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Original Article

Conservation Activities of Women in Nyangores Forest Station, Mau Conservancy, Kenya

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Community-based forest management has increasingly gained popularity in many parts of developing countries. Although the roles of women in forest conservation, management and sustainable utilisation, as well as livelihood improvement, are of paramount importance, it is still scarce and unaddressed in new forest management approaches. Structured questionnaires were administered to 248 Nyangores community forest association members to capture the forest conservation activities of women, determine their role in community forest management and evaluate their socio-economic benefits. Results indicate tree seedling propagation (87.1%), monitoring and evaluation (M&E) (85.1%), and protection of regenerates (84.7%) as the major forest conservation activities. Minor roles included timber harvesting (22.9%), enrichment planting, silvicultural operations (12.9%), and firefighting (8.5%). Accrued socio-economic benefits as a result of women's role in forest management and conservation were freshwater (95.6%) and firewood (94.8%). These results suggest the incorporation of both genders as a pre-requisite for the success of community forest conservation programs in Mau Conservancy, Kenya.

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INTRODUCTION

Forests are valuable natural resource components of any community, region or country in sub-Saharan Africa and play a fundamental role in the socio-economic well-being of those communities (Usman *et al.*, 2016). Indeed, forests contribute to the ecological conservation of soil, water, and biodiversity, which in turn provide various ecosystem goods and services such as food, fuelwood, medicinal ingredients, and timber to the surrounding local communities (Musyoki *et al.*, 2013; Geller *et al.*, 2006). It has been estimated that approximately 1.2 to 1.5 billion people are forest-dependent (Chao, 2012; Weiss *et al.*, 2012; Agrawal *et al.*, 2013). World's commission on forests and sustainable development postulates that 350 million of the world's poorest people almost completely depend on forests for their subsistence and livelihood.

Despite dependence on forests, human activities have led to its degradation and consequent gradual disappearance locally and regionally. This is largely driven by increasing population coupled with widespread poverty levels among communities living adjacent to forest resources, hence exerting pressure on the already dwindling forest resources (Musyoki *et al.*, 2013). Over the past decades, there's been an intense global campaign on increasing the forest cover of each nation, and several international instruments such as legislations have been enacted to guide this endeavour. Against this background, concerted efforts have been put locally in Kenya through legislation on the sustainable management of forest resources. This involves allowing co-management of natural resources such as by provision of the Kenya Forest Conservation and Management Act (2016) which recognises the involvement of forest

adjacent communities in sustainable management. This particular Act has led to the development of Participatory forest management (PFM), which involves a multi-stakeholder approach where the private sector, institutions and communities are involved in management and sharing of benefits (Yemshaw, 2007).

In Nepal and India, community forestry programs were initially conceived to reverse the degradation of national forests, which could not be managed and protected effectively by state forestry services (Springate-Baginski & Blaikie, 2003). In Africa alone, about twenty-one nations have adopted Participatory Forest Management (PFM), a decentralised form of forest resources management (Mutune *et al.*, 2015). This management style is widely favoured as opposed to the centralised form because it enables the participation of local communities in forest management through environmental-sensitive utilisation (Mutune *et al.*, 2015).

Women are known primary consumers of forest products such as firewood (Leone, 2013; Shackleton *et al.*, 2011) and have highly specialised knowledge of trees and forests in terms of biological diversity, sustainable management, use for various purposes, and conservation practices (FAO, 2016). However, their role in value chains tends to be poorly supported by policy-makers and extension services. The perpetual lack of gender-disaggregated data hampers the development of policy interventions to address such issues (FAO, 2016; FAO, 2011). Policies and practices empowering women in the forest sector yield significant benefits to food security and nutrition and the sustainable management of forests. Facilitating women's participation in forest user groups, improving their access to modern sources of

energy, and enhancing their access to processing techniques and markets have been found to make a major difference in the livelihoods of forest-dependent people and their societies.

A sizeable body of literature provides evidence that women are generally under-represented in forest user groups, such as village forest committees and Community Forest Associations (CFA) (Agarwal, 2001; Coleman & Mwangi, 2013). Several authors have suggested that the inclusion of women in forest management is necessary for efficiency and improved livelihoods (Williams, 1992; Agarwal, 2001). According to Sen (2000), involving women in environmental projects require special efforts to extend their participation beyond the traditional roles accorded them. Women are currently involved in many forest conservation activities in Kenya, but their contribution to those particular organisations is not adequately studied. This research, therefore, seeks to examine the role of women in forest conservation activities in the Nyangores community

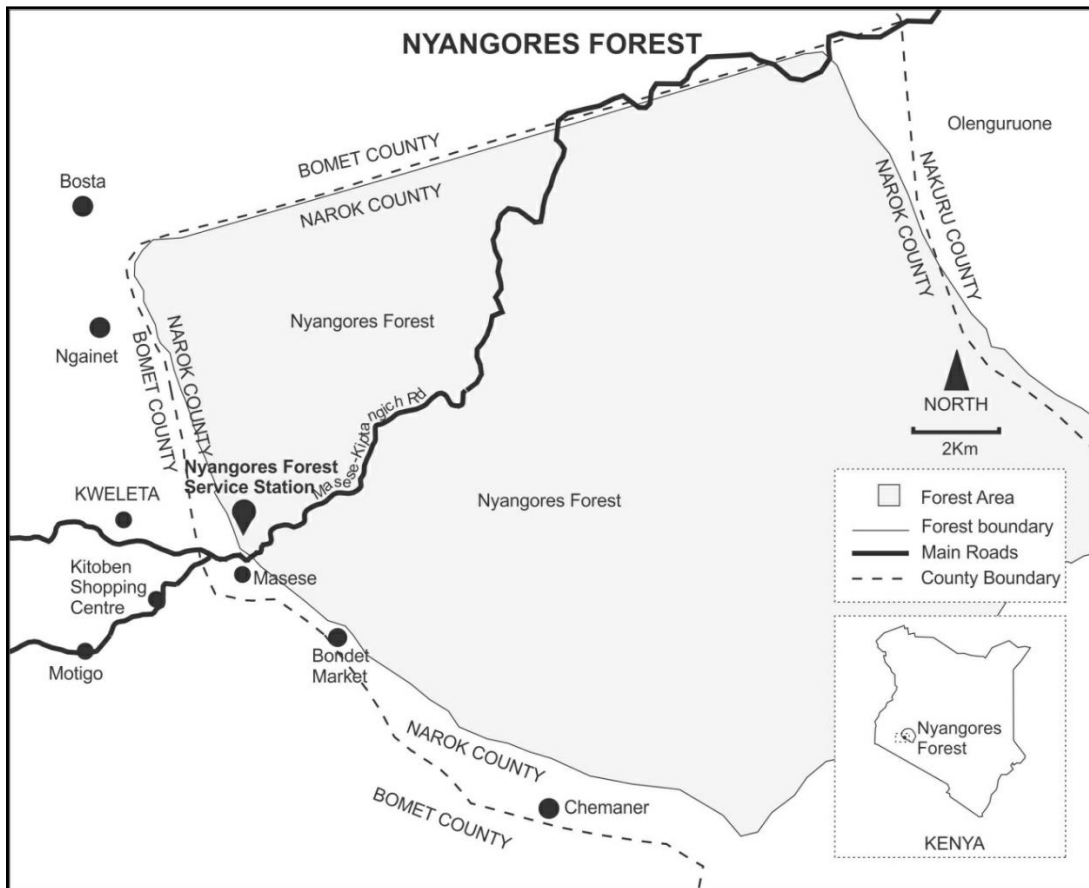
forest Kenya and the resulting socio-economic benefits. The knowledge generated would provide vital insights that inform policies of gender inclusiveness in community forest associations and bring a better understanding of the implications of equity in the operations of community forest conservation groups.

MATERIALS AND METHODS

Study Area

Nyangores forest is located in the South Western end of Trans Mara forest block, Kenya with an area of about 13,142 hectares (Ha). It borders Bomet County to the South and Southwest, Olenguruone forest to the North and Nairotia forest to the east (Figure 1). It lies within an altitude of 2000 – 3000 meters above sea level. The community around the forest is registered as Nyangores Community Forest Association.

Figure 1: Location of Nyangores Community Forest



Nyangores community forest receives an average annual rainfall of about 2000 mm and temperature range 12°C – 16°C. The forest is drained by a pattern of parallel rivers, namely; Kipsonoi,

Nyangores, Ainapngetunyet, Chepkositon and Timongigo with sources in Mau forest reserve and discharging their waters into river Nyangores. The vegetation type in the forest station is mainly montane (4230 Ha) (*Table 1*).

Table 1: Vegetation Types of Nyangores Forest Station

Forest type	Area (Ha)
Montane forest	4230
Bamboo /trees	70
Bamboo	4230
Shrubs	3430
Grassland	100
Tree plantation	70
Nyayo tea zone	820

Source: (Kenya Forest Management Plan, 2017)

Research Design and Sampling

This study was carried out between April 2019 and July 2019 following a descriptive research design. The study targeted all the 827 members of Nyangores Community Forest Association (CFA) who were engaged in conservation and joint management of Nyangores forest resources. Out of this target population, sample sizes of 30% (248 respondents) were randomly selected according to Mugenda and Mugenda (2014).

Data Collection

A structured questionnaire was administered to the 248 sampled members of the Nyangores Community Forest Association (CFA). The structured questionnaires, consisting of closed-ended questions, covered the community demographic aspects, socio-economic profiles of the respondents, information on socio-economic

benefits of the forest, forest conservation activities in Nyangores forest and the roles of women in Community Forest management. Additional information was also received by interviewing key informants representing the Kenya Forest Service (KFS) and other relevant government agencies and non-governmental organisations (NGOs) involved in the conservation of Nyangores forest. All the data collection tools were pre-tested and verified for effectiveness with few randomly selected members before use.

RESULTS AND DISCUSSION

Demographic Profile of Nyangores Community Forest Association members

Table 2 presents demographic profiles and socio-economic trends of Nyangores community forest association members.

Table 2: Demographic characteristics Nyangores Community Forest Association

Demographic profile of respondents	Proportion of the total (%)	
Gender	Male	69
	Female	31
Age (year)	18-25	9.3
	26-33	26.6
	34-41	37.5
	42-49	16.9
	Over 50	9.7
Marital Status	Single	18.1

Demographic profile of respondents	Proportion of the total (%)	
	Married	77.0
	Divorced	2.4
	Others	2.4
Education Level	None	6.5
	Primary	48.5
	Secondary	32.3
Occupation	College	12.9
	Farmer	75.0
	Teacher	8.1
	Civil servant	1.2
	Business	12.5
Annual Income (US Dollars)	Others	3.2
	Below 50	2.8
	51 – 150	56.9
	151 – 250	19.8
	251 – 350	16.1
	Above 350	4.4

Sixty-nine (69%) of the study sample were male while women accounted for 31% of the total. This implied that more men were involved in forest resource conservation and management compared to women. Observation on gender composition has been attributed to the different domestic responsibilities held by women that may have reduced their chances to participate in conservation and management of community forests (Wiafe, 2014; Banana *et al.*, 2012; Wekesa, 2017). Further, the traditional social norms of the communities living around the forest could be a contributing factor to male domination since most of these norms emphasise the superiority of men in the participation in income-generating activities.

The age distribution of the respondents is important in knowing the most effective age range active in performing forest conservation and management roles (Sanjay, 2017). Based on the results in *Table 2*, the majority of respondents (37.5%) were between the age ranges of 34 to 41 years, while the minorities (9.3%) were between the ages of 18-25 years. This is an indication that adults are the most active in forest conservation than youth. Adult members hold greater responsibility for fending for their families through income-generating forest conservation activities, acknowledging the significance of these activities in forest management. Moreover, youths are usually busy acquiring education in schools, some of which are further from the forest, hence limiting their availability for participation in forest conservation

activities. In terms of marital status among the CFA members, 77% were married, 18.1% were single, and 2.4% were divorced (*Table 2*). Examining the marital status of the CFA's was very crucial in exposing their roles in their families besides performing forest conservation and management roles. Education level greatly contributes to decision-making on matters relating to community forest conservation programs. In this study, almost half (48.4%) of the CFA members hold primary education as their highest educational qualification, while secondary education holders accounted for (32.3%) and college education holders (12.9%). This means that most members had enough basic knowledge required to appreciate the significance of forestry and consequently participate in forest conservation activities through the CFA and corresponds to observations by Cheruiyot (2016). Community forestry generally assumes that the user group should have a high degree of understanding of the community forest (CF) concept, process, their roles and responsibilities (Bastakoti and Davidsen, 2015).

Seventy-five per cent (75%) of CFA members majorly rely on subsistence farming (including cattle rearing) and business activities for their livelihoods, while civil servants account for 1.2%. CFA members can therefore participate in the forest conservation activities, which are closely related to farming to supplement their income and pegged on their reportedly low education attainment. As part

of establishing the socio-economic attributes, the income level of the CFA members was evaluated (Table 2). A major proportion of CFA members (56.9%) were making between 50-150 US dollars annually, while a smaller proportion (4.4%) earns over 350 US dollars. The annual income of the vast majority of the respondents is from farming activities which is the dominant occupation in the area and businesses. Those making higher-income

annually are employed as civil servants or teachers. The reported low income by Nyangores CFA members contributes to potentially negative

implications on forest exploitation and conservation. Low annual income often motivates overexploitation of forest resources while suppressing conservation efforts.

Forest Conservation Activities

Forest conservation is the practice of planning and maintaining forested areas for the benefit and sustainability of future generations (Pawar & Rothkar, 2015). Table 3 presents the order of preference for forest conservation activities in Nyangores forest station.

Table 3: Preference of Forest Conservation Activities

Forest activities	Response (%)
Seedlings propagation	87.1
Monitoring & evaluation	85.1
Protection of regenerations	84.7
Forest management plans development	83.1
Resource mobilisation	81.0
Soil conservation and watershed management	79.8
Enrichment planting	79.0
Planning	69.0
Forest patrols	62.9
Calendar of events	54.4
Fire fighting	23.0
Silvicultural operations	12.9
Fire break construction	8.5

The major forest conservation activities in Nyangores forest station were seedlings production (87.1%), protection of regenerates (84.7%) and development of forest management plans (83.1%). These findings are in agreement with studies by (Pawar & Rothkar, 2015; Agera, 2011) who observed that the solutions to the loss of forests include allowing local communities, forest dwellers and other forest conservation practitioners to participate in the restoration of the forest for the goods and services it provides. A study carried out in Nepal found out that, several factors including deterioration in vegetation cover, qualitative and quantitative decline of water resources, degradation and pollution of soil, the encroachment of the forest and marginal lands for cultivation, grazing and settlement lead to a reduction of forest resource potential (Agera, 2011). This however could be reversed by replacing degraded sites with indigenous seedlings in order to restore the forest

(Parrotta, 2000). Firebreak construction (8.5%) and firefighting (23%) were the least preferred forest conservation activities and did not differ significantly from similar studies in other regions in Kenya (Kosgey, 2015; Wamae, 2013).

Role of Women in Forest Conservation and Management

Ninety-one per cent (91.9%) of women are involved in initiating forest management plans (Table 4), despite their other domestic responsibilities. In other related studies (Agrawal and Redford, 2006; Sanjay, 2017; Kosgey, 2015) observed that women's participation in organisational decision-making resulted in better conditions for the conservation of forest resources in terms of the implementation of participatory forest management (PFM). Indeed, women's role in community

institutions of forest governance improves conservation and regeneration (Agarwal, 2009).

Table 4: Role of Women in Forest Conservation and Management

Role of Women in Forest Conservation and Management	Proportion of Women Participation (%)
Initiation of Community Forest Management Programs	91.6
Planning of CFA Program Activities	78.7
CFA Decision Making Process	20.2
Preparation of Community Forest Constitution	77.4
Involvement in Community Forest Management Activities	72.5
Participation in Community Forest Area Patrols	64.5
Drawing Calendar of Events	56.1
Participation in Enrichment Planting	18.5
Silvicultural Operations	41.5
Harvesting of Tree Products	22.9
Resource Mobilisation and Fund Raising	75.4
Distribution of Forest Resources	52.8
Monitoring and Evaluation of Forest Activities	85.1

Seventy-eight per cent (78.7%) of the women participated in planning for community forest management activities. The planning stage is undoubtedly the most important stage of undertaking any program as it provides the basis for all management efforts associated with the program (Sanjay, 2017). Involving women in every step of the planning process is important as they feel that their knowledge and skills in the planning process are recognised.

Seventy-four per cent (74.2%) of women were not involved in decision-making. The small percentage (25.8%) of women who participated in decision making believed that women had a great influence in making decisions that had a positive impact on the status of the forest resource (Agrawal, 2007). Indeed, women are the main collectors of the forest resource; their roles in the formulation of forest rules could help meet their needs and, at the same time, protect the forest base.

Community forest user groups usually operate based on their constitutions. The constitution entails rules and regulations governing the conservation and management of the forest. In the case of the community forest program, the planning stage included the preparation of the group's constitution, which binds people of the group legally, while the operational plan ensures the working modalities of the group are well defined. The majority of the

women (77.4%) were involved in the preparation of the community forest user group constitution, therefore add value to the management of community forest (Table 4). It has been observed that those women who participate in drawing the forest constitution included the elite women with both indigenous and scientific knowledge from forest society (Agarwal, 2010).

The majority of women (54.4%) were involved in the implementation of community forest management activities (Table 4). However, 46.6% of the women who were not involved were held in performing domestic roles of bringing up the family and most of the time they were involved in household activities. Others perceived that forest implementation activities required the attention of men, hence did not bother to participate.

Forest patrols are very important when it comes to the conservation and management of a forest. They enhance the protection of the forest against degradation from either natural or animal activities. The majority of the women (64.5%) were involved in community forest patrol (Table 4). From the focus group discussions, it was believed that women could patrol the forest area and report any illegal operations taking place without due consent from relevant authorities. They could make the arrest forest offenders and present them to the forest manager for prosecution purposes. Others believed

that women were involved in nurturing regenerations through sport weeding, removal of forest litter, cleaning up the firebreaks, opening up of nature trays for easy communication in the forest, among other activities. On the other hand, the low percentage of women who were not involved in forest patrols believed that; patrols are men's activity that is more masculine than the female. During the arrest of forest offenders, women are likely to face a lot of resistance as compared to the male counterpart. This finding of this study is in line with the study by Pandolfelli *et al.* (2007) that found women involvement in the control of illicit grazing and illicit felling of trees in Chiang Mai, Thailand.

Fifty-six (56.1%) of the women were actively involved in drawing up of calendar of events (construction of firebreaks, enrichment planting, nursery production and preparedness for fires season) for community forest management activities. It is believed that women entirely rely on both forest and non-forest products for their livelihood improvement, hence, their involvement in the preparation of a calendar of events as a tool of forest management for sustainable development of the country. Few women (18.5%) participated in enrichment planting (replacement of degraded forest sites with indigenous tree species or restoration of forest composition). It is perceived that the undulating terrain of the study area restricted a large number of women on enrichment planting activity.

Forty-one (41.5%) of the women participated in silvicultural (pruning, thinning and harvesting) operations. It is perceived that silvicultural operations are men's work; hence women have little role in such activities. Pruning involves climbing up the tree and removal of excess branches; hence women are believed to be weak and could not ascend up the tree. Women were restricted to participation in the extraction of minor forest products such as firewood, herbal medicine and fodder harvesting. These results are in agreement with the findings by the International Union for Conservation of Nature (IUCN) (2011) that describes women across the developing world as the major primary users of forest resources and their sale of non-timber forest products is vital for their household expenses. FAO (2014) describes women's control over resources may be more

commonly centred on management and use of fuelwood, fodder and non-timber products. Fifty-two (52.4%) of women participated in resource mobilisation (sale of tree seeds, seedlings and apiculture) and fundraising activity for the conservation and management of Nyangores community forest. These findings are in line with Wamae (2013) who observed that women are more involved in generating funds from the sale of seeds, seedlings other non-forest products such as honey and herbs.

Forty-seven (47.6%) of women are involved in the sharing of benefits accrued from sustainable forest resources management. Equitable sharing of resources will promote unity and prevent conflicts that will perhaps disintegrate the forest user group. The evaluation phase determines the relevance and achievement of objectives, developmental efficiency, effectiveness, impact and sustainability (IFRC, 2010). Eighty-five (85.1%) of the women were involved in monitoring and evaluation (identifying variances from the project management plan and taking corrective action to meet project objectives). Generally, in the poorer parts of the world, women continue to be very dependent on forest goods and services such as firewood, fodder, soil and water protection, or regulation of the climate for their agricultural activities. It is primarily the women who work with these resources and depend on them for the well-being of their families. So, it is vital that women are put at the centre of whatever decisions are being made about how to manage these resources. These results are similar to the findings by Maurice *et al.* (2019) who established and emphasised the importance of women in the conservation of the Rainforest of Mount Cameroon.

Socio-Economic Benefits of Forest Management and Conservation

The study sought to understand accrued benefits to women from Nyangores community forest conservation. Ninety-six (96.7 %) of the women benefited from the extraction of herbal medicine, freshwater (95.6%), firewood (94.8%), knowledge (92.3%), honey production (88.5%), recreational values (88.3%), fodder for animals (78.6%), cultural value gains (58.9%), employment (55.6%), transmission poles (10.9%) and timber production

(8.5%) (Table 5). These findings are in agreement with the studies done by Sanjay (2017) who found multiple benefits accrued to women's role in Panchakanya Community Forest of Nepal. Sanjay (2017) described the forest as an indispensable life support system in many developing countries around the world. FAO (2014) identifies women from rural areas as a major beneficiary of forest products such as firewood, fodder. According to Sanjay (2017), approximately 83% of the population in Nepal uses fuelwood as the source of energy for their households.

Table 5: Socio-Economic Benefit of Women from Nyangores Forest

Benefit	Proportion of Women (%)
Freshwater	95.6
Firewood	94.8
Knowledge	92.3
Recreational values	88.3
Honey	83.5
Fodder	78.6
Cultural values	58.9
Herbal medicine	96.7
Employment	55.6
Transmission poles	10.9
Timber	8.5

Pandolfelli et al. (2007) describe women as the most active beneficiary citizen in the use of forest resources. In large part, this has to do with social and cultural expectations, which accord women primary responsibility for collecting forest products for household use. Tewari (1989) describes forests as a reservoir for social, cultural and economic importance for the survival of the Indian population.

CONCLUSIONS AND RECOMMENDATIONS

The study investigated the gender dynamics in the conservation activities of a Nyangores CFA. Results indicate tree seedling propagation (87.1%), monitoring and evaluation (M&E) (85.1%) and protection of regenerates (84.7%) as the major forest conservation activities. Minor roles included timber harvesting (22.9%), enrichment planting,

silvicultural operations (12.9%) and firefighting (8.5%). Accrued socio-economic benefits as a result of women's role in forest management and conservation were freshwater (95.6%) and firewood (94.8%). These results suggest the incorporation of both human genders as a pre-requisite for the success of community forest conservation programs in Mau Conservancy Kenya.

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