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Impact of Collaborative Forest Management on Forest Status and Local Perceptions of Contribution to Livelihoods in Uganda

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Abstract

This study assessed the impacts of Collaborative Forest Management (CFM) initiatives on forest status of Budongo Forest reserve in Uganda and perceptions of the participating communities on the contribution of CFM towards their livelihood. Impact on conservation was assessed by applying a Participatory community based Forest Resource Assessment (PFRA) method to examine population structure, dynamics, and incidences of human disturbance across two forest compartments under CFM and comparing these with the status in two compartments without CFM, but otherwise similar to the former in terms of forest type, history of resource use-patterns, silvicultural management practices and location (in the production zone of the forest and close proximity to local communities). Impact on local livelihoods was examined through a survey that involved ten focus group discussions and semi-structured interviews among 140 randomly selected forest neighbours. With the exception of tree regeneration, CFM improved forest status in terms of more live stems of timber, pole tree species, trees with harvestable logs, merchantable volume, and lowered incidences of human disturbances. However, local people do not perceive CFM to have contributed to their livelihoods because whereas CFM created opportunities for income generation particularly through bee keeping, the in-forest activities it halted were superior sources of livelihood. As a result, nearly 50% of the respondents explicitly reported dissatisfaction with the CFM arrangements. Other reasons for dissatisfaction included the inability of CFM to deliver benefits as promised in the signed agreements, local people were frequently not consulted or involved in making key management decisions, and inequality in sharing CFM benefits amongst members of the local community. CFM at Budongo forest reserve has thus contributed to improving forest status, but is perceived to have had limited benefits to local livelihoods.

Keywords: Budongo forest, collaborative forest management, benefits, people's livelihoods, Uganda

1. Introduction

In many developing countries, management of natural resources has gradually become participatory and typically involves a broad range of stakeholders (Turyahabwe et al., 2012). Most African and Asian countries (Wily & Dewees, 2001) as well as international development organisations (O'Brien, 2003; Ribot et al., 2006) have been promoting participatory approaches and many national governments have developed, or are in the process of crafting policies to institutionalise Participatory Forest Management (PFM).

The introduction of PFM was ignited by several international and local factors. International endeavours include, e.g. the Tropical Forest Action Plan (TFAP) that sought to reverse deforestation by involving local stakeholders in management of forest resources and the 1992 Convention on Biological Diversity (CBD) that underscores the

value of sustainable use of biodiversity and equitable sharing of associated benefits. PFM is widely favoured within international policy arena possibly because the approaches generally draw idealist and arguably romanticised ideas of "community" but also significantly connects with a dominating paradigm in the development arena where a need for community participation in processes concerning local development is emphasized as a central tool in community development (Hutton et al., 2005; Kanji & Greenwood, 2001). Locally, participation of communities in the management of conservation areas/projects is traceable in the need to target local needs, lower costs of management, incorporate the knowledge of local people and craft a more equitable sharing of conservation benefits (Wily, 1998).

PFM comprises of a variety of arrangements for co-management. The extent to which local stakeholders control PFM processes and outcomes (allocation of benefits and costs) ranges from relatively conservative "benefit sharing" to genuine "community-based natural resource management" where locals are in full control (Wily, 2002). Notable among the PFM approaches are Community Based Forest Management (CBFM), Joint Forest Management (JFM) and Collaborative Forest Management (CFM); all of which advocate that rights and responsibilities to manage forest resources be devolved to local communities settled in proximity (Carter & Gronow, 2005).

In Uganda, CFM is the most popular form of PFM. It is defined as structured partnerships between key stakeholders such as government departments, interested organisations and community groups in the management of local forest resources (Carter, 1999). CFM is provided for in the Forestry Policy of 2001 and Forestry and Tree Planting Act of 2003 of Uganda as an instrument that can address disincentives of a protectionist approach to managing forests and the destructive outcomes of open access (MWLE, 2001; Government of Uganda, 2003). It is implemented by communities forming Community Based Organisations (CBO's) which enter agreement with a National Forestry Authority and District Forestry Services to manage part of or the whole Central Forest Reserve and Local Forest Reserve respectively (Government of Uganda, 2003). Guidelines exist for implementation of CFM (MWLE, 2003). By 2010, a total of 27 agreements had been signed by the National Forestry Authority (NFA) (an autonomous statutory body that manages central forest reserves in Uganda) and community based organizations, but a total of 30 applications for CFM had in principle been approved by NFA. An extra 28 applications were in process (Driciru, 2011). The agreements define local rights to use and participate in management forests. There is a special focus on improving local livelihoods through mutually enforceable plans. However, the national government retains ownership rights of the forest on behalf of the citizens of Uganda (NFA, 2003).

A number of reasons explain the popularity of CFM arrangements. These include belief among government forest agencies in the potential of the arrangements to support local livelihoods and sustainable use of forest resources (Willy, 2002). Proponents of CFM (e.g. see Borrini-Feyerabend 1997 and Ghate 2003) argue that CFM offers local people incentives to conserve forest resources and may thus result into socio-economic, infrastructural, ecological, institutional, and policy impacts to the forestry sector and local communities. Ecological effects include better patterns of use of forest resources, and an improved forest condition. Economic effects include perceived or real improvement in local livelihoods from sale/consumption of forest products or access to forest based employment opportunities.

The impact on livelihoods may encourage local participation (Beck, 2000), which in turn (especially when combined with commitment of participating communities) may regulate access to benefits, thereby curbing illegal activities. It is thus frequently argued that realization of local benefits by communities participating in to CFM yields sustainable resource use patterns and hence an improved forest condition. The latter may also lead to an improved flow of socio-economic benefits to the communities thereby eliciting further participation in CFM (Ghate, 2003).

We conducted this study in Budongo Central Forest Reserve (BCFR) found in mid-western Uganda to determine the impact of CFM on forest condition and status and local community perception on CFM in relation to their livelihood. BCFR has some of the earliest arrangements for CFM in Uganda and in the region. Since an initial agreement was signed in 1998, local communities have been implementing 10 year CFM agreements to manage the northern part of the forest. The area thus provides an appropriate case to respond to Scher et al.'s (2004) call for an understanding of benefits of CFM, identified as critical in sustainable forest management. The following research questions guided this study (i) Does CFM lead to sustainable forest management of Budongo CFR? (ii) How does the local community perceive CFM in relation to their livelihoods?

2. Study Area and Methods

2.1 Location and Vegetation Type

Budongo CFR is a 793 km^2 natural moist forest located between 1°37' and 2°03' N, 31°22' and 31°46' E. Rainfall is bimodal and peaks from March to May and September to November, with a mean annual range between 1150-1500 mm. The minimum annual temperature is 17-20 °C, while the maximum is 28-29 °C. The reserve is continuous with the Murchison Falls National Park and the Bugungu and Karuma Game Reserves (Figure 1). It occupies slopes gently rolling towards the escarpment of the rift valley with an altitude range of 914 m and 1097 m asl. The forest is facing degradation, mainly due to expanding sugarcane growing and high demand for timber (Reynolds, 2005).

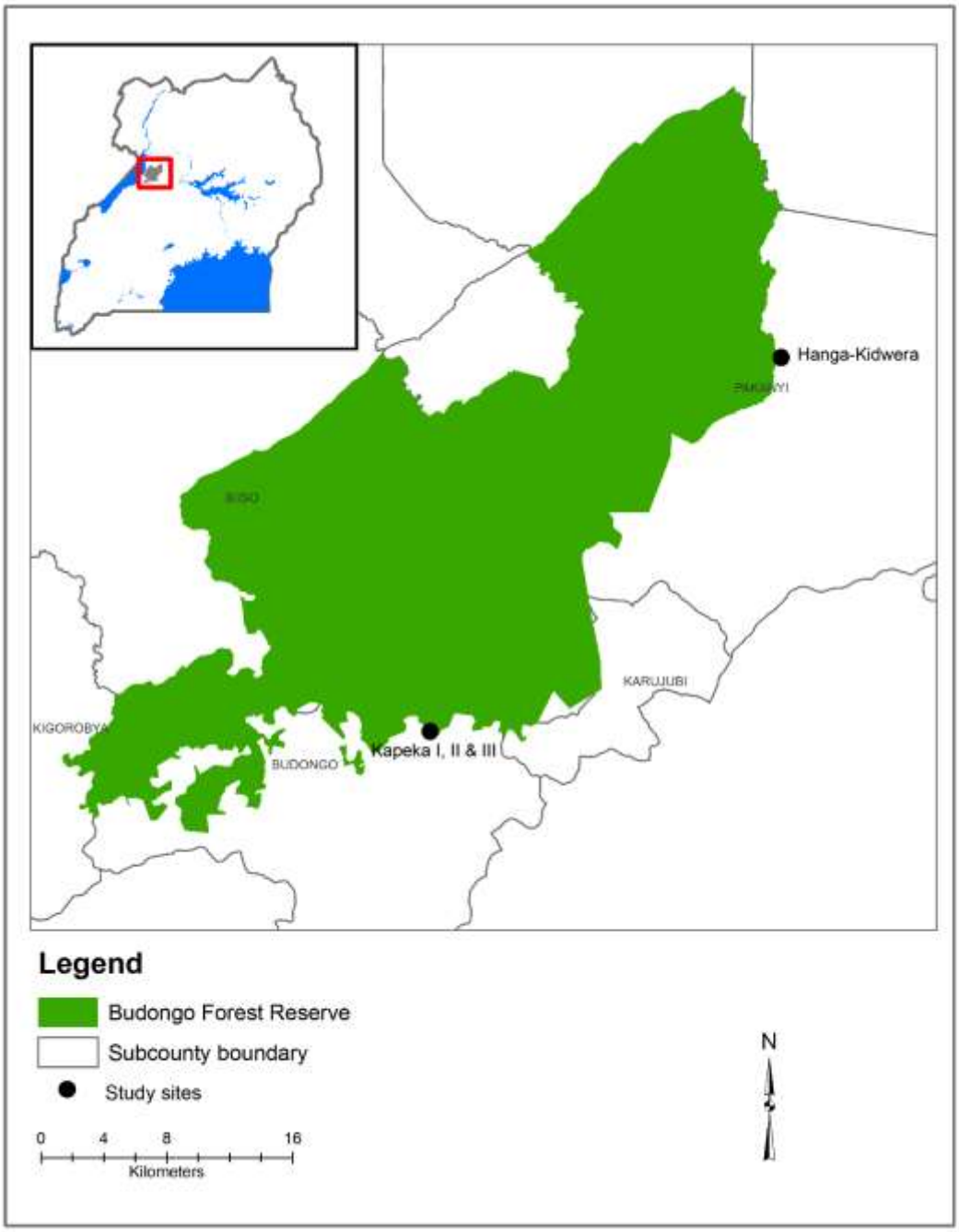

Figure 1. Map of Budongo Forest Reserve. Location map of Budongo Forest Reserve within Uganda (inset) and detailed map of Budongo Forest Reserve showing study sites.

The study area is a mixed forest vegetation that resulted from salvage harvesting that opened the canopy of *Cynometra alexandri* (Plumptre, 1996). In the 1940's it was the mixed forest covered about 65% of the whole reserve (Eggeling 1947), but has increased to 85% following salvage felling and silvicultural weeding of *Cynometra alexandri* trees in 1960s. In this vegetation type, the upper storey consists of *Entandrophragma utile*, *Khaya anthotheca*, *Maesopsis eminii*, *Celtis mildbraedii*, and *Trichilia* while the under storey species are *Funtumia africana* as the dominant species *Diospyros abysssincia* and *Lasciodiscus mildbraedii* as the abundant species (Karani et al., 2001).

2.2 Assessing Impacts of CFM Forest Status

Impact of CFM on the condition of the forest was assessed through an in-forest assessment of forest compartments under CFM (compartments W38 and W24) and comparing their status with non-CFM compartments (compartments W42 and W37). The procedure involved a number of steps: selection of sample compartments, laying sample plots and transects, and enumeration and measurement of trees and recording anthropogenic activities in the forest.

2.2.1 Laying out Sample Plots and Transects

Compartments were selected to match a CFM and with a non-CFM compartment in terms of: (i) overall forest type; (ii) location in the same management zones; (iii) proximity (equidistant to the forest boundary so that residents of nearby villages have comparable accessibility to the forest); (iv) coverage (less than 1000 ha so assessments were completed in the allotted time frame); and for CFM compartments; (v) the agreements had to have been signed at least five years ago or the CFM development process should have begun five years ago before the actual signing. This implies that local CBO's should have received training in CFM and actively been participating and supporting CFM through forest practices/activities. Four forest compartments fulfilled the selection criteria and were chosen (Table 1).

Table 1. Characteristics of selected forest compartments in Budongo CFR

Characteristic	**Compartments**			
	W 38	**W 37**	**W 24**	**W 42**
Forest type	Cynometra Forest	Cynometra Forest	Cynometra Forest	Cynometra Forest
Management Zone	Sawmill Harvesting	Sawmill Harvesting	Low impact harvesting	Low impact harvesting
Forest block	East Waibira	East Waibira	West Waibira	West Waibira
Management Type	CFM	Government controlled	CFM	Government controlled
CFM process started and agreements signed (date)	CFM Process started: 1998 CFM signed: 18.11.2005	Non-CFM	CFM Process started: 2003 CFM signed: 28.05.2008	Non-CFM
Compartment size (ha)	467.7	700.1	767.7	776.1
CBO	NOBUFOCA	-	KICODA	-
Villages in the vicinity of the compartments	Hanga and Kidwera	Hanga and Nyakyanika	Kapeka I, II, III, Kabango and Kinyara	Iragara, Bulyango, Kabango and Kinyara
Total population	4662	3902	7703	7412
Population pressure pr. ha forest	10	6	10	10

Subsequently, a total of 81 plots (0.1ha each) were randomly established in the compartments (Table 2). A sampling intensity of 0.3% was adopted for all the selected forest compartments. This was the most appropriate according to the spatial structure, density and homogeneity of Budongo CFR.

Table 2. Characteristics of sample plots and transects used for assessing the impact of CFM on the condition of Budongo CFR

	Compartments				
	W 38	**W 37**	**W 24**	**W 42**	**Total**
Sampling intensity (%)	0.3	0.3	0.3	0.3	0.3
Area size (ha)	467.7	700.1	767.7	776.1	2711.6
Size of one sample plot (ha)	0.1	0.1	0.1	0.1	0.1
Area sampled (ha)	1.40	2.10	2.30	2.33	8.13
Number of sample plots	14	21	23	23	81
Number of transects	5	5	7	7	24
Length of transects (m)	10.221	11.419	13.245	14.953	49.838

The number of transects and sample plots aligned in each compartment was based on four criteria: (i) sampling intensity, (ii) size and the overall shape of the forest compartment, (iii) vegetation type, and (iv) length of transects.

2.2.2 Enumeration and Measurement of Trees

Nested plots of 20 m x 50 m were randomly established in each compartment and trees enumerated based on diameter size class based on diameter at breast height (DBH) following Kent and Coker (1992). Seedlings were recorded in 1 m x 2 m subplots and saplings in 2 m x 5 m subplots overlaid inside the 20 m x 50 m plots. We adopted IFRI's (1998) approach to categorise size classes. Thus, shrubs and young trees with a DBH less than 2.5 cm and a height less than 1m were considered as seedlings; saplings were taken as shrubs and young trees with a DBH ≥2.5 cm and <10 cm; and plants with a DBH ≥10 cm were recorded as trees. A focus on size classes was deemed informative give local desire for saw logs and thus the tendency to cream the forest of large sized trees.

2.2.3 Recording Anthropogenic Activities in the Forest

Evidence of forms of human disturbance was recorded in plots under CFM and those not under CFM using indicators for eight (8) most common forms of human disturbance: (i) timber cutting; (ii) firewood harvesting; (iii) harvesting of poles; (iv) charcoal making; (v) collection of herbal medicine; (vii) grazing of livestock; and (viii) encroachment for agriculture. Each indicator was scored as a variable recorded for each plot by assigning a categorical value of one for presence of signs or zero for absence of signs. Since CFM compartments had no legal concessions to harvest timber, charcoal, poles as well as crop growing, we considered any observed sign(s) as illegal. The extent of freshness of the signs was used to estimate the age of the disturbance.

2.3 Local Perception of Impacts of CFM on Livelihoods

The target population for the study was local communities in the villages within 5 km radius from the reserve because it is within this range that local people and forest reserve interactions are most frequent and intense (Obua et al.， 1998). Two existing CFM sites: (i) Hanga-Kidwera villages in Pakanyi subcounty and (ii) Kapeka village in Karujubu sub-county in Masindi district were selected because they pioneered CFM implementation in Uganda and have running CFM agreements (Driciru, 2007). Both sites have functional Community Based Organisations (CBOs), which is a requirement for local communities to collaborate with the National Forestry Authority in the management of forests (MWLE, 2003). The CBOs are North Budongo Forest Conservation Association (NOBUFOCA) in Hanga-Kidwera and Kapeka Integrated Community Development Association (KICODA) in Kapeka.

For out-of-forest assessments of impacts of CFM on local livelihoods, a list of CFM households was obtained from the chairpersons of the respective CBOs and a total of 140 households (80 from Hanga-Kidwera (or 16% of

village total) and 60 (or 20% of village total) from Kapeka) were randomly selected for interview. The sample is within the range recommended by Brokensha and Castro (1983) for social surveys. The interviews sought to ascertain benefits accruing to local people, and decision-making powers over forest resources. The survey was augmented with 20 key informant interviews held with staff of the NFA, CBOs and forestry staff with experience in the area. In addition, these key informants at the agency and village levels were constituted into groups of three to six people for focus group discussions (FGDs). In the FGDs participants were asked to elaborate on resources collected by local people under the CFM arrangements, and impact of CFM on local livelihoods. The FGDs participants had in-depth knowledge of CFM and relations with local people. In all, 10 FGDs were conducted. The information collected was used for triangulation to validate the data collected from individual household interviews.

2.3 Data Analysis

Average stand densities of the different diameter size classes were estimated and used to describe the structure of the populations in CFM and non-CFM compartments. Differences in forest condition between CFM and non-CFM compartments were tested using a two-sample t-test, while variation stand densities for the different size classes in CFM and non-CFM compartments was displayed using histograms. Density was derived by the number of individual trees per hectare. To show the relationship between the occurrence of human disturbances and the forest management style, we examined frequency of occurrence of the disturbances in CFM and non-CFM compartments. A chi-square test was used to determine whether human disturbance was associated with management approach.

3. Results and Discussion

3.1 Impact of CFM on Forest Status

3.1.1 Stand Structure

In terms of stand structure, compartments under CFM had more live stems of both timber and pole tree species than non-CFM compartments. This then is yet another case demonstrating CFM's ability to improve forest condition (see Carter and Gronow 2005). CFM compartments had relatively wider coverage observed for trees and poles as a result of either improved regeneration (growth) or controlled extraction. Given that CFM has been operational for almost one decade, the latter is more likely. CFM tends to control tree and pole extraction because of the general tendency to pursue a protectionist approach (e.g. see Donovan, 1999).

3.1.2 Regeneration Status

There were more seedlings and saplings observed in non-CFM than CFM compartments, with the difference being more pronounced for seedlings (Figure 2). Non-CFM compartments had more young trees than CFM probably because of a higher vulnerability of the former to extractive uses thus more disturbance that creates favourable conditions for regeneration. On the contrary, the large trees of CFM compartments closed the canopy and impeded regeneration of understorey tree species.

3.1.4 Merchantable Volume for Timber Trees

CFM compartments had more trees with harvestable logs than non-CFM and significantly higher merchantable volume ($p<0.001$). CFM compartments averaged $400m^3$ per hectare compared to $280m^3$ per hectare in non-CFM further underlining a protectionist approach (e.g. see Donovan, 1999).

3.1.5 Human Activities

Overall, incidences of human activities or disturbance were higher among non-CFM compartments. There were 12% fewer cut trees, 59% fewer freshly cut trees, 86% fewer incidences of fire and 44% fewer incidences of grazing and firewood collection was five times lower compared to the non-CFM compartments. This again demonstrates CFM's ability to reduce human activities in forests hence improve forest condition (see Carter & Gronow, 2005) as a result of a protectionist approach (e.g. see Donovan, 1999). Because of these activities, compartments outside CFM have high levels of human activities. For example, for any forest type in Uganda Budongo forest reserve has one of the highest levels of hunting for bushmeat. This is especially so along areas of human population density such as the southern edge of the reserve. As observed by Plumptre (2002), this is because unlike park authorities, forest authorities do not patrol forests for hunting, partly due to a lack of manpower. However, despite these Budongo remains Uganda's most important forest reserve to be protected for biodiversity (see Forest Department, 1999; Plumptre, 2002).

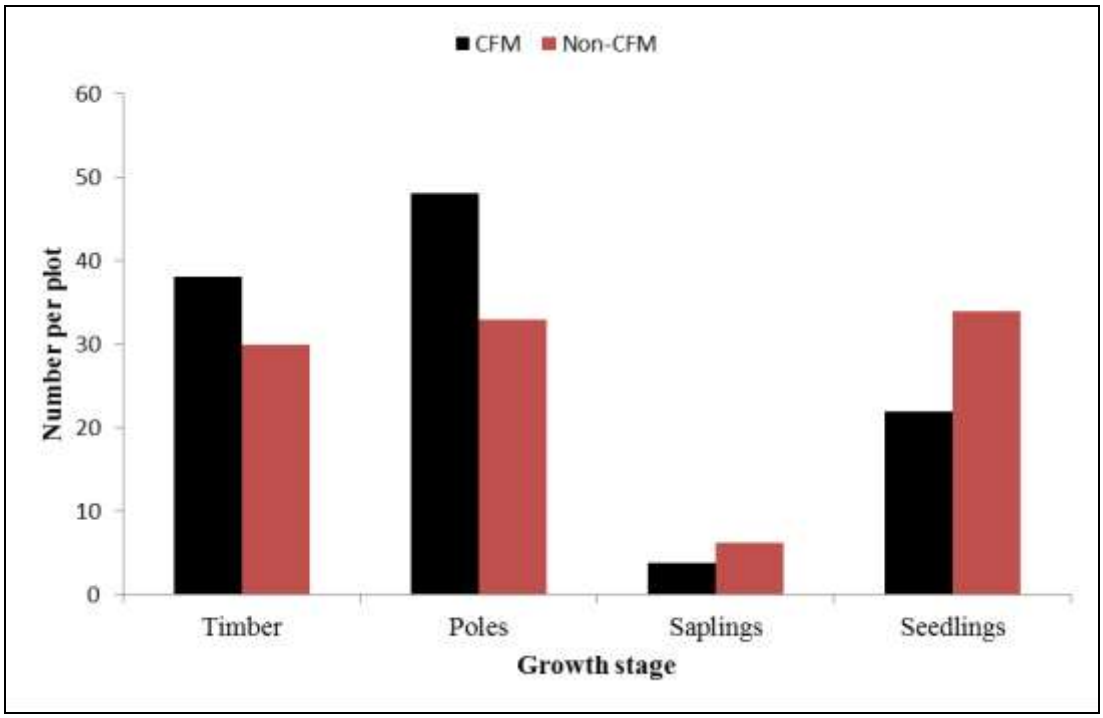

Figure 2. Coverage of different growth stages in compartments with and without Collaborative Forest Management, Budongo Forest Reserve, Uganda.

3.2 Collaborative Forest Management and Socio-Economic Benefits

Implementation of CFM significantly altered the extent to which local people benefit from the reserve (Table 3). In particular, compared to before CFM, significantly lower proportions of households used the reserve for collection of timber, wild foods, poles, thatching material, animal grazing, cultivation of crops, and charcoaling under CFM arrangements. On the other hand, there were significant increases in in proportions of households setting up beehives and collecting tree seed and seedlings from the reserve under CFM arrangements.

Table 3. Percentage of households reporting on use of forest reserve before and under arrangements for Collaborative Forest Management, Budongo Forest Reserve, Uganda

Forest resource/ activity	Before CFM agreement	Under CFM agreement	Two proportions Z-test	
			Z-value	p-value
Timber	88	0	-14.8	0.000***
Wild foods	67	21	-7.7	0.000***
Poles	25	11	-3.1	0.002***
Thatching material	14	5	-2.6	0.008***
Animals grazing	2	0	-1.7	0.082*
Cultivation of crops	18	0	-5.2	0.000***
Charcoaling	39	0	-8.3	0.000***
Handicrafts	25	25	0.0	1.000
Bee keeping	6	24	4.1	0.000***
Herbal medicines	2	2	0.0	1.000
Tree seedlings	0	22	5.9	0.000***
Tree seeds	0	4	28.0	0.024**

*, **, and *** indicate that difference in proportion of households making particular use of forest reserve before and under arrangements for Collaborative Forest Management is significant at 0.10, 0.05. & 0.01 levels of significance, respectively

3.3 Local Satisfaction with CFM Contribution to Household Income

Involvement of local people in arrangements for Collaborative Forest Management frequently enhances forest protection by controlling unregulated open access to forest resources. This is beneficial for conservation, but may affect livelihoods of formerly forest dependent communities for whom environmental income is typically a key constituent of household total income (Tumusiime et al., 2011; Vedeld et al., 2007), thus affecting extent of satisfaction with CFM arrangements.

Nearly half of the sample households were dissatisfied with the CFM implementation process (Figure 3). They attributed this to a number of reasons, particularly: (i) inability of the approach to deliver benefits as promised in the signed agreements. Whereas CFM created opportunities for income generation particularly through bee keeping, the in-forest activities it halted were superior sources of income; (ii) local people were frequently not consulted or involved in making key management decisions at CFM sites; (iii) there were reports of an inequitable mechanism of sharing CFM benefits amongst members of the local community.

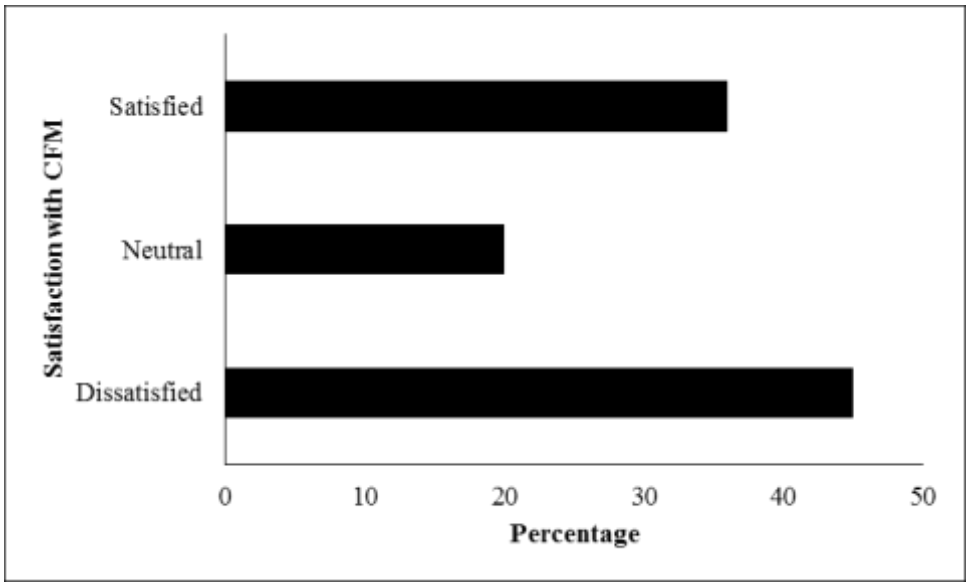

Figure 3. Satisfaction of local people with Collaborative Forest Management at Budongo Forest Reserve, Uganda

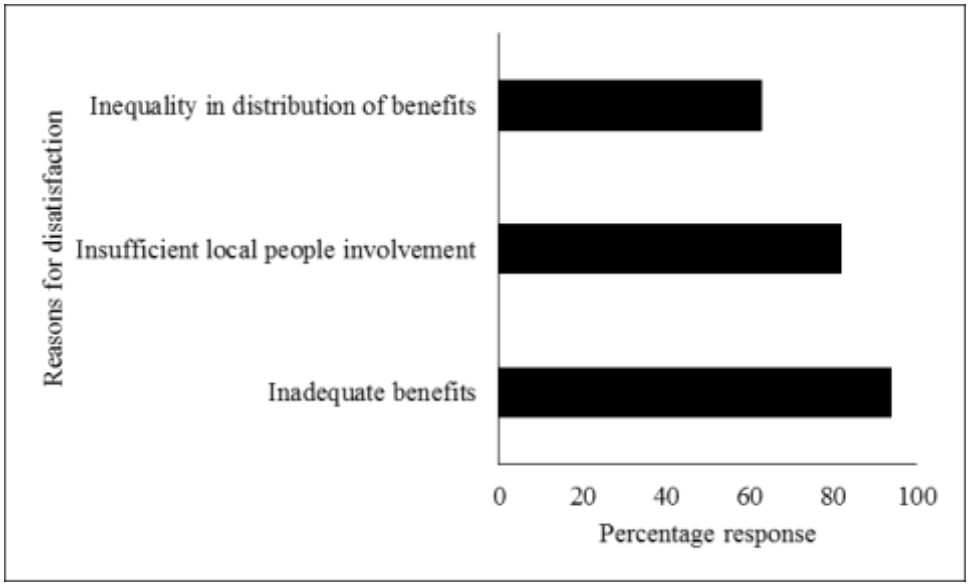

Figure 4. Reasons advanced by local people for dissatisfaction with arrangements for Collaborative Forest Management at Budongo Forest Reserve, Uganda

The tendency to view benefits under CFM as inadequate can be traced in the results of Table 3 where it is clear that with CFM came restrictions of access to valuable resources, particularly timber. On the other hand, local people reported minimal involvement in activities they considered vital, particularly in the setting of calendars for forest patrols, resource access and inventories. With regard to inequality in distribution of benefits, it was for example reported by key informants that only 20 households were given boundary plots for tree planting. Four of these reported households were among the households surveyed, and all of them reported satisfaction with CFM. However, these beneficiary households reportedly had kin or other social relations to forest management authorities and treated the allocated plots as private property, virtually denying other CFM participating households from enjoying the resources thereon. In this respect, CFM has not promoted equitable access to benefits and resources yet proponents of CFM often advance this argument to policy makers. Such inequitable sharing of the benefits among the participating households may sooner or later create disinterest and conflict in the operationalization of the CFM process, and is an issue of distributional justice as benefits of conservation accrue to a few whereas the costs are borne by all (Lazarus, 1993; Rawls, 1971). Moreover, as the local people reported, these beneficiaries are among the elites and more wealthy of community members. This form of elite capture seems a norm (Shackleton et al. 2002 ; Tumusiime and Vedeld 2012) and it is thus imperative to carefully craft pro-poor strategies, of the kind suggested by Pokharel and Nurse (2004) lest CFM fuel local economic inequality (Tumusiime and Sjaastad forthcoming) and hampers attainment of the first of the United Nation's Millenium Development Goals that focuses on reducing poverty (UN, 2008). Despite dissatisfaction, local people reported willingness to continue participating in CFM for fear of losing their own time and resources already invested the process, but also a hope for good returns in the future.

4. Conclusions

Compartments under CFM had more live stems of both timber and pole tree species, more trees with harvestable logs and significantly higher merchantable volume suggesting that CFM arrangements in which share rights are determined by a government agency as in the current study can improve forest condition because there is a tendency to control extraction of forest resources and limited exploitation rights for the community members. However, there were more seedlings and saplings observed in non-CFM compartments probably because of a higher vulnerability of these compartments to extractive use thus more disturbances that creates favourable conditions for regeneration. Incidences of human disturbances were observed in both compartments, but non-CFM compartments had more human disturbances. With the exception of tree regeneration (which can however be improved through assisted regeneration) CFM has improved forest status. However, local people do not perceive CFM to have contributed to their livelihoods because whereas CFM created opportunities for income generation particularly through bee keeping, the in-forest activities it halted were superior sources of livelihood. As a result, nearly 50% of the respondents explicitly reported dissatisfaction with the CFM arrangements particularly because of insufficient benefits generated, inequality in the distribution of these benefits and limited involvement of local people in key management decisions. However, we recommend a future impact study that specifically examines the contribution of CFM arrangements to incomes of participating households, and a deeper analysis of local participation in decision making.

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