Tana River County requires climate-resilient, multidimensional strategies due to the worsening effects of climate variability such as prolonged droughts and shifting vegetation that have escalated competition over scarce natural resources. These conflicts undermine biodiversity, threaten livelihoods, and compromise human security and food systems. Effective mitigation must adopt a systems-thinking approach that links ecological dynamics with land use and socio-economic factors, emphasizing solutions like restoring wildlife corridors, promoting climate-smart agriculture and pastoralism, and incorporating indigenous knowledge into land management. Crucially, success hinges on inclusive and participatory governance frameworks that empower local communities through education, incentives, and decision-making roles, while also enhancing early warning systems and conflict resolution mechanisms. Strong partnerships between government, civil society, researchers, and traditional leaders are essential to mobilize resources and address the root causes of HWC. Ultimately, achieving coexistence between humans and wildlife in Tana

River will depend on how well climate adaptation is integrated with biodiversity conservation and community development efforts, fostering a resilient and sustainable future.

1.9 Recommendations

To effectively reduce human-wildlife conflicts in Tana River County while building climate resilience, this paper proposes a multidimensional strategy that involves ecological restoration, inclusive governance, sustainable livelihoods, and climate-smart planning. These recommendations focus on actionable interventions that can be adopted by various stakeholders including national and county governments, conservation agencies, community-based organizations, and development partners within practical timelines.

Integrating Climate-Resilient Land Use Planning into County Development Strategies: To effectively address human-wildlife conflicts exacerbated by climate change, the Tana River County Government should revise its spatial and development plans to reflect climate-resilient and conflict-sensitive land use policies. This process, to be completed by early 2026, should be led in collaboration with the National Land Commission, the Ministry of Environment, Climate Change and Forestry, and supported technically by the National Drought Management Authority (NDMA) and the Kenya Meteorological Department. These plans must protect migratory wildlife corridors, preserve pastoralist grazing zones, and prevent settlement in flood-prone or ecologically sensitive areas. Community involvement through participatory mapping and consultation processes is critical to ensure local buy-in and sustainable implementation.

Promoting Community-Based Natural Resource Management and Eco-Compensation: Starting mid-2025, Kenya Wildlife Service (KWS), in partnership with the Northern Rangelands Trust (NRT) and other NGOs, should scale up community-based natural resource management (CBNRM) initiatives in conflict hotspots like Kipini and Garsen South. This should involve creating co-management structures that empower local communities to protect biodiversity while receiving direct economic incentives through eco-compensation schemes. Such schemes should reward communities for conserving critical wildlife habitats and tolerating wildlife presence. Additionally, the initiative should include training of community wildlife scouts, deployment of mobile human-wildlife conflict response teams, and installation of wildlife movement early warning systems.

Supporting Climate-Smart Livelihood Diversification: To reduce dependency on fragile ecosystems and mitigate resource-based conflicts, the Ministry of Agriculture and development agencies such as FAO and UNDP should, by mid-2026, promote alternative, climate-smart livelihoods in Tana River County. Programs should focus on drought-tolerant crops, solar-powered irrigation, apiculture, and eco-tourism, especially targeting youth and women in vulnerable areas like the Tana Delta. These interventions must include training, startup support, and integration with markets to ensure that livelihood diversification is both practical and sustainable over the long term.

Establishing a County-Level Human-Wildlife Conflict Prevention Unit: By late 2025, the County Directorate of Environment, Natural Resources, and Climate Change should establish a dedicated Human-Wildlife Conflict Prevention and Response Unit. This unit should operate in close coordination with Kenya Wildlife Service, Kenya Forest Service, and local leaders to respond rapidly to conflict incidents such as crop destruction or livestock predation. The unit should utilize innovative deterrents

like beehive fences, chili-based repellents, and solar-powered electric fences, while also integrating Indigenous Knowledge Systems (IKS) for community-centered conflict prevention. Real-time mobile reporting tools and localized early-warning systems should be part of the response framework.

Strengthening Climate and Wildlife Education through Schools and Community Platforms: To foster a culture of coexistence and climate awareness, the Ministry of Education, in partnership with Kenya Wildlife Service and local NGOs, should roll out a county-wide environmental and wildlife education program by early 2026. This initiative should be implemented through primary and secondary schools, religious institutions, and community gatherings (barazas), particularly in areas like Hola, Wenje, and Bura where human-wildlife interactions are frequent. The curriculum should incorporate modules on climate change adaptation, sustainable resource use, and respectful human-wildlife relations, using local languages and storytelling to enhance relevance. Empowering youth and community elders with knowledge will strengthen local stewardship, reduce fear-based responses to wildlife presence, and support long-term resilience strategies.

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