

Local Participation in Community Forest Associations: A Case Study of Sururu and Eburu Forests, Kenya

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Abstract

Participation of local communities in the management and utilization of state-owned forest resources has become widely recognized in contrast to centralised forms of forest governance. This paper examined the extent of inclusiveness and household participation in community forest associations (CFAs) adjacent to Sururu and Eburu forests in Kenya. The probit model was used to assess the socio-economic factors determining participation in the CFAs. The study established that gender ($P < 0.05$), group membership ($P < 0.0001$), ownership of tree nursery ($P < 0.0001$), wealth status ($P < 0.0001$), percentage share of wage income ($P < 0.05$), and farm size allocated to trees ($P < 0.05$) significantly influenced CFA participation. However, because of high opportunity participation costs some poor (68%) and rich (65%) households did not participate in CFA activities. Since households participated in CFAs to derive livelihood gains, unclear participation benefits offered little incentive to get involved. Thus participation in CFA activities remained low. Therefore, Kenya Forest Service should review participation guidelines to enable effective CFA input in decision making on forest issues.

Keywords: Community; inclusiveness; household; participation; user groups; participatory forest management

1.0 Introduction

To enhance rural livelihoods and sustainable management of forest resources, decentralised forest management has widely been considered as one of the most viable options. Participatory Forest Management (PFM), a form of decentralization has been adopted by more than 21 African states as an alternative method of managing forest resources (Wily, 2002).

PFM is the local involvement of communities in the management of forests (Agrawal and Ribot, 1999). This is done through a process of inclusion, equity, and democratization of governance of the forest resources (Agrawal and Gupta, 2005). More often than not, PFM promises to increase participation in ways that will profoundly affect who manages, uses and benefits from forest resources. Likewise, greater access to decision makers, higher levels of participation by various social groups in decision making, and the accountability of decision makers are often the claimed effects of participation (Andersson *et al.*, 2004).

Where participatory forestry is concerned, the goal of decentralization policies, as for example in the case of PFM, has often been to increase participation of rural households in decision making and benefits related to all aspects of forest management (Schreckenber *et al.*, 2006). However, participation is broad-based, and achievement of inclusiveness has been challenging in these processes. Yet inclusiveness is important because it allows broad-based participation in local public decision making for the sustainability of forest management with economic objectives.

PFM was introduced in Kenya following pressure from local forest-adjacent communities and civil society organizations as an approach to ensure sustainable management of forests (UNEP, 2012). The enactment of Forest Act 2005 acknowledged involvement of the local communities in state forest management. Under the PFM arrangement in Kenya, the government retains ownership of the forest while forest adjacent communities, organised in CFAs, obtain user rights (GoK, 2005). The user rights are granted under the condition that CFAs are registered under the Societies Act and apply to the Director of Kenya Forestry Service (KFS) to be involved in forest management. The CFAs together with the KFS are required to develop a forest management plan and sign a management agreement. The plan outlines the forest activities that the community will undertake while the agreement confers management rights and responsibilities to the CFA. In Kenya, the first PFM site was at Arabuko-Sokoke Forest established in 1997 but without a supportive legislative framework (Thenya *et al.*, 2007). Today there are more than one hundred CFAs that are distributed across various parts of Kenya (Ongugo *et al.*, 2008).

Recent studies have analysed household characteristics that influence community participation in forest management. However, the evidence based on participatory forestry is geographically biased towards South Asia, notably Nepal and India (Adhikari, 2004; Agrawal and Gupta, 2005; Dolisca *et al.*, 2006; Maskey *et al.*, 2006; Baral and Heinen, 2007). This is problematic, given that there are large differences in society and nature, as well as the models of participatory forestry, between Asia and Africa.

Some existing studies have examined CFA roles in the decentralization process of Kenyan forests and highlighted the emerging issues which have slowed down the development of the PFM process (Koech *et al.*,

2009; Mogoi *et al.*, 2012; Musyoki *et al.*, 2013). The issues identified included the right for communities to license, extraction and movement of forest products, arrest and prosecution of offenders in forests under PFM, and the cost and benefit sharing, among others. However, factors affecting inclusivity and household participation in CFAs have not been adequately addressed yet participation by the community in decision making and management of the forest resources is important for the success of PFM. Studies that interrogate the factors that influence household decisions to participate in CFA are scanty especially in Sururu and Eburu Forests in the Rift Valley of Kenya.

This paper contributed to the existing literature on PFM and decentralization by examining the factors that explain local participation in government efforts to decentralize forest management. The research is important in view of the recent paradigm shift towards decentralized control of forest management in Kenya. It is also important because many rural communities, especially in Kenya, generally are highly differentiated and stratified in terms of identity e.g. ethnicity, income and wealth. In such circumstances, the question of differential participation becomes especially important because the benefits associated with PFM policies are seen to improve with greater participation. It is likely that those households that participate more in CFAs are likely to gain greater benefits from forest resources. However, non-participating households were likely to benefit less from PFM policies because the PFM benefits were experienced at the CFA participation level (Mutune *et al.*, 2015...forthcoming). This study examined the factors that influenced household heads decisions to participate in CFAs. Specifically, the study analyzed the socio-economic differences between those who choose to participate and those who didn't choose to participate referred here as CFA and NCFA members respectively. We need to know who is included or excluded from CFA participation and why. Such information is crucial to target policies of inclusiveness better and to understand the equity implications for sustained participation of community members in CFAs. In the following, the study area and methods used were described and then an outline of the key results. This was followed by discussions and conclusions.

2.0 Study area

The study was carried out among households adjacent to Sururu and Eburu forest of Eastern Mau Forest Reserve (EMFR). The Sururu and Eburu forests are among nine forest blocks of the EMFR of Mau Forest Complex in Rift Valley Province Nakuru County of Kenya. The study purposively selected them being the only forest blocks with well established CFAs having potential to interrogate factors that influence participation into CFA comparison to other younger CFAs of EMFR, e.g. Logoman and Baraget.

Sururu forest occupies 13,648 ha and lies approximately between latitudes 0°17' and 0°51' south and longitudes 35°40' and 36°15' east (Sururu Forest Participatory Management Plan, 2011...unpublished). PFM activities commenced with community sensitization in 2004. This led initially to the formation of three Community Forestry Associations (CFAs) in 2008, but they were later in the same year merged to one: the Mau Sururu Likia (MASULICOFA).

A five year forest management plan was prepared by the community and Conservation & Management of Mau East Group (COMEG, a NGO) in 2010 and approved by the KFS in 2011. No management agreement had been concluded between the KFS and the CFA.

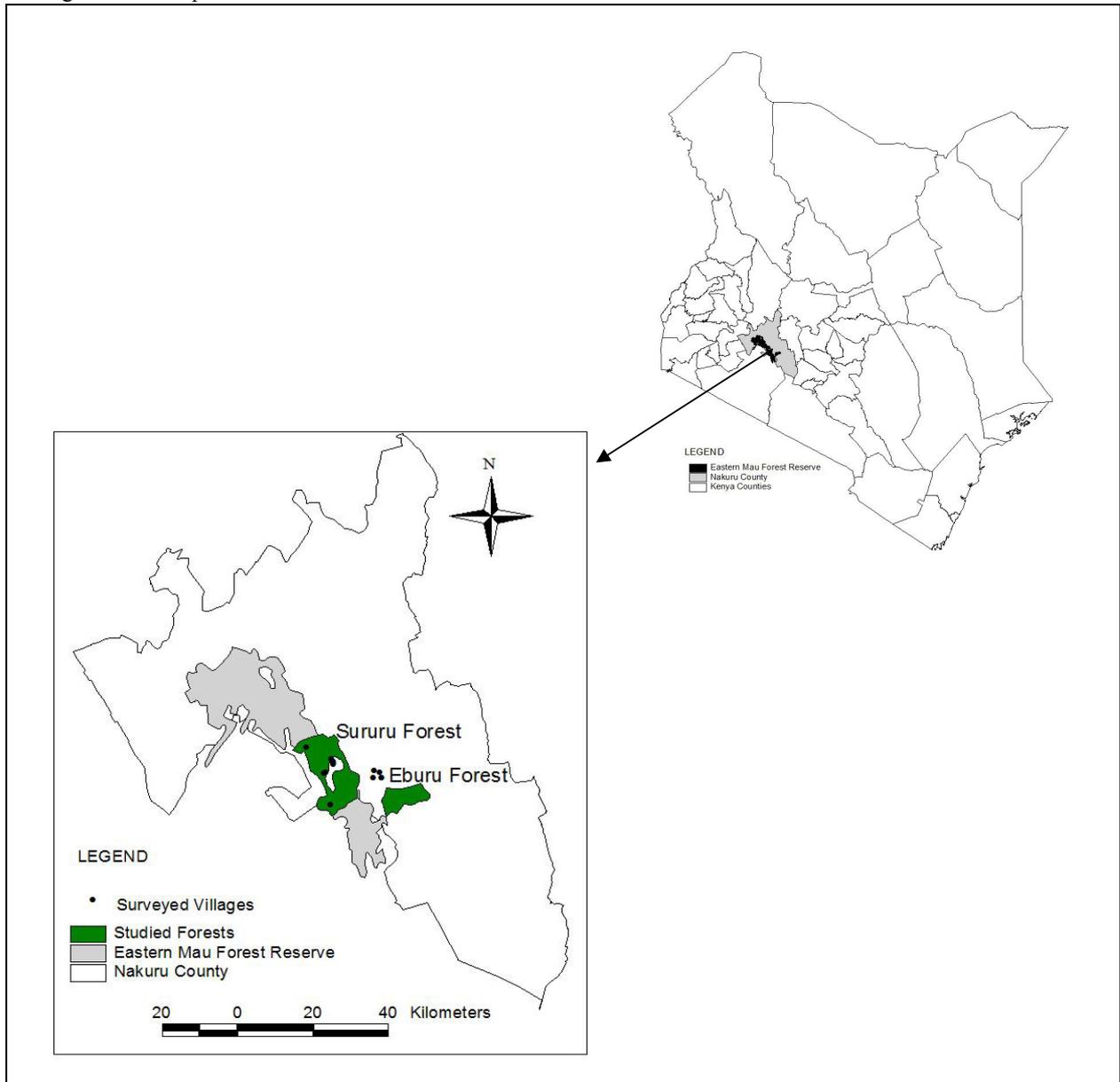
The association had about 300 members constituted from eight CBOs. The members belong to one or more of five forest user groups (FUGs): beekeepers, firewood, grazers, seed and seedling collection.

The CFA membership is drawn from residents of forest adjacent communities and is, in practice, mostly formed from pre-existing community based organisations, such as *Kifanuma*, *Muugano*, *Mulimagama*, *Greenland Youth* (own survey, 2014). The various members of the respective user groups elect their own executives, i.e. chairperson, treasurer and secretary, who are in charge of the day to day management. In turn, the user groups' executives elect five CFA executives (chairman, vice chairman, secretary, vice secretary and treasurer) who hold office for a period of three years. Individuals/households pay one-off subscription fee to become members of the CBOs, typically around KSH 300 (USD 3.5). The CBOs register their members in the CFAs and pay a one-off subscription fee in the order of KSH 5,000 (USD 59). There are also membership fees for FUGs.

Eburu forest occupies an area of 8,700 ha and lies between latitudes 0° 40' and 0° 41' south and longitudes 36° 05' and 36° 16' east (Eburu Participatory Forest Management Plan, 2008...unpublished). On the backdrop of heavy forest degradation, a stakeholder committee was set up to oversee the management of the forest (interview data). The committee was transformed to the Eburu Community Forest Association (ECOFA) in 2006. The governance structure is identical to the one described for Sururu. The CFA has about 250 members organized in eight CBOs. Seven forest user groups have been formed: water, ecotourism, beekeepers, firewood, grazers, seed and seedling collection. The forest management is guided by a five year management plan prepared jointly by the community, Kenya Wildlife Service and Kenya Forests Working Group (KFWG) in 2008 and approved by the KFS in 2009. A management agreement between the CFA and KFS was signed in 2010.

The population around Sururu and Eburu forest depend on crop farming, livestock production, wage,

business, pension and remittances. All households use forest products for cooking, heating, house construction, animal fodder, hang hives, seed and wildling collection and, bush meat, medicinal herbs, and organic fertilizer. The figure 1 below presents the location of Sururu and Eburu forests within the EMFR.



3.0 Materials and Methods

3.1 Econometric model

The probit model was used to determine the relationship between household socio-economic characteristics and CFA participation. The probit model is appropriate whenever modelling which of two alternatives occurs (Hoetker, 2007). The model has been used in categorical analysis such as severity analysis, behavioural analysis and level of participation (Maskey *et al.*, 2006; Hoetker, 2007; Ogada, 2012; Mutune *et al.*, 2011).

In the probit model, the dependent variable is a binary response i.e. household members' participation in CFA is 1 and 0, otherwise. CFA participation was hypothesized to be influenced by farm characteristics, individual and institutional attributes. Furthermore individual decision to participate in CFA y_i^* is linearly related to a vector of observable variables X_i e.g. group membership, ownership of tree nursery and other factors we cannot observe, the error term ε_i (Hoetker, 2007), this is expressed as:

$$y_i^* = \alpha X_i + \varepsilon_i \quad \text{Equation} \quad (1)$$

If y_i^* is greater than zero individuals decide to participate in CFA. But we cannot observe participation, only the actual choice, y_i and give a value of one when the individual participates and zero otherwise. The estimation model is therefore stated as:

$$P(y_i = 1 / X_i) = \begin{cases} \phi(X_i\beta) \\ 0 \text{ otherwise} \end{cases} \quad \text{Equation} \quad (2)$$

Where ϕ is cumulative density function for the standard normal distribution.

To assess participation, it is important to consider both economic and social variables at the participating household level, as well as factors that affect benefits and costs to households (Agrawal and Gupta, 2005; Maskey, 2006). Some of the costs associated with CFA participation include one off membership fees, annual subscriptions, and time to undertake the association's activities. The benefits include contracts to undertake silvicultural activities within the forest, training on nature based enterprises such as beekeeping, access to information on care for trees and general benefits of maintaining forests, and better access to forest products e.g. quality tree seedlings (Mutune *et al.*, 2015...forthcoming). Thus if benefits exceed costs, individuals were more likely to participate in CFA activities.

To evaluate the local participation in community forestry, the study relied on recall information about assets and income in 2003 (before) PFM establishment. The years 2003 represented a normal production year in the area with no major events affecting the local economy. Further, the year 2003 was marked by a radical shift from one party to multi-party system and residents faced post-election violence, implying that recall was facilitated.

Formulation of the model was influenced by a number of working hypotheses. Thus the participation model was specified using several factors, derived from literature. The hypothesized variables included:

Group membership: household heads (HHheads) membership to social groups other than CFA was considered as a binary response. This referred to whether the HHhead held membership to any community based group before the advent of the CFAs. CFAs were formed from pre-existing community- based organisations such as environmental, youth and women groups (Ongugo *et al.*, 2008). Moreover, group membership facilitated social networks that accelerated diffusion of new ideas (Matuschke and Qaim, 2009; Conley and Udry, 2010). Thus it was hypothesised that HHheads that belonged to community-based groups a time before the arrival of the CFAs were more likely to make a decision to participate in CFAs than their counterparts who did not belong to such groups. The level of household involvement in the community based groups was not elicited during the interview because the focus was on CFAs rather than community based organisations.

Household ownership of a tree nursery: this variable was measured as a binary response (1, 0). Heads who owned a tree nursery were probably more environmentally interested and/or had economic motives to participate in CFAs. Thus it was hypothesised that HHheads that owned a tree nursery before arrival of CFAs were more likely to join a CFA as an avenue for forest conservation and/or generating incomes from the sale of seedlings.

Distance of the household to the forest: this was measured as the number of kilometres from the household to the nearest edge of the state forest co-managed with CFAs that the household could access and use. Households nearest to the forest edge have the advantage of distance and are more likely to exploit the forest resources more than those further away. Such households by the virtue of being close to the forests could appreciate the various forest values forest than those at distances further from the forest. Thus it was hypothesized that such households were more likely to join CFAs to sustain the benefits they derived from the state forest.

Household head level of education: the study considered the education level of the HHhead as the highest level of education attained. It is hypothesised that households with higher levels of education are less dependent on forest resources and thus less likely to participate in CFA. A higher level of education provides a wider range of job options, hence making forest-related activities e.g. wood collection unprofitable due to greater opportunity costs of collection (Adhikari *et al.*, 2004).

Wealth status: this was considered as a continuous variable and was determined by computation of the wealth scores from basic necessity surveys, BNS (Davis and Smith, 1998). The BNS was used to obtain a locally relevant wellbeing ranking from the perspective of residents. It was hypothesized that a wellbeing measure relative to the specific community was likely to shape individual decision to participate in CFA. Previous studies have shown poor household to be more dependent on the forest resources (Fisher, 2004; Lund and Treue, 2008; Chao, 2012). Thus the poor households were hypothesised to be more likely to join the CFAs than their counterparts, non-poor, to secure forest related values.

Household ownership of domestic animals: due to the long recall periods of absolute number for domestic animals owned by the households in 2003, the variable was considered as a binary response (1, 0). It was hypothesized that households who owned domestic animals at the advent of the CFAs were more likely to

participate in CFA to maintain access to forest grass following for their demand on the product.

Household size: Bigger household sizes have the implication of higher demand for forest products thus are more likely to participate in PFM to meet their needs for forest products (Chhetri, 2005).

Farm size under trees: land owned and allocated to trees in acres per adult equivalent units was hypothesized to negatively relate to decision to participate in CFAs. Household with larger acreage of land allocated to trees have own supply of fodder, trees for fuel wood and agriculture and thus are less likely to rely on forest products.

Gender of household head: Gender of household head was considered as a dummy variable. The presence of young men and women is regarded to be vital to success and sustainability of CFAs (Koech *et al.*, 2009). Thus Gender participation was included as factor in assessing inclusiveness in CFA.

3.2 Study design, sampling and data collection

All nine forest blocks of the EMFR are implementing PFM. The Sururu and Eburu forests were purposively selected for the study because they have the longest history of PFM.

Data was collected over a 5-month period between late 2013 and early 2014. Different research methods were applied. Household surveys were undertaken with 286 households randomly selected in each of the villages. The survey instrument was administered to every fifth household selected. The sample frame was developed from community maps created with local informants. Also, the study included in-depth interviews with key informants, including four KFS officials, five CFA executives, four CFA scouts, four timber dealers, a saw miller and 15 household heads. The informants were purposely selected for their ability to inform the study objectives. The interviews were guided by interview guides specific for each main stakeholder group prepared in advance of the interviews. In all cases where the interviewee gave consent, the interviews were recorded, otherwise detailed notes were taken.

A number of additional methods were used to triangulate the information gathered through the methods described above. This included participants' observations, informal talks with villagers, focus group discussions and review of documents.

The BNS was used to obtain a locally relevant wellbeing ranking from the perspective of residents, as it was hypothesized that a wellbeing measure relative to the specific community would be likely to shape CFA participation. The BNS formed the basis for an index of poverty for every household in the sample, relative to a locally-derived definition of poverty. The method has been applied in both developed and developing nations (Noble *et al.*, 2008). According to Davis and Smith (1998) basic necessities are defined as assets or services that 60% or more of respondents agree are basic necessities that everyone in the community should be able to have and nobody should have to go without. Prior to the survey, a list of 25 assets and services was defined based on focus group discussions in villages not selected for the survey. The list was deliberately constructed to include some items no one would consider basic necessities currently (e.g. all school-age children attending school) to encourage interviewees to consider their responses carefully. During the survey, respondents were asked which items they considered a basic necessity and which they owned currently.

For each item, the percentage of respondents who believe the item to be a basic necessity was calculated and only items which at least 60% of respondents consider to be basic necessities are considered as such. The percentage of respondents who consider each item to be a basic necessity was then considered as the weighting for that item. A poverty score was computed for each respondent by adding together the weighting for all the items which the respondent actually possesses, divided by the total of the weightings for all the items (see Davies and Smith, 1998). Higher poverty scores indicate a wealthier household.

3.3 Data analysis

Descriptive analyses were used to summarize the profile of the respondents and information related to people's participation in forest management program. The probit model was used to analyse the socio-economic determinants of household participation in CFA, a time before the CFA was established. The model estimated the marginal effects of socio-economic factors on different levels of participation suggesting how per unit change in such socio-economic characters affects the level of participation. Positive coefficients mean that the probability to participate in CFA increases with that variable. Gamma values and Chi-square test statistics (χ^2) were computed to assess association between categorical variables. Categorical tests of hypotheses specifically t- and z- tests were used to test whether the difference between the means differences were significant or not. For estimation of marginal effects, Sururu and Eburu were not separated because the intention was not to compare the two CFAs. But the logic, discussed in another paper, was to assess the extent of PFM practice because Eburu had both a management agreement and plan while Sururu lacked a management agreement. Following Claro *et al.* (2010), farm sizes are reported in adult equivalent units (AEU) to enable comparison between households of different sizes.

4.0 Results and Discussions

4.1 Basic socio-economic attributes for CFA and NCFA participants, 2003

CFAs in both sites were dominated by young male headed households (30-44 years) but Eburu CFA had a higher average age (over 60 years) of household heads. Most of the active labour force in Eburu was reported to have migrated elsewhere in search of employment. In both sites, CFA member households were larger (5.63) and with slightly smaller land holdings (0.47 acres) per AEU than NCFA households. NCFA households had slightly bigger farm sizes allocated to trees than CFA households, particularly in Eburu. CFA households, on the other hand, had a much higher proportion of livestock ownership. Ownership of livestock may drive the need to participate in CFA to access forest fodder. The descriptive statistics of explanatory variables for CFA and NCFA participants are presented in Table 1.

Table 1: Basic descriptive statistics for participants and non-participants in CFAs

Household head attributes	CFA, n=92				NCFA, n=182			
	Mean	Std.dev	Max	Min	Mean	Std.dev	Max	Min
Individual attributes								
Ethnicity dummy 1=prominent group i.e. Kikuyu	0.64	0.28	1	1	0.73	0.24	1	1
Household size	5.63	2.14	10	1	5.09	2.24	10	1
Age	37	13.70	56	21	54	11.40	71	23
Wealth score	84.03	15.55	100	18.51	59.43	20.91	100	0
Percentage share wage income	11.30	4.35	100	0	14.68	20.62	100	0
Percentage share forest income	25.73	10.41	100	0	19.53	13.99	64	0
Farm characteristics								
Farm size in acres per AEON	0.47	0.15	0.67	0	0.83	2.02	0	0
Farm size allocated to trees in acres per AEON	0.11	0.27	0.23	0	0.25	0.62	0	0
Proportion with tree nurseries= 1, if yes	0.51	0.10	1	0	0.04	0.20	1	0
Proportion with domestic animals e.g. sheep, donkey	0.75	0.23	1	0	0.69	0.58	1	0
Institutional attributes								
Proportion of group membership = 1, if yes	0.58	0.19	1	0	0.38	0.18	1	0

The smaller land sizes allocated to trees and bigger proportion of animals could have led to higher demand of forest products such as firewood and forest grass particularly by CFA participants. Thus on the whole the percentage share of forest income was higher among CFA than NCFA households in both sites. However, the NCFA members had significantly higher percentage share of wage income that helped them fill the gap in forest income.

Results from BNS showed that in both sites, CFA members had higher relative wealth scores in 2003 than NCFA members. CFA participants were more in groups before the establishment of CFAs than their counterparts. In both sites, membership to community based organisations is crucial because the pre-existing groups were precursors to CFAs formation.

4.2 Socio-economic determinants of household participation in Community Forest Associations

The probit model included all the variables hypothesized by the study. All the 274 observations were included meaning that no cases were missing. The likelihood ratio chi-square of 185.75 with a p-value of 0.0000 shows that the model as a whole is statistically significant, that is, it fits significantly better than a model with no predictors.

The probit model results for estimating determinants to participate in CFA as a function of pre-PFM observed household socio-economic characteristics are presented as below. The model is statistically significant for both sites ($P < 0.0001$), and pseudo- R^2 values show that the equation explains 54% of the variation in the choice of whether to engage in PFM or not. The study estimated the probit model of household membership to CFAs as described in Equation (1). The results are displayed in Table 2.

Table 2: Household heads socio-economic determinants to CFA participation.

Variable	Marginal Effect	Standard Error	Z
Education level of HHhead	0.02	0.05	0.34
Age of HHhead	0.04	0.003	1.47
Gender of households, =1 if female	0.04	0.08	0.04**
Household size	0.03	0.02	2.72
Proportion owning tree nursery	0.44	0.03	0.000**
Proportion owning domestic animals	0.05	0.09	0.53
Proportion in groups, not CFA	0.15	0.007	0.001**
Farm size under trees	-0.30	0.02	0.015**
Distance to nearest forest edge (in Kilometres)	-0.006	0.004	2.70
Share of wage income (%)	-0.03	0.002	0.011**
Share of forest income (%)	0.19	0.07	0.000**
Wealth score (%)	0.021	0.03	0.08***
No. of observations		274	
Pseudo R-Squared		0.54	

Note: ** Significant at 5%, *** Significant at 10%

The following section provides a discussion on the factors that influenced households' decision to CFA participation in Sururu and Eburu forest.

4.3 Discussion of socio economic factors that influence household decision to participate in CFA.

The empirical results (Table 2) indicated that gender, group membership, ownership of tree nursery, wealth status, percentage share of wage and forest incomes and farm size allocated to trees as significant factors that influenced household decision to participate in CFAs. However, age, education, household size and proportion owned by household heads were insignificant.

Percentage share of household's *wage income* in 2003 was significantly different ($\chi^2 = 7.83$, $P = 0.045$) with a negative correlation to CFA participation. This implied that households who relied mostly on wage income as the main livelihood source were less likely to have made a decision to participate in CFA. Table 2 shows that a unit increase in wage income decreased CFA participation by 0.3%. FGD and key informants revealed that those in wage income had no time to spare for CFA activities e.g. attending meeting, fire fighting, tree planting and scouting. They were working most of the time and were less likely to be exposed to new opportunities. Interviews with casual labourers revealed that non-forest wage income sources e.g. washing carrots and harvesting crop produce were more profitable than casual labour in the forest. Thus households having wage income as prime livelihood activity were less likely to participate in CFA and missed out on benefits associated with the PFM concept because they were busy in earning wage incomes. Key informants told us that lack of direct and obvious livelihood benefits associated with PFM discouraged the community particularly those in wage income from CFA participation.

In terms of forest governance under PFM, the KFS oversees the CFA activities, controls access to forest resources and retains all the forest related revenues. Moreover, the KFS remained in control of the forest resources e.g. licensing forest products and decision making while in practice the CFA were involved as labour providers for forest rehabilitation and policing. The Forest Act 2005 clearly provides forest user rights through CFA participation but the Act is not clear on decision making power for community. Part of current problems with lack of interest in the CFA relates to lack of real decision-making power. Therefore, to enhance local participation in CFAs, there is need to involve the community not only as cooperating forest users but as decision makers in their own rights.

Wealth status measured wealth score in BNS had a strong positive and significant relationship with CFA participation (Gamma, 0.62, $\chi^2 = 10.82$, $P = 0.000$). A higher wealth score indicated a wealthier household. Table 2 showed that the non-poor heads had a 2.1% higher chance of participating in CFA than the poor household heads. This implied that the non-poor were more likely to have made a decision to participate in CFA than the poor households.

Of the 67 household categorised as poor, when asked 55%, 22% and 23% of the cited lack of direct livelihood benefits in CFA activities, lack of information and lack of money respectively to pay for subscription fees as reasons for not participating in CFA. The number of CFA members was 300 and 250 for Sururu and Eburu CFA respectively. The total population of adults in was 36,000 and 7,119 for Sururu and Eburu. This means that only 1% and 3% of the total adult population in Sururu and Eburu respectively participated in CFA. This could be interpreted not representative of the population in both study sites.

Furthermore, it was observed that the some of the members registered in CFA were not actively involved in groups' activities. Key informants attributed the low participation and lack of interest to join CFA to

lack of direct livelihood benefits. Since households participated in CFAs to derive livelihood gains, unclear participation benefits offered little incentive to get involved. Thus participation in CFA activities remained low. Therefore, the KFS should truly decentralize forest rights and benefits to enhance community participation in PFM.

In terms of time to conservation activities, poor households have a high opportunity cost of participation as the time spent on participation could be used as labour for cash income elsewhere e.g. washing carrots, weeding and harvesting farm produce. The benefits for participation in conservation programmes take time to be realised; therefore, the preference of poor people for wage earning in developmental activities is expected. These results are consistent with those discussed under wage income and group membership. The findings are in agreement with those of (Agrawal and Gupta, 2005; Maskey *et al.*, 2006; Baral and Heinen, 2007) that the non-poor are likely to participate in conservation activities but poorer people are more likely to participate in public work schemes.

However, because of high opportunity participation costs some poor (68%) and rich (65%) households did not participate in CFA activities. FGD revealed that the non-poor who had participated in CFA were the middle class.

The very rich/elites wanted to gain direct membership to CFA but the CFA structure does not permit that. Key informants told us that the elite expected to form a small clique that would enable them to own the forests together with KFS. But they later realised the CFA structure could not accommodate direct membership. Generally, community members interested in joining CFAs must first belong to pre-existing community groups and ought to be available to undertake collective CFA activities. Purportedly, the rich had less time to spare for forest conservation activities such as weeding, fire fighting and scouting. Thus the likelihood of participation in CFAs was greater for those who were financially better off and available to undertake conservation activities particularly the middle class households. It is interpreted that the middle class heads had less opportunity cost of participation in comparison to poor and rich households. Thus the poor were less likely to benefit than the non-poor under PFM. This was likely to result to greater marginalization for the poor households.

Several studies (Fisher, 2004; Lund and Treue, 2008; Hogarth *et al.*, 2010; Chao, 2012) show the poor households to be the most dependent on forest income. Hence as a CFA advances, the difference between the poor and the non-poor households is likely to increase. This is because particularly the poor deficit of participation in CFA lack a forum to voice their concerns on forest that could profoundly affect their forest based livelihoods. These findings have implications for the PFM policy implementers, e.g. KFS and CFA to devise realistic ways of including the poor so as to improve their livelihoods in reference to PFM principles. This is because enhancing participation of poor households could result in an increased benefit for the most desperate population and improve livelihoods.

There was a strong positive and significant relationship between CFA membership and HHheads who belonged to *other social groups* before the establishment of PFM (Gamma= 0.68, $\chi^2 = 9.5982$, P=0.000). Table 2 shows household heads who held membership in other social groups had a 15% higher chance of participating in CFA. This is because social groups may expose individuals to new ideas and trust that built from the groups may encourage a household to quickly accept new frontiers of collective actions. Further, FGD revealed that the existing social groups were precursors to the CFA formation and joining such groups was a pre-requisite to CFA membership.

Further, communities around Sururu and Eburu, particularly those in groups, had been sensitized by civil society organisations (CSOs) e.g. Kenya Forestry Working Group and Forest Action Network about CFAs and user rights provided under the 2005 Forest Act. When new legislations such as the Forest Act 2005 provide community members with clear user rights, they find it important to participate in CFAs. This finding is in agreement with that of Temesgen *et al.* (2007), that sustainable forest management would be enhanced when, in practice, communities are provided with clear user rights to the forest.

In particular, membership to an environmental based group increased the chances of CFA participation by 18%. Household heads who had gained membership to an environmental group saw the establishment of CFA as an avenue for forest conservation. Household data showed that 51% of NCFAs members, did not have any knowledge about CFA existence and its activities; such information is mostly accessible in existing groups. This finding is in agreement with that in Ogada (2012) that most information about developmental activities such as CFA is disseminated in groups rather than through individuals. The analysis in this paper revealed that heads that did not belong to any group at the time of CFA arrival were most likely excluded from participation and benefits associated with PFM. Thus it becomes imperative for development agencies including those of government to strengthen grassroot organisations. Also FACs should be encouraged to join these groups or form new ones so as to advance CFA participation.

Ownership of tree nursery before CFA arrival increased the possibility to participate in CFA. There was a strong positive relationship between tree nursery ownership and CFA participation (Gamma=0.80) and the association was highly significant ($\chi^2 = 83.037$, P=0.000). Table 2 showed that household heads who owned

tree nursery pre-PFM had a 44% higher chance of participating in CFA. Household data showed that about 57% of households, in 2003, that owned tree nurseries had joined CFA. These results demonstrated that households were motivated to participate in forest management if they anticipated direct economic benefits.

The KFS had sensitized the communities about the Forest Act 2005 and CFAs establishment. Consequently, community members were aware that KFS would involve them in rehabilitation of the forests. Individuals joined CFA with the expectation to benefit (Ongugo *et al.*, 2008). Hence community members who owned tree nurseries, pre-PFM, ended up participating in CFA because they saw market opportunities in CFA and wanted to take advantage. They may also have found it easier to believe the earlier efforts, from CSOs and KFS, to encourage communities to join CFAs. Some reasons that may account for such a finding is that greater interaction with organisations and government officials helped disseminate information about CFAs and potential benefits to villagers. But unless households are interested in such information, it does not make much of a difference to the likelihood of participation. If interaction with CSOs and KFS leads to more CFA participation then these organisations should intensify their campaigns and create awareness about CFAs among the local populace.

The realization of livelihood gains by community members could prop up CFA participation. Thus out-scaling of nature based income generating enterprise e.g. tree seedling production closely associated with PFM (Mutune *et al.*, 2015) could provide incentives for participation. Recent studies on participation have shown that benefits (including power of decision making) derived from participation significantly influence an individual verdict to participate in community forestry (Maskey *et al.*, 2006; Ongugo *et al.*, 2008). If the community cannot openly benefit from the associations, then there is little incentive to join and the CFAs remained small. Therefore, the lack of direct livelihood benefits among FACs could partly explain the low participation by CFA membership. I.e. out of the total population 50,330 and 10,100 (Kenya National Bureau of Statistics, 2009) about 29% and 10% in Sururu and Eburu respectively participated in CFAs. To spur up participation, KFS should review participation guidelines to enable effective CFA input in decision making on participatory forest management issues.

Farm size allocated to trees had a significant but negative relationship with CFA participation ($\chi^2=3.97$, $P=0.015$). Each additional acre allocated to trees reduced the likelihood to participate in CFA by 3.1%. A plausible explanation was that households with more trees on farm produced some products e.g. firewood which they would otherwise extract from forests. If this is the situation, such households would not be motivated to join CFAs. Nevertheless this had the implication that farm forestry could be encouraged not only for households to directly and indirectly benefit from farm forests but also enhance state forest conservation by reducing pressure on the reserves.

There was a strong positive relationship between CFA participation and *percentage share of forest income* before CFA establishment (Gamma= 0.78) and the association was highly significant ($\chi^2 = 9.5982$, $P=0.000$). All the community members irrespective of CFA membership use the forest resources mostly for subsistence use such as firewood and grazing. However, the households that ended up in CFA had a higher percentage share of forest income than their counterparts. Even though CFA and NCFA member had equitable access to forest products, when asked, 67% of the CFA participants joined CFA to have better access to forest products and services. This implied that households participated mostly to derive livelihood benefits while in the CFA. For instance, household heads who participated in CFA had bigger proportion of livestock than non-participating heads, though not significantly different in this paper. But Chhetri (2005) observed that households with more livestock were more inclined to use community forest resources for their higher demand for fodder and ground grass. Thus the range of products harvested and other activities allowed in the forest could be expanded to cater for the varying interests of households. It also calls for stakeholders' agreement on the objectives of the forest management including enhanced but sustainable use of high value forest products and services such as timber and ecotourism that would heighten community participation.

The relationship between CFA membership and *gender* of household head was significant ($\chi^2 = 3.68$, $P=0.04$). Hence gender was an important determinant in household decision to join CFA. Table 2 shows that female headed households had a 4% higher chance of making a decision to participate in CFA than their male counterparts. This implied that women were more involved in CFA activities than men. This could be explained by the different social roles held by women and men. For instance, in Sururu and Eburu, like most rural areas of Kenya, women have the social role to collect fuel wood for household energy and gather food for the entire household. This could imply that households that demand higher amounts of forest products e.g. firewood are more likely to participate in the CFAs. Consequently, this would allow them a chance to influence decision making in the associations.

Generally women manage as much as 74% of Kenya's smallholding farms, implying that women hold power to sustainable management of the country's natural resources (Kabutha and Humbly, 1996). Data from observations and key informants revealed that women were attracted to CFA activities that included beekeeping, seedling production and contracts to carry out silvicultural activities such as thinning that would generate

firewood. This concurred with the observations made by Coulibaly-Lingani *et al.* (2009) in Burkina Faso, that there was a highly significant relation between gender and participation in forest conservation. This implied that gender is an important factor to consider for successful implementation of PFM in Kenya. Based on this finding, then PFM implementers e.g. KFS and CFAs should concentrate their efforts about CFA activities around women because they are the major stakeholders that could be employed to enhance forest conservation while improving rural livelihoods.

5.0 Conclusions and Recommendations

Household heads with high opportunity cost particularly household those in wage income; the very poor and rich households were excluded from CFA participation. Since households participated in CFAs to derive livelihood gains, unclear participation benefits offered little incentive to get involved. Thus participation in CFA activities remained low. Therefore, KFS should review PFM guidelines in order to make CFA participation benefits more obvious and realizable. Also, KFS should involve the CFAs as forest managers and decision makers in their own rights rather than cooperating forest users.

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