

# Influence of Socio-Economic Activities on Conservation of Non-Gazetted Forest Reserves in Kisii County

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*Abstract- The phenomenon of rapid population expansion exhibits significant disparities across different regions of the globe, leading to a heightened and unsustainable exploitation of forest resources. Deforestation has had adverse effects on local livelihoods and regional economies. The purpose of the study was to find out the influence of population growth on conservation of non-gazetted forest reserves in Etago sub-county, Kisii County. The purpose of the study was to assess the influence of socio-economic activities on conservation of non-gazetted forest reserves in Kisii County. The inclusion of these factors is of great importance as it helps to notify the ministry of forestry of the need to establish a well-informed policy framework. This framework would be crucial in the preservation of non-gazetted forest reserves, not just within Kisii County but also throughout the entirety of Kenya. This study was grounded in the theoretical frameworks of the tragedy of the commons. It utilized a descriptive survey design. The study focused on a sample of 2439 individuals residing within Nyangweta forest, specifically targeting family heads, local leaders, and forest authorities. For the purpose of data collection, a sample of 244 respondents was randomly selected in proportion to the distribution of household heads. The study employed various data collection instruments, namely the questionnaire, interview schedules. Based on the findings of the study, it is recommended that the county government, in collaboration with the national government, should actively promote and provide assistance for the implementation of free and mandatory education within the community. Moreover, it is imperative for the government to actively promote and maintain initiatives related to family planning, as indicated by the findings of the study, which demonstrate that conservation efforts are more effective in smaller family units. The study suggests that it would be beneficial for the government to establish a policy*

*mandating the involvement of recipient societies in conservation efforts prior to the completion or initiation of social projects such as schools and hospitals.*

*Indexed Terms- Socio-Economic Activities; Non Gazetted Forests Reserves; Conservation*

## I. INTRODUCTION

According to the statistical data presented by the Food and Agriculture Organization (FAO, 2015), it was ascertained that forests encompassed around 4 billion hectares, equivalent to approximately 31% of the total geographical area of the Earth. According to the results of the Intergovernmental Panel on Climate Change, it has been demonstrated that forests function as habitats for over 80% of terrestrial species.

According to the United Nations (2010), the global population achieved notable milestones during specific years. These milestones include the attainment of 4 billion individuals in 1975, 5 billion in 1987, 6 billion in 1999, and the recent commemoration of the arrival of the 7 billionth person in 2011. Based on the research conducted by the United Nations in 2010, it was estimated that the worldwide population would reach 8 billion by 2027 and 9 billion by 2046. Nevertheless, the phenomenon of rapid population growth and development has been characterized by uneven distribution throughout various regions worldwide. African countries have consistently witnessed significant population expansion, leading to detrimental outcomes such as the unsustainable loss of forest resources.

Dhurve and Chandramauli (2022) provided evidence of a positive correlation between population increase and the magnitude of forest coverage. There exists a claim that Anuppur District, situated in the state of

Madhya Pradesh, India, has undergone a notable decrease, potentially ascribed to the swift expansion of its populace. A comparison research was undertaken to investigate the extent of forest covering in Anuppur district during two distinct time periods, specifically 1981 and 2011. In the year 1981, the forest area encompassed a total of 129,885 hectares, or approximately 34.7% of the entire district, which had a land area of 374,671 hectares. Nevertheless, the forest cover experienced a substantial decrease to 76,448 hectares by the year 2011.

Misra *et al.*, (2014) conducted a study to examine the relationship between population density and the conservation of forest resources. The results of the study revealed a significant inverse correlation between human density and the preservation of forest resources. The research findings indicate that the potential for forest cover extinction arises when the density of the human population exceeds certain predetermined limits. The paper suggests that in order to preserve forest resources, it is advisable for the government to implement economic measures tailored to the broader populace, aiming to efficiently address population expansion.

According to George (2018), there exists a notable inverse correlation between population increase and the availability of resources, particularly in developing areas like Kenya. These resources contain various attributes, including forest cover, water availability, terrain composition, and other associated aspects. According to George (2018), there exists a correlation between the increase in population and the deterioration of natural resources. The provided link is based on the premise that as the population grows, there is a corresponding increase in the need for essential resources such as food, energy, wood fuel, and habitat. The aforementioned criteria impose considerable pressure on the limited forested areas, resulting in a reduction in the overall extent of forested land.

## II. LITERATURE REVIEW

Both the United States and Mexico have experienced an inland extension of their urban centers as a result of the California urbanization phenomenon. The aforementioned construction is located adjacent to a

protected coastal habitat that has many features with the Mediterranean biome. Throughout contrast, arid conditions prevail throughout the interior. The population has increased dramatically, from an estimated 1.5 million in 1900 to over 37 million in 2006 (Reynolds, 2005). The urbanization process along the California–Baja California border, as well as the anticipated construction of a border fence, presents problems to animal movement patterns due to habitat fragmentation and obstruction of wildlife migration routes. An estimated 35,000 new residents have moved to North Carolina each year, contributing to the state's rapid population growth. There have been serious consequences for the region's watersheds and ecosystems as a result of the population boom. Both endangered and threatened species are feeling the effects of the reduction in habitat quality and quantity due to population growth (North Carolina Wildlife).

There is evidence, according to Humphreys Bebbington *et al.* (2018) that extractive industries and infrastructural development go hand in hand in a number of places, including Mexico, Central America, the Brazilian and Western Amazon, and Indonesia. Legislative and institutional shifts brought about by the allocation of resources in both sectors and their interdependencies have led to new approaches to forest management. There has been an increase in incidents of violence against environmental advocates, a reduction in the number of protected areas, a loosening of the procedures for environmental assessments, and a weakening of the protection of indigenous territories as a result of the aforementioned reforms (Humphreys Bebbington *et al.*, 2018).

Numerous studies have shown that the mining industry poses a serious danger to biodiversity, with much attention paid to the industry's link to deforestation (Ranjan, 2019). Multiple studies have shown that mining operations degraded an area of the Amazon rainforest covering 11.67 square kilometers between 2005 and 2015 (Pepper *et al.*, 2011). Concerns about environmental damage caused by mining activities are a common source of inquiry into the sustainability of these operations (Cook *et al.*, 2011; Khenisa, 2017).

Nhantumbo and Macqueen (2011) point out that despite their undeniable significance, woods continue to confront challenges due to the increasing demands caused by growing people. A rise in population, increased cow herding methods, a history of political instability, and low agricultural output are all indicators of population pressure. As a result, vast swaths of forest have been cleared and split up to make room for human endeavors. Aynekulu et al. (2011) write that woods are essential for supporting a diverse array of life, including many kinds of birds and other animals and plants. However, human interference and activities have a major impact on the stability of these forests. The authors go on to say that traditional communities are a source of contention when it comes to issues of resource distribution and land use. Political interference, poor governance structures, and ineffective law enforcement and managerial competencies at sanctioned institutions are all at blame. The heavy reliance of the local community on forest resources compounds the aforementioned worries.

Countries that rely substantially on their natural resources tend to develop quickly, as stated by Siqueira-Gay et al. (2020). Unfortunately, the environment, especially forests, suffers as a result of human advancement. The loss of biodiversity and flora and fauna species is a direct result of the use of natural resources. The effects go beyond the typical challenges associated with the "curse" of natural resources or resource exhaustion within the realm of the extractive industries sector, which includes oil, gas, and mining. Extractive industry activities have been linked to natural capital decline, as pointed out by Sonter et al. (2017).

Forests established on reclaimed mining site are more vulnerable to environmental stresses such drought, insect infestation, and reduced fertility, as reported by Brusseau and Artiola (2019). Air pollution is released when natural gas is burned in oil wells, and there is always a risk of leaks and spills during the drilling and extraction process (Cook et al., 2011; Pepper et al., 2011).

Many developing countries' GDPs receive a sizable boost from their extraction industries (Hailu and Kipgen, 2017). About 3.5 billion people in 81

countries throughout the world depend heavily on the economic, social, and political stability brought about by the extractive industries. At least 20% of export earnings and government revenues in twenty poor and middle-income countries originate from the extractive sectors. According to Hailu and Kipgen (2017), there is a connection between the growth of economies that rely significantly on extractive resources and the prevalence of pollution and forest degradation as a result of mining activities, as measured by the Extractive Dependence Index.

Deliberate clearing of land by local communities to facilitate agricultural endeavors and illegal timber extraction for export are the two main causes of forest degradation in the Democratic Republic of the Congo (Ndoye and Tieguhong, 2014). The authors also argue that the rise in human population has helped make conservation efforts in the Congo more successful. The previously mentioned situation has endangered the world's second-largest tropical forest. Lugazo (2017) investigated how population growth affected the administration of Tanzania's West Usambara region's forest resources. The research showed that the forests in the examined area had inadequate management practices. Furthermore, the local community has shown a lack of commitment to the preservation of forest coverage by complying with government laws, rules, and regulations. Criminal activities like as unchecked deforestation, firewood gathering, encroachment on forested areas, and mining operations have put a heavy strain on the woods in the Usambara region. Existing data suggests that rapid urbanization has resulted in inadequate forest management in the examined area, largely due to a mismatch between resource demand and supply.

### III. MATERIAL AND METHODS

The study employed a descriptive survey research design, a methodology that aims to capture the subjective attitudes, activities, and views of the participants (Kothari, 2011). According to Creswell (2013), employing the respondent's individual language can enhance the understanding of their knowledge, feelings, and experiences in a more comprehensive and clear manner. The research incorporated a combination of quantitative and

qualitative approaches in order to obtain a thorough understanding of the viewpoints held by the primary participants, recognizing that their individual perspectives may differ in relation to the matter being examined. The study focused on a sample of 2439 individuals residing within Nyangweta forest, specifically targeting family heads, local leaders, and forest authorities. For the purpose of data collection, a sample of 244 respondents was randomly selected in proportion to the distribution of household heads. The study employed various data collection instruments, namely the questionnaire, interview schedules, and document analysis. The data obtained from the surveys was processed through coding, data entry, cleaning, and analysis with the assistance of the Statistical Package for Social Sciences (SPSS).

IV. RESULTS AND DISCUSSIONS

The study sought to find out the extent to which socio-economic activities affects non-gazetted forest reserves. The data was analyzed based on the 204 respondents who fully responded to the questionnaire. Responses were based on a 5-item 5-point Likert scale where The respondents were required to use the 5 point Likert scale which was interpreted using the ranges of 4.3-5=strongly disagree; 3.5-4.2=disagree; 2.6-3.4=undecided; 1.9-2.6=agree and 1-1.8=strongly agreed(Nemoto and Beggarlar, Joshi, Kare, Fhandel and Par 2015) depicted on Table 1.

Table 1: Socio-economic activities on conservation of Non-Gazetted forest reserves

Statement	N	Mean	Std. Deviation
Urbanization activities affects the forest negatively	204	2.38	1.598
The social aspect of collecting firewood and charcoal burning activities affects conservation efforts	204	1.13	.354
Overstocking activities leads to overgrazing which leads to the destruction of the forest.	204	1.38	.744
Agricultural activities have affected conservation efforts	204	1.13	.354

Results from Table 1, revealed that majority of the respondents with a mean scale range of 1.13 (STD .354) were in strong agreement that agricultural activities had affected conservation efforts. The study also revealed that majority of the respondents with mean scale range of 1.13 (STD .354) were in strong agreement that the socio-economic activities like charcoal burning and firewood harvesting in the community around the forests contributed negatively to the destruction of the forests hence frustrating the conservation efforts. The study further revealed that majority of the respondents with a mean range of 1.38(STD .744) were in strong agreement that household livestock overstocking activities led to overgrazing which consequently, frustrated conservation efforts. Finally, the study revealed that majority of the respondents with a mean range of 2.38 (STD 1.598) were in agreement that urbanization activities affect the forest negatively. The overall weighted mean revealed that majority of the respondents mean scale range of 1.505 were in strong agreement that social activities affects conservation of the Nyangweta non-gazetted forest in Etago sub-county, Kisii County.

The study conducted linear statistics to make inferences on the socio-economic activities and conservation interventions but before running a linear regression analysis, fitness tests were conducted to establish if the data set fitted into the linear regression model. The Normal P-P plots and histogram were conducted as described in Figure 1.

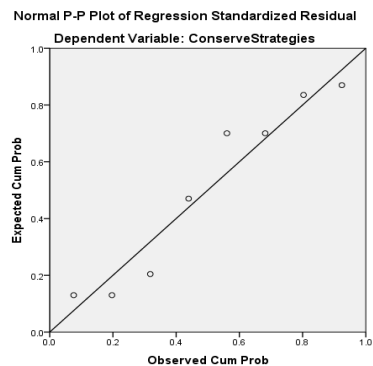


Figure 1: P-P plot for socio-economic activities and conservation strategies

The adequacy of the test's fitness was illustrated in Figures 1, which sought to determine the existence of a linear relationship between socio-economic

activities and conservation strategies. The scatter plot depicted in Figure 1 exhibits a clear correlation between socio-economic activities and conservation intervention alternatives, indicating a linear relationship. There were no instances of bivariate outliers seen, as the data points exhibited a concentrated and equally distributed pattern along the line. In light of the fact that the evaluation of linearity in the study did not only rely on the P-P plot, an additional analysis was conducted utilizing a histogram test. The purpose of this experiment was to assess the presence of linearity, as illustrated in Figure 2, through verification and validation.

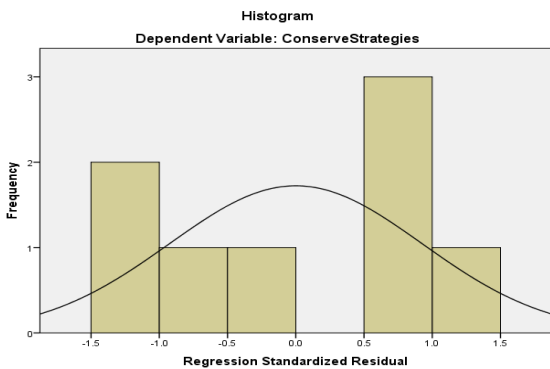


Figure 2: Histogram tests socio-economic activities

In accordance with the findings presented in Figure 2, the analysis of the standardized residuals indicated the lack of any exceptional data points. The residual plots displayed indications of homoscedasticity and normalcy in the residuals. The study successfully conducted a linear regression analysis, yielding the following subsequent observations. A study was conducted using linear regression analysis to examine the possible predictive association between socio-economic activities taking place in non-gazetted woodlands and conservation actions. Various statistical measures were calculated in order to establish the association as delineated in the following description.

Table 2: ANOVA for Socio-economic Activities

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.161	1	5.161	91.263	.000 <sup>b</sup>
	Residual	.339	6	.057		
	Total	5.500	7			

a. Dependent Variable: ConserveStrategies

b. Predictors: (Constant), SocioeconActivities

The findings from Table 2 indicate that there is a statistically significant relationship between socio-economic activities and conservation measures ( $F(1, 6) = 91.263, p < .001$ ). Based on statistical analysis, the null hypothesis that posits the absence of a meaningful association between socio-economic activities and conservation measures was rejected due to the observed correlation coefficient ( $\rho$ ) being less than the predetermined significance level of 0.05. Therefore, the study supported the alternative hypothesis and concluded that there is a statistically significant correlation between socio-economic activities and conservation strategies.

Table 3: Model Summary for socio-economic activities

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.969 <sup>a</sup>	.938	.928	.23780	.938	91.263	1	6	.000

a. Predictors: (Constant), SocioeconActivities  
b. Dependent Variable: ConserveStrategies

According to the findings presented in Table 3, the R2 coefficient of .938 indicates that about 93.8% of the variations observed in conservation methods can be accounted for by socio-economic activities. The remaining 6.2% of the variations can be attributed to elements that are not encompassed by this particular variable. Additionally, the corrected R2 coefficient of determination, which is equal to 0.928, indicates that about 92.8% of the variation in conservation strategies can be accounted for by the socio-economic components included in the model. The remaining 7.8% is attributed to the error term, suggesting that the model fits the data well (Cohen, 1988).

Table 4: Coefficients Regression for Socio-economic Activities

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.054	.208		.257	.806		
	SocioeconActivities	1.214	.127	.969	9.553	.000	1.000	1.000

a. Dependent Variable: ConserveStrategies

The study further revealed from the coefficients of regression that the correlation between socio-economic activities was statistically significant  $r (.969) = 1.214$ ,  $p < .001$  showing a significant and positive (T value = 9.553). The regression equation for predicting conservation strategies from the socio-economic activities was  $Y = .054 + 1.214X$ .

### CONCLUSION

Based on the study findings study findings indicated a notable and favorable correlation between the socio-economic activity within the local community surrounding the non-gazetted forest and the implementation of conservation initiatives hence concludes that, socio-economic activities are significant predictors of environmental conservation at Nyangwete Non-Gazetted Forest, in Etago Sub-county of Kisii County.

### RECOMMENDATIONS

The study suggests that it would be beneficial for the government to establish policy frameworks that require companies contracted for economic projects, such as road and industrial development, to allocate a portion of their corporate social responsibility efforts towards conservation. This would serve as compensation for the destruction of forest resources that often occurs during these development projects. The recommendation is based on evidence from the study, which indicates a significant positive correlation between such projects and the destruction of forests. It is imperative to establish policy frameworks that enhance the accountability of the local community in relation to agro-forestry practices within non-gazetted forests, as their actions often undermine forest conservation intervention measures.

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