

Assessing The Impact Of The Green Anglican Movement On Household Climate Resilience In Kaiti, Makueni County

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Abstract

One of the measures Anglican churches have taken to become more climate-resilient through their environmental stewardship is through the Green Anglican Movement (GAME). The study assessed the effectiveness of GAME initiatives in improving the climate resilience of Kaiti in Makueni County, Kenya. The study specifically focused on the effects of awareness programmes as well as tree planting, waste management, and clean energy training on household climate resilience. This study used a mixed method in which both quantitative and qualitative methods were applied. A sample of 682 members of the Anglican Church of Kenya (ACK) from the Ukia Deanery was selected via stratified and purposive sampling techniques, of which 215 participants were targeted. The data collected were both quantitative and qualitative with the help of structured questionnaires and interviews. Data analysis included descriptive statistics, linear regression, and thematic analysis. The results indicated that awareness programs had a positive and significant impact on climate resilience ($\beta = 0.350$, $p < 0.05$), while education about tree planting had a more positive and significant effect ($\beta = 0.410$, $p < 0.01$). Both waste management training ($\beta = 0.320$, $p < 0.05$) and clean energy training ($\beta = 0.406$, $p < 0.05$) also had significant positive impacts on household resilience. In conclusion, the study argues that faith-based environmental programs help advance environmental sustainability and community climate resilience.

Keywords: *Climate resilience, Green Anglican Movement, Faith-based environmental stewardship, Tree planting, Clean energy, Waste management, Kenya.*

1. Introduction

Climate resilience is the ability of people, households and communities to adapt to, endure, withstand and bounce back from climate-related shocks and stressors, maintaining their livelihoods, wellbeing and key functions. Whereas climate mitigation refers to the reduction of GHGs, environmental sustainability refers to long-term preservation of natural resources; climate resilience is mainly about the adaptive capacity of communities in facing the short- and long-term effects of climate change (Dharmarathne et al., 2024). Throughout the world, climate change, including increasing temperatures, climate extremes such as droughts, irregular rainfall, flooding and other climate-related events, has exacerbated food security, water availability, agricultural production and rural livelihoods. Despite progress made with international instruments like the Paris Agreement, the United Nations Framework Convention on Climate Change (UNFCCC) and

the Green Climate Fund (GCF) in the promotion of climate adaptation and mitigation at the global level, there is still a lack of evidence demonstrating the successful implementation of such actions at the community level. This has led to a growing focus on locally-focused strategies which incorporate indigenous knowledge, community involvement and local grassroots institutions to strengthen household resilience.

High climate sensitivity of livelihoods and poverty, and low climate resilience in Sub-Saharan Africa (SSA), make it one of the most vulnerable regions to climate change (Ebi et al., 2021). Governments and development partners have taken actions such as climate-smart agriculture, drought early warning systems, ecosystem restoration, and natural resource management. But empirical research is increasingly challenging the sustainability of these interventions, as many are externally designed, project-based, and poorly embedded in local social and cultural institutions (Ogunode et al., 2025). While the African Union (2022) recognizes the social legitimacy and the capacity of faith-based organizations to drive long-term behavioural change, and their extensive community networks, this often excludes them from adaptation efforts. However, there is mixed evidence to date regarding faith-based climate action. Religious organisations have successfully implemented environmental awareness and community mobilisation, but few studies have assessed if this impacts actual household climate resilience.

Climate change continues to negatively affect agricultural production, water security, and household livelihoods, especially in the arid and semi-arid lands (ASALs) of Kenya, where frequent droughts, unreliable rainfall, and land degradation are commonplace (Department of Lands, 2021). There has been a strengthening of climate adaptation planning and environmental management through national policy frameworks, such as the National Climate Change Action Plan (NCCAP) and the Climate Smart Agriculture Strategy (CSAS). However, these policy measures remain insufficient in their implementation at the local level, where community engagement and the implementation of adaptation programmes are still low, and the integration of indigenous and faith-based knowledge systems is limited. Thus, most climate interventions still focus on technical solutions while neglecting locally trusted institutions that can shape community behavior and enhance adaptation capacity.

The Anglican Church of Kenya (ACK) is one of these institutions that has become a significant player in the area of environmental stewardship and community adaptation through its Green Anglican Movement (GAME). GAME runs projects such as environmental awareness drives, tree planting campaigns, waste management projects, clean-up projects, and clean energy technologies, incorporating the Bible into environmental work (Mash, 2021; Oino & Musau, 2024). The interventions aim not only to enhance environmental sustainability and support climate mitigation through ecosystem conservation and reduced emissions, but also to boost household climate resilience by promoting behavioural change, engaging communities, and supporting sustainable livelihoods. Yet, although GAME has spread to several Anglican dioceses in Kenya, empirical studies that show how these interventions have increased measurable household resilience are still scarce.

Some dimensions of climate adaptation have been looked at individually in recent studies but are identified as having important knowledge gaps. Ruiz-Mallén et al. (2022) found that while grassroots EE had some beneficial effect on environmental awareness, it had little impact on collective action due to a lack of institutional integration. Likewise, Eichinger et al. (2022) reported that there was no guarantee of continued behavioral modification among the participants after being provided with more climate knowledge. These studies offer good insights into EE, but they

have not investigated faith-based EE programmes nor the impact of EE programmes on household resilience outcomes. However, in Kenya, previous studies have focused on government-based initiatives for climate adaptation, on climate-smart agriculture, or on donor-funded food security and livelihood resilience, but have paid limited attention to the positive effects of church-based environmental initiatives and their measurable impact on the adaptive capacity of household members. Therefore, it is not known whether any significant differences in household resilience result from engaging in faith-based environmental stewardship activities, such as GAME, beyond raising environmental awareness.

In Kaiti Sub-County, Makueni County, households are still highly vulnerable to climate risks as a result of recurrent droughts, irregular rains, failed harvests, water scarcity coupled with reliance on rain-fed agriculture. While the Anglican Church has been at the forefront of taking action on GAME issues in the area, there is limited empirical evidence on the effect of environmental awareness programmes, tree planting education, waste management training, and clean energy promotion on strengthening households' climate resilience. This knowledge gap is critical to the ability to assess if faith-based environmental efforts can support government/adaptation by donors. The study, therefore, examines the influence of the Green Anglican Movement on household climate resilience through an empirical analysis of the contribution of key environmental stewardship interventions by the Green Anglican Movement towards enhancing the adaptive capacity and resilience of households in Kaiti, Makueni County.

2. Literature Review

The empirical evidence indicated that interventions that increase knowledge, diversify livelihood options, strengthen natural resource management, and augment community adaptive capacity increase household climate resilience. Climate resilience is not the same as environmental sustainability or climate mitigation, as it is about how households can prepare for, cope with, adjust to, and bounce back from climatic shocks while sustaining their livelihoods. It is, therefore, interventions like environmental education, tree planting, waste management, and clean energy that support resilience only if they strengthen the adaptive capacity of households, not just by conserving the environment. Existing research generally confirms the impact of these interventions, although there are important variations in how resilience is gained and in the conditions under which impacts can be maintained.

Environmental Education and Household Climate Resilience.

EE components have repeatedly been noted as a key enabler for climate resilience, as they help to increase households' awareness of climate risks, strengthen decision-making and encourage the uptake of adaptive practices. Ruiz-Mallén et al. (2022) identified that grassroots environmental education contributed to enhancing environmental knowledge, critical thinking and engagement in climate action. Similarly, Eichinger et al. (2022) found that climate education was effective in raising environmental awareness among youth, but not always resulting in long-term changes in behavior, thus indicating that knowledge is not enough to build up resilience. By contrast, Mbah and Liberty (2025) believe that the effectiveness of climate education is enhanced by including its incorporation with indigenous knowledge and culturally relevant learning methods that promote the process of adaptation in the local community.

These studies show that EE helps to enhance the household resilience of communities by helping households predict climate risks and take adaptive action. The literature shows that; however, better resilience outcomes can be seen when the education intervention is also paired with trusted community-based institutions that can reinforce educational behaviour change. The majority of current research is on schools, community organisations or government initiatives, with little research on faith-based environmental education. As a result, there is limited empirical evidence on the effectiveness of climate change awareness programs in improving household resilience to climate change, such as those delivered by churches as part of the Green Anglican Movement (GAME).

Planting new trees and supporting household climate resilience.

Tree planting is recognised as a climate adaptation intervention and an environmental conservation strategy. To achieve successful reforestation, it is crucial to involve communities in the process and raise environmental awareness, according to Rakshit (2024). Martin et al. (2021) provide a demonstration of the benefits of tree planting on biodiversity conservation, ecosystem restoration, and carbon sequestration while warning that these benefits are only long-term if they are continuously monitored and owned by the community. Trees can also enhance soil quality, regulate microclimates, mitigate erosion, increase water infiltration, and improve public health, all of which increase communities' resilience, as reported by Turner-Skoff and Cavender (2019). Likewise, community-based tree-planting initiatives that use environmental education as a catalyst enhance environmental sustainability and contribute to resilience to climate variability, in line with Anabaraonye et al. (2022).

While these studies have consistently shown the ecological impacts of tree planting, most of the assessments of the environmental impacts of tree planting have focused on restoring biodiversity and sequestering carbon, and have not been based on the adaptive capacity of the household. The benefits of tree planting for households' vulnerability to climate shocks (conservation of water and soil resources, diversification of livelihoods, increased environmental vulnerability) are rarely mentioned explicitly. Moreover, relatively little research has investigated church-based tree-planting programmes and the extent to which they bring tangible benefits, such as increased household resilience, in rural communities in Kenya.

Waste Management and Household Climate Resilience

Good waste management promotes climate resilience by enhancing environmental health, minimizing pollution, safeguarding water resources, and mitigating the high risk of contracting diseases associated with climate change, thereby affecting households' resilience in the process. According to Kurniawan et al (2024), sustainable waste management systems decrease GGE by implementing recycling and circular economy practices. Likewise, Okorundu et al. (2024) have observed that the lack of proper disposal practices enhances environmental degradation and increases vulnerability in developing countries. In addition, Chaudhary et al. (2024) show that the reduction of waste, recycling, and energy recovery are also means of climate mitigation and environmental quality improvement. Abubakar et al. (2022) noted that better waste segregation and disposal systems at the community level help lower environmental risks, while decentralising waste management boosts local environmental quality and resilience (Thomas et al. 2023).

For the reviewed studies, effective waste management is broadly seen to contribute to climate resilience through the reduction of environmental risk and enhancement of community adaptive capacity. However, the vast majority of research focuses on environmental or public health

outcomes rather than on how waste management directly enhances household resilience during events such as floods, droughts, or water scarcity. Furthermore, the extent of evidence on how community-based waste management programmes can be run through faith-based organisations is limited. In the absence of this, this study provides a gap of importance and relevance.

Clean Energy Adoption and Household Climate Resilience

Renewable energy technologies have become an increasingly important means of adaptation, as they enhance household energy security and reduce reliance on environmentally harmful energy sources. Suman (2021) found that solar energy, biogas, and improved cook stoves help mitigate the negative impacts of greenhouse gas emissions, while simultaneously improving the health and socio-economic outcomes of a household. The authors of the study, Hasselqvist et al. (2022), also state that decentralised household energy systems increase resilience by enhancing communities' resilience to challenges to traditional energy systems due to climate change. Renewable energy adoption is also correlated with sustainable development and economic resilience, as highlighted by Benhacene and Hussien (2025), and by Eitan (2024), who underlines the enhanced accessibility and adaptive capacity of decentralised energy systems. In Kenya, Mutura et al. (2024) attributed improved household resilience to the adoption of solar energy. However, they noted that financial constraints and a lack of information remain major barriers to its adoption.

Clean energy enhances resilience through increased energy reliability, reduced vulnerability of livelihoods, reduced household expenditure on traditional fuels, and the enablement of productive economic activity during climate risk events. Much of the existing evidence, however, assesses technology adoption rather than the institutional mechanisms that foster it. It is therefore unclear whether FBOs like GAME are a successful means of supporting household uptake and adoption of clean energy technologies, and whether clean energy technologies are effective at enhancing resilience among vulnerable rural communities.

Faith-Based Environmental Stewardship and Household Climate Resilience

Climate adaptation is increasingly seen to rely on the community. In this context, there are important roles played by Faith-based Organisations, due in particular to three characteristics: a wide grassroots network, a moral authority, and influencing collective behavior. Religious institutions foster environmental stewardship by mobilising the communities and embedding ecological concerns in their teachings, as seen by Hearn et al. (2024). Climate change poses a moral and spiritual issue, as seen in the work of Salter and Wilkinson (2023), who argue that it is a call to action for behavioural change and environmental responsibility. Bomberg and Hague (2018) also show that religious identity and social networks enhance collective engagement with environmental action, and Puglisi and Buitendag (2022) suggest that, in addition to scientific and policy measures, moral transformation is needed to be effective in responding to environmental crises. Boorse and Jablonski (2024) also found that partnerships among faith-based organizations, governments, and development agencies boost trust, engagement, and the implementation of climate projects.

Although there is consensus about the significance of the role of faith-based organisations in promoting environmental stewardship, published research tends to focus on testing and measuring levels of environmental awareness, environmental protection, and community engagement. Very little empirical research has assessed the impact of faith-based environmental interventions on measurable changes in household climate resilience in rural Africa. Moreover, there was no empirical study conducted specifically on the Green Anglican Movement that assessed the

combined effects of the EE, tree planting, waste management, and clean energy interventions on the resilience of the households in Kaiti, Makueni County.

The literature reviewed shows a general agreement that EE, planting of trees, waste management, adopting clean energy, and faith-based environmental stewardship positively bolster adaptive capacity by enhancing knowledge, health of ecosystems, lessening environmental risks, providing greater livelihood security, and increasing community involvement. Important restrictions, however, still exist. These interventions are considered independently in most studies, but not as contributing to the climate resilience of households. Current literature also tends to focus more on environmental sustainability or climate mitigation or ecological conservation than on the measurable ability of households to anticipate, absorb, adapt to, and recover from shocks related to climate change. Furthermore, there is a lack of empirical research to support the work on the effectiveness of church interventions in building household resilience in vulnerable rural communities, and the function of faith in the development of environmental programmes. In this study, we explore these gaps through a comprehensive analysis of how the Green Anglican Movement's integrated environmental awareness programmes, tree planting education, waste management training, and clean energy promotion collectively impact the climate resilience of households in Kaiti, Makueni County..

1.1 Hypotheses Development

The literature reviewed and the three theoretical lenses reviewed all indicate that the interventions of the Green Anglican Movement (GAME) can have a positive effect on building household climate resilience through strengthening adaptive capacity, sustainable environmental practices, and facilitating community action. The stewardship theory (ST) indicates that moral responsibility and shared values drive individuals to make contributions to environmental conservation. The Sustainable Livelihoods Framework (SLF) suggests that building resilience involves increasing the human, natural, social, and physical assets of households. Ecotheology also states that the impact of faith-based teaching on environmental behaviour is manifested in terms of responsible stewardship of creation. Based on these views, the following hypotheses were formulated.

H1: GAME awareness programmes positively influence household climate resilience.

Environmental awareness programmes increase environmental awareness, preparedness, and adaptive practices, thereby enhancing household resilience. Past research has demonstrated that EE positively influences environmental responsibility and climate action, but for lasting behavioural change it is necessary to keep engaging with the community and institutional support (Ruiz-Mallén et al., 2022; Eichinger et al., 2022). The Sustainable Livelihoods Framework posits that when knowledge improves, human capital improves, and Stewardship Theory and Ecotheology provide for an understanding of how teaching responsibility for the environment strengthens responsible environmental behaviour. Therefore, it is expected that as a result of participation in GAME awareness programmes, households will be better able to anticipate, prepare for, and adapt to climate-related shocks.

H1: GAME awareness programmes have a positive and significant influence on household climate resilience.

H2: GAME tree planting education positively influences household climate resilience.

Tree-planting education provides households with knowledge and skills for environmental restoration and sustainable land management. Trees increase soil fertility, control soil erosion, increase water-holding capacity, moderate local temperatures, and provide livelihood resources which help build resilience during climate-induced shocks (Martin et al., 2021; Turner-Skoff & Cavender, 2019). Natural capital is recognised as a key factor in household resilience as part of the Sustainable Livelihoods Framework, and environmental stewardship is recognised as a shared moral obligation as part of Stewardship Theory and Ecotheology. Thus, the adaptive capacity and resilience of households involved in the GAME tree planting education can be expected.

H2: GAME tree planting education has a positive and significant influence on household climate resilience.

H3: GAME waste management training positively influences household climate resilience.

Training in waste management helps make households more resilient to the effects of climate change by reducing environmental pollution, protecting water resources, promoting good sanitation practices, and decreasing health risks from environmental hazards. Sustainable waste management also improves the community's readiness and vulnerability to environmental degradation (Abubakar et al., 2022; Thomas et al., 2023). The Sustainable Livelihoods Framework provides a clear link between the sustainability of livelihoods and an improved environment, which brings better livelihood assets, and Stewardship Theory and Ecotheology provide an ethical basis for responsible management of the environment. As a consequence, the households involved in the GAME waste management training should be more resilient to climate change.

H3: GAME waste management training has a positive and significant influence on household climate resilience.

H4: GAME clean energy training positively influences household climate resilience.

Clean energy training helps to encourage the use of renewable energy technologies, which enhance the energy security of households, lessen reliance on climate-sensitive natural resources, and increase their adaptive capacity in the face of climate shocks. Renewable energy technologies have been shown in previous research to have positive impacts on household resilience, as they facilitate access to energy, mitigate environmental shocks and stresses, and enable sustainable livelihoods (Suman, 2021; Hasselqvist et al., 2022; Mutura et al., 2024). Access to energy technologies is seen as an increase in household physical and financial assets in the Sustainable Livelihoods Framework. In Stewardship Theory / Ecotheology, the use of environmental resources is encouraged. Thus, it is expected that households trained in the GAME clean energy project will have increased climate resilience.

H4: GAME clean energy training has a positive and significant influence on household climate resilience.

2. Theoretical Review

This study is grounded in Stewardship Theory, Sustainable Livelihoods Framework (SLF), and Ecotheology, which together illustrate the behavioural, livelihood, and spiritual pathways of the Green Anglican Movement (GAME) to improve household climate resilience. The three perspectives do not overlap, but they do complement one another and offer complementary answers to the question of "why" and "how" households engage in environmental stewardship, and why faith-based institutions are effective vehicles to catalyze community climate action.

The theory of stewardship (Donaldson & Davis, 1991) suggests that people are motivated to act in the interests of the group, not for their personal gain. The theory focuses on the importance of trust, shared values, ethical leadership and moral responsibility in explaining behaviour (Pastoriza & Arino, 2008; Schillemans & Bjurstrom, 2019). It was originally a construct for organisational management. Still, it has been used more and more in environmental governance and community development, as much of environmental conservation is dependent on voluntary collective action. In this study, Stewardship Theory provides a framework for understanding why people in the Green Anglican Movement are willing to engage in environmental awareness programmes, tree planting, waste management and clean energy programmes. GAME creates a sense of responsibility for environmental conservation in households, which helps them become more resilient to climate shocks through more sustainable practices. It is assumed, however, that people will always be doing this in the best interests of the public, and that structural factors like poverty, poor infrastructure and lack of resources don't impact on the resilience of rural households.

The Sustainable Livelihoods Framework (SLF), devised by Chambers and Conway (1992) and later adopted by the Department for International Development (DFID), provides an overview of livelihood resilience. The framework proposes that five types of capital – human, natural, social and physical, and financial assets – all need to be strengthened in the household for it to become resilient (Natarajan et al., 2022). SLF is different from Stewardship Theory, which is about behavioural motivation; here it is about the ability of households to prepare for, absorb, adapt to, and recover from climate-related shocks given the nature of environmental interventions. The present study highlights the benefits of awareness programmes for improving human capital by increasing awareness about the climate; tree planting education for strengthening natural capital through ecosystem restoration and soil conservation; waste management training for natural and physical capital by protecting environmental health; and clean energy training for strengthening physical and financial capital by promoting reliable and affordable energy technologies. These interventions work together to increase adaptive capacity and household resilience. However, the framework has been challenged for failing to account for the importance of the cultural, religious, and moral dimensions that shape engagement in resilience-building activities.

Ecotheology is used in conjunction with other theories, adding a spiritual component to the concept of environmental stewardship. Ecotheology is based on Christian teachings, and it is based on the biblical principles, including Genesis 2:15 (Conradie, 2020; Ratanya & Ratanya Mukaria, 2021), which say that caring for creation is a moral obligation. While Stewardship Theory applies to a general understanding of moral responsibility, Ecotheology applies to the understanding of motivation for environmental behaviour through religious beliefs and church teachings. In GAME, the Bible, sermons, and church fellowship promote awareness of the environment, planting trees, managing waste, and using clean energy as ways to live as Christians. Some have criticised Ecotheology for neglecting socio-economic influences on environmental action, but the former is very pertinent as GAME is definitely a faith-based environmental action.

The three theories have been brought together to provide a framework for the study. Ecotheology accounts for the spiritual drive towards caring for the environment, while Stewardship Theory accounts for the household's voluntary behavioural commitment to engage in GAME activities and how participation strengthens their livelihood assets and adaptive capacity, as explained through the Sustainable Livelihoods Framework. They offer a unified theory of how the four GAME interventions help to strengthen the household climate resilience in Kaiti, Makueni County.

3. Materials and Methods

This research used a convergent mixed-methods research approach, where quantitative and qualitative data were collected at the same time, analysed independently, and then later brought together to gain a comprehensive understanding of how the Green Anglican Movement (GAME) affects household climate resilience. The quantitative approach analyzed the statistical relationship between the GAME interventions and the climate resilience of the household; the qualitative approach analyzed the experiences and perceptions of participants on the implementation and effectiveness of the interventions. The study was undertaken in Kaiti Sub-County, Makueni County, in the highly vulnerable semi-arid region in which rain was found to be unpredictable, prone to dry spells, unavailable in certain seasons and much scarcer than average in others, and in which water availability is low, droughts were regular occurrences and land degradation was pronounced. The study examined four GAME interventions (environmental awareness programmes, tree-planting education, waste management training, and clean energy promotion). It explored their role in bolstering the adaptive capacity of households. Household climate resilience was defined by the capacity of households to anticipate, prepare, adapt and recover from climate-related shocks, while maintaining their livelihoods.

A total of 682 Anglican Church of Kenya (ACK) members in the congregations of the Ukia Deanery, comprising 667 household heads, five priests, and 10 lay readers who actively participate in GAME activities, were targeted. Household heads were the study population, as they are directly involved in making decisions regarding their households' livelihoods and adaptation. At the same time, priests and lay readers were key informants as they are directly involved in the implementation of GAME programmes. Stratified and purposive sampling were used to get 215 respondents. Household heads were sampled using stratified sampling to guarantee proportionality in the participating parishes, while the samplers of priests and lay readers were drawn through purposive sampling because of their special knowledge of GAME implementation. Household heads were approached with structured questionnaires, and priests and lay readers were approached with semi-structured questionnaires. To test the clarity, reliability, and validity of the instruments, a pilot study was conducted on 68 respondents from Machakos County, which shares similar socio-economic and environmental characteristics with the study area. The pilot sample size was about 10% of the total sample size, which was also recommended for pilot testing in social science research. Ambiguous and repetitive questions in the questionnaire were changed based on feedback from the pilot.

The questionnaire included five constructs (Environmental Awareness Programmes, Tree Planting Education, Waste Management Training, Clean Energy Training, Household Climate Resilience), with the answers ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The scores on each construct were averaged to create composite scores, and higher scores reflect higher involvement in GAME interventions and higher climate resilience. Cronbach's alpha was used to test the reliability of items of all constructs, all of which were found to have alpha levels greater than the recommended level of 0.70, indicating acceptable internal consistency. To enhance the content and construct validity, experts from various disciplines related to climate resilience and

environmental studies conducted an expert review. 156 questionnaires were received from the 215 respondents, and these were used for quantitative analysis because they had little missing data and were complete except for a few incomplete items. The interviews with the selected priests and lay readers were completed and included in the qualitative analysis.

The data collected were quantitative data, which were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Respondent characteristics and study variables were summarised using descriptive statistics (frequencies, percentages, means and standard deviations), and multiple linear regression was used to explore the impact of the four GAME interventions on household climate resilience. Diagnostic tests for normality, multicollinearity, and heteroscedasticity were performed to ensure that the assumptions of regression analysis were met. Qualitative data were transcribed and analysed thematically using NVivo software, and categorised and themed. The quantitative and qualitative results were integrated during interpretation, where the results of the interviews were utilized to explain and supplement the statistical relationships found in the regression analysis. The St. Paul's University Research Ethics Committee gave ethical approval, and informed consent was obtained from all participants before the collection of data. Any participant who wished to take part was accepted, and the data of the study were treated confidentially, anonymously, and in a secure manner.

4. Results and Discussions

4.1 Descriptive Results

Descriptive statistics of the study variables are given in Table 1 for 156 valid responses. In general, the participants expressed low- to medium-level perceptions of the implementation and effectiveness of the interventions of the Green Anglican Movement (GAME) in strengthening household climate resilience. Although the respondents recognized that there were GAME activities, mean scores ranged from 2.42 to 2.53 on a five-point Likert scale, indicating they perceived insufficient participation in or success with GAME activities. This indicates a great potential to improve implementation and engagement in the community. However, among the independent variables, tree planting education and clean energy training had the highest mean scores (2.48 – 2.50), showing moderate preference and implementation of the interventions, when compared to the other interventions. The mean scores for the awareness programmes ranged from 2.43 to 2.48, indicating that although participation in environmental education activities was low, it was significant. The lowest mean values were obtained in waste management training (2.42 to 2.48), indicating comparatively less involvement in recycling, waste segregation and proper disposal. Household climate resilience averaged between 2.49 and 2.53, signifying that the respondents felt that their household condition preparedness, adaptive capacity, and recovery from climate shocks were moderate. The standard deviations varied from 1.16 to 1.26, which is moderate variability amongst the respondents' perceptions.

Table 1: Summary Descriptive Statistics for Study Constructs (N = 156)

Construct	Number of Items	Range of Item Means	Range of Item SDs
Awareness Programmes	5	2.43–2.48	1.19–1.22
Tree Planting Education	5	2.48–2.50	1.17–1.19

Construct	Number of Items	Range of Item Means	Range of Item SDs
Waste Management Training	5	2.42–2.48	1.21–1.26
Clean Energy Training	5	2.48–2.50	1.17–1.19
Climate Resilience	4	2.49–2.53	1.16–1.21

4.2 Inferential Results

All study constructs were found to be satisfactory in terms of internal consistency from reliability analysis. The Cronbach's alphas of the items ranged from 0.754 to 0.807, and the overall reliability coefficient was 0.777, which is higher than the recommended value of 0.70. The results of these findings showed that the questionnaire had the reliability for the intended constructs and was appropriate for the subsequent statistical analysis.

To examine the overall effect of the four GAME interventions on household climate resilience, multiple linear regression models were then fitted. The regression model was statistically significant ($F(4,151) = 228.481$; $p < .001$) and accounted for about 85.8% of the variation in household climate resilience ($R^2 = 0.858$; Adjusted $R^2 = 0.854$). While this model had very high explanatory power, the high R^2 values should be interpreted with caution, as the predictor variables are highly related environmental stewardship interventions.

All four GAME interventions had a significant and positive impact on household climate resilience through regression coefficients ($p < .001$). The highest standardized effects were achieved by clean energy training ($\beta = 0.406$), by tree planting education ($\beta = 0.352$), by waste management training ($\beta = 0.308$), and by environmental awareness programmes ($\beta = 0.302$). The results suggest that the households that were engaged in the GAME cleaning activities saw the highest increase in adaptive capacity, followed by tree planting, waste management, and awareness campaigns.. The regression equation is:

$$CR = -0.833 + 0.299EP + 0.355TP + 0.300WM + 0.393CE$$

where CR represents Climate Resilience, EP Environmental Awareness Programmes, TP Tree Planting Education, WM Waste Management Training, and CE Clean Energy Training.

Table 2: Inferential Statistics Summary (N = 156)

Component	Statistic	Result
Reliability	Cronbach's α (Awareness)	0.781
	Cronbach's α (Tree Planting)	0.769
	Cronbach's α (Waste Management)	0.754
	Cronbach's α (Clean Energy)	0.773

Component	Statistic	Result
Model Fit	Cronbach's α (Climate Resilience)	0.807
	R	0.926
	R ²	0.858
	Adjusted R ²	0.854
	Std. Error	0.4479
Regression	ANOVA F(4,151)	228.481 (p < .001)
	Awareness Programmes	$\beta = 0.302$ (p < .001)
	Tree Planting Education	$\beta = 0.352$ (p < .001)
	Waste Management Training	$\beta = 0.308$ (p < .001)
	Clean Energy Training	$\beta = 0.406$ (p < .001)

School-based environmental awareness initiatives have a positive impact on the resilience of the household climate, in line with the findings of Ruiz-Mallén et al. (2022), which indicate that grassroots environmental education (GEE) fosters critical thinking, environmental responsibility, and engagement with climate action. It also backs Mbah and Liberty (2025), who spoke about the need for culturally relevant climate education in African communities. The relatively weak impact of awareness programmes in the current study corroborates the findings of Eichinger et al. (2022), who found that “higher levels of climate knowledge do not necessarily lead to lasting behavioral change”. This implies that awareness-building should not be considered the sole strategy unless supported by actions and interventions, institutional support, and household resources. Tree planting education had the second highest impact, with results from Rakshit (2024) concluding that community involvement is associated with better environmental restoration, and Anabaraonye et al. (2022) that education-supported tree planting is a way of strengthening climate resilience. Results also align with those of Martin et al. (2021), who noted that tree planting can have positive outcomes only if it is long-term monitored and community-driven. Tree planting in Kaiti may have had a significant impact due to its direct impact on soil erosion, loss of vegetation, moisture loss, and reliance on rain-fed agriculture.

Waste management training also had a positive impact on resilience, as noted by Kurniawan et al. (2024), who also attributed reduced emissions and environmental sustainability to recycling and circular-economy activities. This finding aligns with Abubakar et al. (2022), who determined that better waste segregation and disposal decrease environmental vulnerability, and Thomas et al. (2023), who linked waste systems with local economic resilience. On the other hand, its less pronounced impact could be due to the limited recycling system, lack of markets for reusables,

and the indirect value of waste management in a rural area. Clean energy training was the most strongly associated with, and consistent with, the results of Suman (2021), Hasselqvist et al. (2022), and Eitan (2024), who found that renewable and decentralised energy systems enhance household health, access and resilience to energy shocks. It specifically reinforces Mutura et al. (2024), whose finding was that high uptake of solar energy in Kenya was linked to high household resilience, and that financial and informational constraints were found. Clean energy might have yielded better results in Kaiti because of the immediate benefits of solar systems and improved cookstoves, such as reduced fuel costs, less reliance on firewood, better lighting, and more reliable access to energy.

The overall impact of the four interventions is supported by findings from Hearn et al. (2024), Salter and Wilkinson (2023), and Bomberg and Hague (2018), who found that religious organisations can mobilise environmental action through moral teachings, trusted networks, and collective identity. These results also lend evidence to the claims of Boorse and Jablonski (2024) that faith-based collaboration enhances participation and the effectiveness of climate action. The findings thus support the Ecotheology and Stewardship Theory by showing how spiritual values and the sense of responsibility can drive environmental behaviour and the Sustainable Livelihoods Framework by providing evidence on the benefits of clean energy, trees, knowledge and environmental health to livelihood assets. However, self-selection may also play a role in participation, as richer, better-educated, or more environmentally concerned households might be more inclined to participate in GAME activities. The reported resilience outcomes thus suggest strong associations but do not provide definitive evidence that GAME interventions were the sole cause of the outcomes.

5. Conclusions

This study found that the interventions by the Green Anglican Movement are positively related to household climate resilience in Kaiti, Makueni County, with slight differences in the strength of the relationship between the interventions and household climate resilience in the four interventions. The strongest link was seen with clean energy adoption, with tree planting education, waste management training, and environmental awareness programmes following. Some interventions with direct, immediate livelihood impacts like access to reliable energy, reduction of fuel dependency, soil conservation, etc, are likely to have more resilience implications than awareness raising alone. The study builds on previous research by demonstrating a way in which religious values can be linked to meaningful household adaptation in a rural Kenyan context through a lens of faith-based environmental stewardship. The results contribute to Ecotheology by illustrating that spiritual beliefs can drive efforts for creation care, to Stewardship Theory by revealing the voluntary nature of collective responsibility, and to the Sustainable Livelihoods Framework by illustrating how environmental initiatives can bolster human, natural, physical, and social livelihood assets. In this way, the study offers an integrated account of the role of churches as trusted grassroots institutions in climate action. The results of this research, however, cannot be interpreted as causal results, because the design of the research used a cross-sectional method. Household resources, awareness, education, and participation could have influenced the relationships observed. GAME is a complementary mechanism that can be an important way to enhance the climate resilience of rural communities in environmentally sensitive areas.

6.0 Recommendations

The Anglican Church of Kenya (ACK) should increase its efforts to promote clean energy, as this has the highest positive association with household climate resilience, and invest in promoting solar power in its parishes by increasing access and affordability; support community training; and foster partnerships with county governments and energy providers, alongside development partners, to enhance access and affordability. The Church should also increase its tree planting efforts through the creation of Parish Nurseries, and liaising with the Kenya Forest Service and County Environmental Departments to encourage agroforestry and the restoration of ecosystems. Environmental awareness programmes should be embedded in the sermons, youth ministries, and community outreach programmes. They should promote sustainable environmental practices, while waste management programmes should promote composting, recycling, and good waste disposal practices, involving the National Environment Management Authority (NEMA), county governments, and environmental NGOs. Future research should focus on how household climate resilience changes over time through longitudinal studies; comparative studies of different Anglican Dioceses and faith traditions to compare and contrast outcomes; and objective measures of resilience and measures of perceptions of resilience, to provide a stronger evidence base on the impact that the practice of environmental stewardship has on climate adaptation in a faith context.

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