



# Influence of Community Forest Association (CFA) on Local Community Sustainable Forest Utilization in North Nandi Forest, Kenya

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**Abstract:** A key feature of forest conservation and management is the practice of Participatory Forest Management (PFM). In the PFM there is inclusion and collaboration with the local community members in managing and conserving the forest resources, mostly through Community Forest Association (CFA). However, most of the roles of CFA on achieving management objectives of the forest resources are rarely met. The study evaluated the influence of CFA on local community sustainable forest utilization in North Nandi Forest. The study targeted 7,807 people living along the forest and a sample size of 156 respondents was used. Primary data was collected using questionnaires and Focus Group Discussions. Validity was ensured through expert judgement while Cronbach Alpha was calculated to determine reliability. To determine the sustainable utilization of forest resources, data was analyzed using frequency distributions and percentages. The study found out that joint forest management between the government and the community, use of sensitization meetings, the involvement of indigenous people within and outside the forest and the use of county and national government policies to support the conservation and protection of Nandi North Forest were the most significant strategies for management and protection. It was recommended that policies on expansion of land for agriculture and other developmental activities, excision of forest for settlement and illegal cutting of trees for posts, charcoal, fuelwood and timber need to be put in place by both the national and County governments. The findings of this study will help to develop recommendations for forest conservation interventions.

**Keywords:** Community, Association, Sustainable, Forest, Utilization

## How to cite this work (APA):

Chepkonga, K., Ramesh, F. & Kapyask W. K. (2022). Influence of Community Forest Association (CFA) on Local Community Sustainable Forest Utilization in North Nandi Forest, Kenya. *Journal of Research Innovation and Implications in Education*, 6(2), 168 – 176.

## 1. Introduction

Forests supply energy, construction materials, can be sources of food and medicines (Sheppard *et al.*, 2020). Accompanying these direct resource needs is the ecosystem services provided by forests, such as water catchments functions, soil fertility enhancement, amelioration of climate and carbon budgets (Hong & Saizen, 2019). Moreover, the rural dwellers that are poor in resource base rely on forest resources for livelihood sustenance. In this aspect, approximately 300 million people globally, mostly from developing countries of

Africa, depend largely on forest resources for their subsistence (Arfin-Khan & Saimun, 2020).

As a result of the continued use and increasing demands of forest resources, forest utilization has reached an alarming level of over-exploitation, especially by the adjacent forest dwellers (Ceccherini *et al.*, 2020). Poor governance contributes to a substantial decline of forest resources through exploitation or unsustainable over-use of resources, including the floral and faunal biodiversity (Kimutai & Watanabe, 2016). There is a consensus that

the management of these forests needs to focus on the local community members.

Worldwide, participation or involvement of the local communities to manage forest resources is gaining increasing significance over the years (Apipoonyanon *et al.*, 2020) and is currently identified as a successful approach in the management of forest sources (Akamani & Hall, 2019). It is becoming obvious that for forests to be sustainably managed, the Forest Adjacent Communities (FAC) should be incorporated into the management decision-making processes and including subsequent action plans on the adjacent forest landscapes (Volker, 2020). There is overwhelming evidence of engaging communities living adjacent to the forest in Africa and Asia, in advancing and managing neighbouring forests under Participatory Forest Management (PFM) arrangement (Nzau *et al.*, 2020). The process and mechanisms of PFM enable stakeholders of the forest ecotones to be included as part of the decision-makers in managing the forest resource (Wood *et al.*, 2019). Most of the PFM has been practiced through the Community Forest Associations (CFAs).

In several countries of Sub Saharan Africa which mostly have large parts of their forest surrounded by local communities, the role of CFA has been highlighted as core in the management of the forest resource for almost three decades (Okumu & Muchapondwa, 2020a). This has been accomplished in several ways but the main one involves the members of the local forest community entering a formal corporation with single or several bodies, including the government through formally registered CFAs (Laura *et al.*, 2020). The underlying principle for participating in forest management through local community partnerships is based on the underlying assumption of shared resources leads to collective prosperity (Kahsay & Bulte, 2019). The local community members in such forms of partnerships have certain alienable freedoms that may see them sustainably utilize and manage the adjacent forest resources (Sungusia *et al.*, 2020) subjects to minimize conflicts with the resources under their custody (Sarkki *et al.*, 2019).

The CFA is supposed to ensure that by regulating the utilization of forest resource, they allow for proper forest growth and generation even if the forest resources are being harvested and used (Sarkki *et al.*, 2019). In several countries, the CFA educate the local community members on the dangers of illegal cutting down of trees, encourage them to collect firewood that has just fallen from the main trees and to ensure they don't interfere with the ecological processes of the forests (Boiyo, 2019). This is to ensure that there is the maintenance of the best forest structures that will ensure optimal forest production of resource (Apipoonyanon *et al.*, 2020).

The key function of CFA is to ensure sustainability in the utilization of forest resources (Lefèvre *et al.*, 2020). The forests are capital resources that the current generation should sustainably manage for future generations (Rahimian & Irvani, 2017). Inappropriate use of these resources may endanger the interests of future generations (Wendiro *et al.*, 2019). Sustainable forest utilization is geared towards maintaining the health and vitality of forest ecosystems and, thereby, for maintaining their protective future roles (Uisso *et al.*, 2019). Thus sound utilization of tree-planting resources should encompass biological diversity such as forest genetic resources, plant resources, as well as an animal resources within the forests (Poudyal *et al.*, 2020).

North Nandi forest, in Nandi County, has faced increased human population and weak environmental enforcement in the past, leading to over-exploitation and unsustainable utilization of forest goods and services (Njunge & Mugo, 2011). The scenario can be managed by improving governance and addressing the legitimate needs of the people, and seeing them actively engage in forest management. In Kenya, endeavours to manage forests in the past have partly failed to be acquainted with the importance of Forest Adjacent Communities (FAC). Yet to date, there is very little information known about how CFA affect the utilization and sustainable forest management of forest resources in North Nandi Forest. Moreover, the perception of the non-CFA members critiquing legally registered CFAs on inadequate participatory forest management objectives has not been adequately addressed. Therefore, this study investigated the influence of Community Forest Association (CFA) on local community sustainable forest utilization in North Nandi Forest, Kenya with particular interest on components used by CFAs to enhance forest utilization, strategies used to protect and conserve forests, threats to traditional forest conservation and actions employed to conserve forest resources

## 2. Literature Review

Past conservation strategies in managing forests encompass fencing off the boundaries or reserve areas that totally exclude the local community members from the reserves (Gatiso, 2019). This was a form of protectionist that has been the cornerstone of conservation for ages and for a time now has been regarded as the mainstream form of conservation (Okumu and Muchapondwa, 2020b). This method created a kind of unique geographical areas such as national forest reserves and parks and game reserves. They are managed through legal instruments with guiding principles that may exclude the adjacent community members or allow minimal contact to the forest (Duguma *et al.*, 2018). This approach was advanced because the objective of development envisaged by the local community members was deemed to clash or conflict with

conservation objectives espoused by conservation agencies (Tajuddin *et al.*, 2019).

The fortress approach presents various viewpoints to the local community members as a threat to the management of the forest. It has also, given a new paradigm that identifies the socio-economic demands and desires of the local community members in ensuring there is advancement in conservation efforts and management of forests (Okumu and Muchapondwa, 2017). In order to overcome those shortcomings of the fortress approach, new methods that recognize the local community members as potential partners in the conservation was recommended (Garekae *et al.*, 2020). The approach looks at conservation from two distinct perspectives which permit the adjacent forest communities to the confined/zoned area, with defined user rights for purposes of conservation and participation process by the community members. This attempts to accelerate and improve localized development needs of the forest adjacent communities (Johann *et al.*, 2019). The approach looks at conservation as a cost that requires the local community to meet through their engagement and hence attains conservation of the forest resource (Mawa *et al.*, 2020).

Involvement of the forest adjacent communities in forest conservation is a decadal long tradition but has regularly transformed in theory and practices over the ages (Parhusip *et al.*, 2020; Sturiale *et al.*, 2020). Seeing its development, several countries have attempted to coin and label it using various names such as community-based forest conservation (CBFC), community-based natural forest resource management (CBNFRM), community-based forest management (CBFM), social forestry/forest management (SFM), sustainable forest management (SFM), collective/joint forest management (CFM), community forestry (CF), as well as participatory forest management (PFM) (Larson *et al.*, 2019). Diverse viewpoints are now available expressing the implementation of community in forest conservation and management to ensure efficiency, equitability, sustainability and local community benefits (Putraditama *et al.*, 2019). The effectiveness of the local community involvement and subsequent benefits that the stakeholders derive from the practice that clearly separates it from the traditional exclusionary forest management.

In Kenya, involving the local people in community forestry has a long history in many regions (Okong'o, 2017). In Kenya, there is much incentives of providing the local community members opportunities to enhance sustainable forest management in ensuring that there is the protection of forest resources (Malupi *et al.*, 2018). In realization of this, a number of issues have been put into place to ensure the rehabilitation of forests by engaging the forest adjacent communities in sustainable management of the forest. Communities adjacent to forests rely on forests resource for their sources of

livelihood such as firewood, food, pasture, or vegetables. There are activities executed by the forest adjacent communities that contribute to improper utilization of forest, these include; - overgrazing, logging, charcoal making, among others (Maloba *et al.*, 2018). Involvement in participatory forest management has therefore been recommended as a way to enhance the livelihoods of the local community members (Ngugi *et al.*, 2018). In particular, the local community forest associations (CFAs) ought to be supported to vigorously participate in forest resources management.

Sustainable utilization of forest resources by communities living adjacent to the forest exhibit good management practices, especially those that have historical claims to forest areas, and have inhabited those forests for a sizeable amount of time. It is also, evident that, there are communities that inhabit agricultural or pastoralist areas adjacent to the forests, and utilizes the forest resources either legally or illegally. Kenyan history places most communities adjacent to the forests to be locally actively involved in the forest resources management (Rajula, 2017).

Studies have postulated and proven that the model of involving communities living adjacent to the forest to participate and manage the forest have significantly reduced deforestation or illegal activities and improved the structure of the forest (Georgine, 2019). Community forest associations undertake activities that help in reducing pressure on the forest for livelihood (Hristo *et al.*, 2020). Conservation friendly entities have noted with a lot of concern that CFA is only prioritizing activities that aim at sustainable management of forest resources and are not safeguarding the components of forest structure (Hilostle, 2018). At present, there is proof that CFAs are gradually moving towards active participation in the management of forests. Sound management of forests resources paves the way to the sustainable production of goods and services and at the same breath maintains the structural components of the forest (Raul *et al.*, 2018).

### 3. Methodology

This study involved the collection of data on sustainable utilization of forest resources as well as sample plants, mammals and birds. The study therefore applied a mixed-method design. This research employed the use of qualitative and quantitative approaches as enabler to a better understanding of the research problem. The study was conducted in North Nandi Forest which is located on longitude 34°51'0" E and 35°10'0" E and latitude 0°33'30"N and 0°40'30" N in Nandi County, Kenya.

In order to determine the sustainable utilization of plants, a household survey was done at the sampling sites. The study population comprised the household families who

reside along the North Nandi Forest where the sampling sites were located. According to the Kenya National Bureau of Statistics, (2010) survey, the demographic population of the study area is approximately 68,053. Approximately 7,807 persons that translate to 11.5% of the population access the forest for their needs.

The formula  $n = z^2 \left( \frac{pq}{d^2} \right)$  was used to calculate the number of households for the administration of the questionnaires (Ellen, 2012);

- Whereby: n = the desired minimum sample size,
- z = the standard normal deviation at a set confidence interval,
- d = the acceptable range of confidence level (0.05),
- p = the proportion of individuals accessing the forest, and
- q = the proportion of individuals not accessing the forest = 1-p.

Thus,  $n = 1.96 * 1.96 \frac{(0.115 * 0.885)}{0.05^2} = 156$

A sample size of 156 respondents was used. The use of a structured questionnaire was a major useful qualitative tool employed in collecting the data. The researchers administered a questionnaire that had both open and closed-ended questions. In ensuring validity of the research instruments, supervisors were consulted and their comments used to improve the instruments while in

ensuring reliability of the research instruments, a pilot study was conducted in the nearby Nandi South Forest and Cronbach Alpha was calculated. A Cronbach Alpha of 0.82 was obtained on the instruments.

Data analysis was done using recognized and approved tools such as SPSS 23.0 and Microsoft Excel spreadsheet 2020. The data obtained was analyzed for normality after cleaning and the application of appropriate transformation methods was taken into consideration in case of any pronounced deviation from the normal distribution (ZAR, 1996). To determine the sustainable utilization of forest resources data was analyzed using frequency distributions, percentages mean and standard Deviations.

## 4. Results and Discussion

### 4.1 Components used by CFAs to enhance forest utilization

Respondents were asked to indicate the components that have been improved by the existing CFAs to enhance forest utilization. The respondents were allowed to indicate more than one (multiple responses allowed). Responses were tabulated and the results are presented in Table 1.

**Table 1: Components for Enhanced Forest utilization**

<b>Component</b>	<b>Frequency</b>	<b>Percent</b>
Knowledge of plant use	121	60.20
Knowledge of animals	48	23.88
Traditional social organization	32	15.92
<b>Total</b>	<b>201</b>	<b>100.00</b>

Table 1 shows that a total of 121(60.2%) respondents reported that their knowledge on plant use had been improved by CFAs in their areas and 48(23.88%) respondents indicated that they had enhanced their knowledge on animals and birds while 32(15.92%) respondents acknowledged that they had enhanced traditional social organization thus improving on forest utilization. Therefore, majority (60.2%) of the respondents had benefited from their CFAs on knowledge on plant use.

### 4.2 Strategies used to Protect and conserve Forests

The respondents were further asked to indicate the strategies that have been employed to protect and conserve forests in their locations. Multiple responses were allowed in this section. Their responses were tabulated and the results are presented in Table 2.

**Table 2: Strategies used to protect and Conserve Forest**

<b>Strategy</b>	<b>Frequency</b>	<b>Percent</b>
County and national government policies support	109	15.01
Community and school-based conservation and management approach	72	9.93
Conservation and Environmental clubs in institutions	54	7.45
Joint forest management between the government and the community	136	18.73
Cultural conservation in management of forests	63	8.69
Involvement of indigenous people within and outside the forest	131	18.04
Traditional laws	28	3.86
Sensitization meetings through barazas, workshops or conferences	133	18.32
<b>Total</b>	<b>726</b>	<b>100.00</b>

Table 2 shows that 136(18.73%) respondents indicated that joint forest management between the government and the community was used as a strategy for protection and conservation of North Nandi Forest, 133(18.32%) respondents acknowledged the use of sensitization meetings through barazas, workshops or conferences and 131(18.04%) respondents reported that the involvement of indigenous people within and outside the forest was used to conserve and protect the forest while 109(15.01%) respondents noted that the use of county and national government policies supported the conservation and protection of North Nandi Forest. Millions of people depend on forests for livelihood. Hence, there is the need to direct policies toward improving forest management in order to promote ecologically sustainable management where ecological processes are maintained, biodiversity is preserved, and a full range of benefits accrue to the society

within the natural limits of a given natural forest (Thorn *et al.*, 2020). Community participation is the process "whereby people act in groups to influence the direction and outcome of development programs that will affect them." Participation may be thought of as the deliberate action of the people and government to respond jointly in the formulation, planning, and implementation of a strategy to satisfy a particular need (Fragallah *et al.*, 2021).

### 4.3 Threats to traditional Forest Conservation

In addition, the respondents were asked to indicate direct threats to traditional forest conservation. Multiple responses were allowed in this section. Their responses were tabulated and the results are presented in Table.3.

**Table 3: Threats to Traditional Forest Conservation**

<b>Threat</b>	<b>Frequencies</b>	<b>Percent</b>
Variation in Traditional livelihood strategies	128	37.76
Disintegration of traditional rights	23	6.78
Breakdown of traditional Institutions	52	15.34
Over-use of natural resources	136	40.12
<b>Total</b>	<b>339</b>	<b>100.00</b>

Table 3 shows that 136(40.12%) respondents reported that over-use of natural resources was a threat to traditional forest conservation, 128(37.76%) respondents acknowledged that variation in traditional livelihood strategies was a threat to traditional forest conservation while 52(15.34%) respondents reported that break down of traditional institutions was a threat to traditional forest conservation. From the results it emerged that variation of traditional livelihood strategies and over-use of natural resources were the greatest threats to traditional forest conservation. Forests and their associated products have

been vital in sustaining livelihoods since time immemorial (Mukul *et al.*, 2016), notably for the residents of forest-dependent communities who live in abject poverty (Kabubo-Mariara, 2013). Numerous researches on the forest-livelihood nexus have shown that forests play an important role in livelihood sustenance and diversification, as well as a path to poverty reduction (Mukul *et al.*, 2016). Forests are critical for meeting fundamental necessities, saving money, and providing safety nets (Bwalya, 2013;). They provide energy, jobs, medicine, and other necessities for the majority of local

communities, particularly in developing countries (Suleiman *et al.*, 2017).

Further, the respondents were asked to indicate threats to traditional forest conservation according to their CFAs. Multiple responses were also allowed in this section. Their responses were tabulated and the results are presented in Table.4.

**Table 4: Factors contributing to threats to Traditional Forest conservation**

<b>Factor</b>	<b>Frequency</b>	<b>Percent</b>
Strict government policies, laws and regulations	15	3.66
Expansion of land for agriculture and other developmental activities	136	33.17
Excision of forest for settlement	123	30.00
Illegal cutting of trees for posts, charcoal, fuelwood and timber	136	33.17
<b>Total</b>	<b>410</b>	<b>100.00</b>

Table 4 shows that 136(33.17%) respondents reported that expansion of land for agriculture and other developmental activities was a threat to forest conservation, 136(33.17%) respondents also reported that illegal cutting of trees for posts, charcoal, fuelwood and timber was a threat to traditional forest conservation while 123(30.0%) respondents acknowledged that excision of forest land for settlement was a threat to forest conservation. Thus, in this study, expansion of land for agriculture and other developmental activities, excision of forest for settlement and illegal cutting of trees for posts, charcoal, fuelwood and timber were the major factors affecting traditional forest conservation in North Nandi Forest. Agriculture is the most prevalent human-environment interaction, affecting more natural resources than any other human activity (Barrios *et al.*, 2018). As the world's population rises, the agricultural industry is under growing pressure

to produce more food (Tschora & Cherubini, 2020). In response to increased food demand, agriculture is being intensified, which can lead to soil quality degradation, and is being spread into forest environments (Jayathilake *et al.*, 2021). Overdependence on land-based resources for income or food (Antwi *et al.*, 2014), farming activities and illegal felling of trees has threatened the existence of forests in Africa (Kamwi *et al.*, 2017).

#### 4.4 Actions Employed to Conserve Forest Resources

The respondents were further asked to indicate the actions they undertake in their CFAs as a way of conserving forest resources. This was also multiple responses item. Their responses were tabulated and the results are presented in Table 5.

**Table 5: Actions Employed to Conserve Forest Resources**

<b>Actions</b>	<b>Frequencies</b>	<b>Percent</b>
Use of local indigenous Knowledge	76	31.54
Adhering to government policies, laws and regulations	29	12.03
Participatory forest management	136	56.43
<b>Total</b>	<b>241</b>	<b>100.00</b>

Table 5 shows that 136(56.43%) respondents acknowledged that they were using participatory forest management as a way of conserving the forest, 76(31.54%) reported that they were using local indigenous Knowledge to conserve the forest while 12.03% of the respondents reported that they were adhering to government policies, laws and regulations on conservation of forests. The results pointed out that most of the respondents were using participatory forest management

as a way of conserving the forest. Following massive failures of centralized systems of forest management, many developing countries have experimented with some form of decentralized forest governance (Lund *et al.*, 2018). This involves a shift in forest governance towards increased involvement of local communities in the management of forests (Kairu *et al.*, 2018). Decentralized forest management has been promoted on the basis that it can improve efficiency and equity in natural resource

management (Ribot *et al.*, 2010). Participation in forest management involves planning, which entails involving local actors in decision-making, creating new rules or modifying old ones, formulating alternative planning activities and allocation of rights, responsibilities and resources among the forest management actors (Tadesse *et al.*, 2017). Participation in planning allows the dynamic nature of stakeholder needs, priorities and interests to be captured and integrated throughout project implementation (Reed *et al.*, 2009). Implementation involves bringing the forest associations into forest management activities (Luswaga & Nuppenau, 2020).

In addition, it emerged different age groups among the CFA members were involved in forest management through planting of more tree species, reporting any illegal activities in the forest, ensuring that harvesting of medicinal plants were conducted in a sustainable way and in sensitization of the community members through barazas on the importance of the forest and its resources. Among the plant parts that were used by the communities included roots, leaves, barks, flowers, stem and branches. The respondents noted that there are some trees in the forest which are medicinal and thus are protected by community members. These trees included *olea carpensis*, *Fegaropsis Angolensis*, *Solanum Spp*, *Celtis Africana*, *Cassipourea Molosasana* and *Syzygium Cordatum*,

During the Focus Group Discussions, it emerged that the indigenous plants in the forest provided them with medicine, protected water catchment areas, maintained soil fertility, provided food and shelter to other animals, shade for animals, feed for livestock particularly during dry season, provides them with firewood and fencing posts. A rising number of studies shows the value of forests as a source of income for many rural people in developing countries (Nguyen *et al.*, 2020). According to

the Food and Agriculture Organization (FAO), forest extraction accounts for a major portion of one billion people's income (FAO, 2016). Studies from tropical forest areas demonstrate the numerous significant functions of forests in rural livelihoods, including the provision of a wide range of subsistence goods, marketable products for cash income creation, agricultural productivity inputs, and vital safety nets during difficult times (Chilongo, 2014).

## 5. Conclusion and Recommendations

### 5.1 Conclusion

Joint forest management between the government and the community, use of sensitization meetings through barazas, workshops or conferences, the involvement of indigenous people within and outside the forest and the use of county and national government policies to support the conservation and protection of Forest were the most significant strategies for management and protection of the Forest. However, expansion of land for agriculture and other developmental activities, excision of forest for settlement and illegal cutting of trees for posts, charcoal, fuelwood and timber were the major factors affecting traditional forest conservation in Nandi North Forest.

### 5.2 Recommendation

Policies on expansion of land for agriculture and other developmental activities, excision of forest for settlement and illegal cutting of trees for posts, charcoal, fuelwood and timber need to be put in place by both the national and County governments. The effective implementation of these policies with the CFAs will ensure effective management and conservation of North Nandi Forest.

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