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Assessment of Local Community Perception of and Attitude Towards Participatory Forest Management (PFM) System and Its Implications for Sustainablity of Forest Condition and Livelihoods: The Case of Chilimo-Gaji Forest in Dendi District, West Shewa Zone, Oromia, Ethiopia

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Abstract

Participatory Forest Management (PFM) system was piloted in Chilimo-Gaji Forest in Ethiopia in 1990s as an alternative forest management approach. This was necessitated by national objection over forest resource degradation, clamor for decentralization and need for better forest governance system. In order for local residents to cooperate with a reduction of deforestation and forest degradation, they must have a positive perception toward the forest conservation system and positive attitude toward the forest conservation approach. A positive attitude of local communities towards forest management system is an essential prerequisite for local participation in forest management. The main purpose of this study was to assess the local community perception of and attitude towards Chilimo-Gaji forest and Participatory Forest Management (PFM) system. The perception and attitude of the local people were studied in two dimensions: the attitudes toward the PFM system and the perception of the forest and forest resources. Data for the study was generated through household survey comprising of 265 respondents selected through simple random technique. Linear Logistic Regression model was used to assess the effect of socio-economic and demographic factors on the households' willingness to participate in forest management. The study findings revealed that, generally the respondents held positive attitudes towards the forest and PFM System. The results also depicted the association between socio-economic features of people living close to the forest and their use of forest resources and demonstrated the basis of attitudes towards those managing the forest. Sixty percent of respondents were found to agree with the idea of Chilimo-Gaji forest conservation; however, statistically significant differences were found between the villages in terms of supportive attitudes toward the forest conservation system (p=0.02) and toward the PFM System (p=0.01). Nearly half of the respondents held a positive attitude toward the conservation project. However, those highly dependent on the forest to generate income remained reluctant and unsupportive, suggesting that high levels of support toward a conservation project by sections of the community may not translate into conservation success, because the drivers of the deforestation and forest degradation are not supportive. A perception of direct financial benefits accrues from the PFM system was found to be the main factor of the respondents' attitudes and perceptions. This study then suggests that to change the perception and attitudes of local people around the forest, environmental education through awareness raising programs should be encouraged, and then addressing local development needs, ensuring real participation in PFM system if the new forest management system wants to win long lasting support of local communities to improve the forest condition and ensure sustainable rural livelihood.

Keywords: PFM system/process; Local communities; Attitude; Perception; Chilimo-Gaji; Forest

Introduction

Background of the study

Forests have enormous ecological, economical, and socio-cultural significances [1-3]. Forests constitute critical habitat for humanity, providing a range of ecological and environmental services including protection of biodiversity, sequestration of carbon, provisioning of fresh air, renewal of soil fertility, and maintenance of hydrological cycles. Rural communities worldwide depends on forests heavily, as these contribute significantly to their livelihoods, providing basic needs, cash resources, and safety-nets during times of crisis. Regrettably, despite widespread acknowledgment of the significance of forests, it has been very difficult to tackle deforestation, which continues to represent a major global challenge [4]. Globally, the forestry sector has over the years been faced by a myriad of challenges including; excision of state forest land, indiscriminative destruction of natural forests, poaching of rare species, weak governance structures, and lack of resources to regulate, lack of incentives to enhance communities' participation and the duplication of laws and regulations. Many developing countries including Ethiopia continue to face the challenge of how best to manage and conserve their forests. Forest management systems adopted by governments, whether they are protectionist oriented or incentive-based are important in determining outcomes of conservation and sustainable use [5]. Historically, conservation strategies have been dominated by attempts to fence off or reserve areas for nature and exclude people from the reserved areas [6]. This protectionist model has been labeled the 'fortress conservation', 'coercive conservation' or 'fence-fine' and for a long time has dominated mainstream thinking in conservation. It involved the creation of protected areas (national parks,

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game reserves and national forest reserves), the exclusion of people as residents, prevention of consumptive use, and minimization of other forms of human impact. Broadly, this approach viewed development objectives of local communities as being in direct conflict with the objectives of biodiversity conservation [7].

Governments from the commencement of nation-states have usurped forest management and use rights from traditional forest dependent societies as they perceive these societies as being opportunistic non-conservationists, thus dismissing their capability to manage their forests on a sustainable basis. Centralized control imposes strict regulations that prohibit the use of forest produce, including wildlife [8]. One of the negative immediate impacts of forest centralization is the loss of local control over forest resources and the reduced role of local institutions in managing forests [9]. Forest dependent communities, devoid of any legal capacity to protect the resource encroach upon the protected forests to make up for the loss of use rights and incentives to manage their forests [10]. This has resulted in deep-seated mistrust, antagonism and conflicts with the government, forest management regime and negative attitude towards the forest itself. In a situation in which little consideration was given to the people's livelihood needs, indigenous know ledges, values and spiritual aspirations, local people lose the feeling of owning the forests and develop negative perceptions and attitudes towards them Kinyanjui. This in turn leads to indiscriminate exploitation of forests, degradation and deforestation. In such kind absolute exclusionary condition, it is not surprising that the attitudes of local people living within and adjacent to forest reserves reflect suspicion and mistrust on forest management system [11]. It is not possible therefore to have the forests for exclusive use by the state alone and deny forest adjacent communities access to the forests [12]. The local communities, particularly poorer households, would continue to access and use the forest resource whenever available despite not having legal tenure rights to access the forest resources. In addition, the lack of local community participation in forest management has generally meant local communities have a negative attitude towards conservation efforts and the enforcement of conservation-related regulations.

In response to the problems associated with the fortress approach, since the 1980s a new discourse has arisen that stresses the need to incorporate the needs and aspirations of the local people in conservation [13]. Unlike fortress conservation that viewed people as a 'threat' to conservation, the new approach views them as potential partners in biodiversity conservation [6]. This approach has two distinct elements. First, it allows people in the vicinity of the protected area or others with property rights to participate in the conservation process and second, to link the objectives of conservation with the local development needs of the people [13]. This approach recognizes the moral implications of imposing costs on local people and the pragmatic problem of hostility of displaced or disadvantaged local people to conservation organizations practicing fortress conservation strategy [6]. The approach adopts sustainable development concept and combines both biocentrism arguments and anthropocentric arguments in conservation. Through Participatory Forest Management (PFM) initiatives, communities are expected to manage their environment based on ecological principles, and benefit economically by becoming stewards of the forests and the lands that are close to them. The practice of PFM in recent times has been accepted as the way for sustainable management of forest resources. It is well documented that PFM provides opportunities for local people to participate in forest conservation and management, thereby contributing to improved status of forests and the well-being of local communities. The approach is based on the concept of involving the local people whose daily lives are affected by the operation of a forest management system in the forest management.

Chilimo-Gaji forest is one of the oldest PFM intervention sites in Ethiopia in which the government had invited local people to participate in planning, designing, implementing, managing and benefit sharing of forest resources under the participatory forest management program. Farm Africa pioneered the introduction of PFM in Ethiopia in the mid-1990s in partnership with local NGO SOS Sahel Ethiopia and along with other agencies such as the German development agency GIZ [14,15]. In sharp contrast with the old 'command and control' system of forest governance, PFM system hoped to meet people's needs in conservation by involving them in decision-making, allowing them to share benefits of conservation, and providing them with measures to mitigate any adverse effects of conservation. So, it is expected to bring positive attitudinal change of local communities towards the forest management system and the forest itself. Integrating the views and needs of local communities in conservation processes is crucial to for the effectiveness of the introduced PFM scheme and sustainability the livelihoods of the communities and the forest condition. However, in many cases people's perceptions of these efforts are rarely elicited, analyzed and included in decision-making processes and readjustment measures have taken.

Statement of the problem and the rationale of the study

PFM provides local incentives for conservation of forest resources by sharing the costs and benefits of conservation. The implementation of PFM may result into ecological, socio-economic, institutional, and infrastructural and policy impacts to both the communities and forestry sub-sector. The ecological impacts may include stabilized and/or forest resource use patterns and improved quality and or condition of forests. The economic impacts include improved livelihoods through sale of forest products, increased skills, employment and exclusion of non-PFM actors from accessing forest resources. The participation and commitment of communities under PFM encourages regulated legal access to socio-economic benefits. The more the community are involved in PFM, the fewer the number of illegal activities in the forest managed under PFM and the higher diameter at breast height, the basal area and density of trees.

Understanding local communities' forest use, perceptions and attitudes of forest management and the factors that influence these perceptions is important for designing management policies that are sensitive to their needs. The new approach to forest management that emphasize local community participation need to be introduced as a measure for reducing mistrust and conflict between local communities and forest managers. Positive perception and attitude of local communities towards participatory forest management regime and the forest is an essential prerequisite for active local participation in forest management system and sustainable forest condition improvement and ensuring sustainable rural livelihoods [7]. However, in many cases people's perceptions of these efforts are rarely elicited, analyzed and included in decision-making. This study attempted to examine the perception of the local people involved in PFM. The general objective of the study was to examine local people's perceptions towards participatory forest management (PFM) system in Chilimo-Gaji forest and further determine the factors that influence these perceptions. The Specific objectives of this study were therefore to (i) analyze the perception of the local communities of participatory forest management; (ii) identify factors that influence the community perception of PFM system.

Theoretical Framework

Attitude is understood to be the major antecedent of people's behavior in relation to natural resources management or conservation.

Thus, most studies employ items on selected attitudinal issues that are presented as open- or close-ended questions asking peoples' evaluation of issues in positive/negative or affective (like/dislike) scales However, the theory of reasoned action (TRA) states that behavior is determined by the intention to perform the behavior [16]. A person's intention is in turn a function of his attitude toward performing the behavior and of his subjective norm. It follows thus that a single act is predictable from the attitude toward that act provided that there is a high correlation between intention and behavior. Besides for a reliable prediction of behavior from attitude, the two must correspond in terms of four important elements— the action, the target, context, and time. Therefore, items or statements to elicit attitude and intention have to be well specified and identical in terms of these four elements. Therefore, theory of planned behavior is expected to provide a fuller explanation and precise prediction of behavior. Methods of assessing people's attitudes and behavior are well documented in the social science literature. Generally, the manner in which local people use forest resources and react to forest rules determines their social behavior and attitudes towards the forest [17-20]. According to Gross there is a relationship between one's attitude and behavior. Therefore, it might be possible to predict his/her behavior. But attitudes can only be used to predict behavior when appropriate measurement techniques are used. In this study, it was felt that in order to predict whether local communities living adjacent to Chilimo-Gaji would participate in a participatory management program, their use of forest resources and attitudes towards forest management practices need to be known.

Methodology

Description of the study area

The study was conducted in Chilimo forest, which is one of the oldest PFM intervention sites in Ethiopia, located in Dendi district. Chilimo Forest represents the remnants of the dry Afro-montane forests in the central plateau of Ethiopia. The main species in the canopy layers are *Junipers procera, Podocarpus falcatus, Prunus africana, Olea europaea* subspecies *cuspidata, Hagenia abyssinica, Apodytes dimidiata, Ficus spp., Erythrina brucei,* and *Croton macrosytachus* [14]. This forest is also home to some 150 bird species, of which five are Ethiopian endemics and many more are Afro Tropical Highlands' biome species. Chilimo forest is characterized by the presence of *Juniperus procera (Tsid), Podocarpus falcatus (Zigba*), *Prunus africana (Tikur Enchet) Olea europaea* subspecies *cuspidata, (Weyra), Hagenia abyssinica, (Kosso)* and *Apodytes dimidiata, Ficus spp*. (*Shola*). This makes it the main source of indigenous tree seeds for the central highlands. According to wildlife surveys undertaken in 1982, there are about 180 specious of birds and 21 mammals in this forest reserve. A number of rivers including, Awash River, start from within the Chilimo forest (Mulugeta Lemenih and Melaku Bekele [14]. The vegetation throughout this area has been subject to human interference for over 2,000 years (longer than in any other East African country), and the rate of deforestation has been extremely high, with significant changes in forest cover observed even since the 1970s [21-24].

The forest is Montane-mixed broadleaf–coniferous, although conifers predominate. Historically, this entire upland area is thought to have been covered by *Juniperus–Podocarpus* forest, but most of the forest has been cleared for agriculture, and this encroachment continued. Selective cutting of trees for commercial use stopped about 1973, but illegal cutting by the local people for fuelwood sale continued. The forest is important to local people for grazing, fodder, commercial and subsistence fuelwood extraction, herbal medicine for humans and animals, farm implements, construction poles and timber and occasionally non timber forest products [25]. A few shrub species dominate, such as *Myrsine africana*, with others like *Maytenus arbutifolia* and *Rubus apetalus* abundant indicators of forest disturbance. Small patches of plantation forests, initiated by the forestry department of the state in 1976, are present within the forested lands. Indigenous and exotic species are used; the main exotic species are *Eucalyptus saligna, E. camaldulensis, Pinus patula* and *Cupressus lusitanica*, with indigenous ones including *Juniperus procera, Hagenia abyssinica* and *Podocarpus falcatus.*

In response to failure of previous "fences and fines" approach, the FARM-Africa's Chilimo Participatory Forest Management phase I and II Projects were operational from 1996-2006. Also the 2003 regional legislation on forest management allows for devolution of management power and handover ownership status to local people or community based organizations (CBOs). PFM approach was introduced in 1996 as a strategy to arrest forest degradation and to meet the livelihood needs of the local community [26]. Transferring the ownership of the forest was made in 2004 when the district cooperative promotion bureau legalized the by-laws of forest cooperatives, clarifying the responsibilities. The FCs and government signed a contractual agreement to manage the forest in jointly base and share both the responsibilities of and benefits from establishing and maintaining PFM. Currently, there are 10 legally registered Forest Cooperatives(FCs) and two Forest User Groups (FUGs). From these ten forest cooperatives the eight were formed one forestry cooperative union-Chilimo-Gaji forest cooperative union [27-30].

Sampling design

Multi-stage sampling procedure was employed to identify the sample households for the study. There are forty eight rural kebeles in Dendi district that use the forest for different purpose [30-32]. However, the PFM scheme is being implemented in parts of the forest extended in seven kebeles. Firstly, from the 48 rural kebeles existing in the district, the seven kebeles where PFM approach is being implemented were purposively selected. Secondly, from those seven kebeles the PFM regime implemented, four kebeles randomly selected. These kebeles were Chilimo, Galessa, Dano Sangota and Goban. Thirdly, the sample households were selected by stratified random sampling technique. The households were selected after close consultation with Forest Cooperatives Executive Committee (ECs) and the villages' leaders based on their Forest user group membership and their wealth stratum [33-36]. The households were selected randomly within each well-being rank (determined through a participatory well-being ranking exercise) to reflect the approximate proportions of people in each rank and to include both PFM members and non-members Chilimo, Galessa, Dano Sangota and Goban kebeles have a total of 2657 households. The wealth stratum of the studied household was classified using participatory well-being ranking (PWR) ranking exercise. Stratified random sampling based on participatory well-being ranking (PWR) was employed to draw the sample households from both FC members and non-members in these selected kebeles. The exercise conducted with 5 people who know the villages very well (key informants); these individuals were selected with the help of the village leaders. Three well-being categories were identified - Rich, Medium and Poor [36-39]. After setting criteria, each FCs member households list extracted from membership list and non-member household list extracted from village register and assigned to well-being class. This list served as sampling frame for stratified random sampling. The sample size of the study was 265 households.

Primary data collection techniques and tools adopted

Both primary and secondary source of data were used for this study. Semi-structured questionnaire was administered to household heads or their spouses by trained enumerators. The questionnaires elicited information on households' demographics, socio-economic and geophysical characteristics, farming activities, kinds and quantities of products extracted from the forest, costs they incur and their perceptions of an array of forest management aspects. Attitude questions concerning the forest resource use were phrased around the benefits from the forest (in terms of collecting forest products), restrictions on resource use, burning of the forest, because these are considered the contentious issues in the area [40]. Fifteen enumerators, all diploma holders, recruited from the study area and two-day intensive induction training was given to them. Key-informants were drew from development agents (DAs) working in the sample *kebeles*, Experts from district natural resources management, village leaders and Expert from the Oromia forest and wildlife enterprise. Hence, in-depth interview with key informant was conducted with selected informants of forest user groups. A set of structured questions were used to guide the interview. Also three focus groups with eight persons from different backgrounds were established. Participants in this discussion were selected from ordinary members of FCs in the study area. In the respective groups of the study area, the group is divided in to two parts [41]. That is the males group and the females group discussed separately and the division was purposely done to increase the confidence of female to speak more on the problem at hand.

Methods of data analysis

This study generated both qualitative data from PRA tools and quantitative data from household surveys. The qualitative data obtained through PRA tools were subjected to in-depth analysis and used to complement the discussion of analyzed quantitative data [42-44]. The qualitative data obtained through PRA tools were subjected to in-depth analysis and used to complement the discussion of analyzed quantitative data. Respondent's perception was elicited by obtaining their satisfaction ranking with performance of the forest management approach with regard to several aspects of management. The respondents were specifically asked to rank the performance of forest management system operating a Likert scale of 1 (very satisfied) to 5 (very dissatisfied) with respect to selected management aspects. The quantitative data were cleaned, sorted, summarized, and stored using Ms Excel. In analyzing quantitative data, both descriptive and inferential statistical methods were applied [45,46]. The relationship between dependency on the forest resource and individual attitude questions, and between participation and benefit distribution were analyzed using the Pearson chi-square test, while logistic regression was used to identify the variable associated with the attitude toward the forest management system. A $p \leq 0.05$ was considered statistically significant.

Empirical model and identification of variables: From the theoretical framework, the decision to predict those people who are either willing or not willing to participate in forest management make the choice of a logistic regression a more appropriate tool for this analysis. Therefore, Logistic Regression model was used to assess the effect of socio-economic and demographic factors of the households' willingness to participate in forest management. Logistic regression is a widely applied statistical tool to study farmers' perception conservation technologies. Logistic regression allows predicting a discrete outcome from a set of variables that may be continuous, discrete, and dichotomous or a combination of them. The dependent variable, (i.e., perception of PFM practice) is dichotomous discrete variable that is generated from the questionnaire survey as a binary response, and the independent variables are a mixture of discrete and continuous [47]. Following the methods of used by Abera and Mekuria, the logistic regression model characterizing perception of the sample households is specified as: The model is represented as:

$$P=e^{-}/1+e^{-}$$

p=probability of an individual saying 'no' (0=unwilling) or 'yes' (1=willing) to participatory forest management. In using the model, it is assumed that the probability that an individual supports participatory forest management is independent of their demographic and socio-economic characteristics, i.e., $\ln(Pi/1-Pi)=\beta 0+\beta 1X1+\ldots+\beta kXki$. (1)

Where:

i denotes the *i*-th observation in the sample.

P is the probability of willingness to participate in forest management.

$\beta 0$ is the intercept term.

$\beta 1\ldots\ \beta k$ are the coefficients associated with each explanatory variable $X1\ldots Xk$.

The impact of age, gender, education, residency, total household income (income), and on participation is estimated. The independent variables of the study are those which are expected to have association with farmers' perception of PFM regime. More precisely, the findings of past studies on the farmers' perception, the existing theoretical explanations, and the researcher's knowledge of the farming systems of the study area were used to select explanatory variables.

Results and Discussion

Demographic and socio-economic characteristics of respondents

The survey result shows that there is a great deal of variation in resource endowments, socio-economic, and demographic factors. The majority of the respondents were from Chilimo, 82 (30.94%), followed by Galessa 76 (28.68%), followed by Dano Sengota 57(21.5%) and Goban 50 (18.87%). More males were interviewed 184 (69.43%) compared to 81 (30.57%) females. With regard to educational level 30% of the respondents were cannot read and write, 50% went to primary school, 16% went to second cycle primary school, and 4% went to high school. This low level of education has limited the active involvement of the local people in the PFM process [48]. The survey result also shows that 25% of the respondents were between 20 and 30 years of age, 35% of the respondents were between 31 and 40 years of age, 30% respondents were between 41 and 50 years of age, and 7% were above 51 and 60 years of age and 3% were above 61 years of age (Table 1). As a result, 67% of the respondents were between 30 and 60 years of age which is representing most productive age group [49].

Majority of the respondents (70%) livelihood sources of the surveyed households were from subsistence agriculture; however, people that attained relatively higher education level had other substantial sources of income from non-farm small businesses such as store ownership, motorcycles and local grocery business, or a public profession. The agricultural land ownership varied from functionally landless to 4 hectare, of which 85% of the respondents owned between half a hectare to one and half a hectare [50-53]. The source of cash

Characteristics		Chilimo (n= 82)	Galessa (n= 76)	Dano Sangota (n= 57)	Goban (n= 50)	X^2	df	p
Age	20-30	18	16	7	6	7.346	7	0.47
	31-40	24	21	18	17			
	41-50	28	29	22	24			
	51-60	10	8	9	3			
	>60	2	2	1	0			
Educational level	0	26	24	18	16	12.634	9	0.28
	01-05	36	42	28	24			
	06-09	14	6	8	6			
	≥10	6	4	3	4			
Family size		8	7	6	7	17.645	6	0.012
landholding	<1	32	33	33	27	14.567	7	0.03
	01-02	28	29	17	13			
	02-03	12	9	6	6			
	03-04	6	3	1	2			
	>4	4	2	0	2			
Annual cash income (in USD)	>250	6	4	2	1	17.893	8	0.01
	201-250	12	14	10	8			
	151-200	22	24	12	14			
	101-150	32	29	18	11			
	51-100	6	4	14	14			
	<50	4	1	1	2			
Wealth stratum	Poor	38	42	33	33	13.456	9	0.02
	Medium	32	30	22	12			
	Better off	10	4	2	5			

Table 1: Demographic and socio-economic characteristics of the respondents (n=265).

income mainly came from livestock rearing (32%), crop sell (30%), and PFM membership associated cash benefits distributed among the member households (20%), small business (8%) and fuelwood sale (10%). The wealth stratum of the studied households was classified using Participatory Wealth Ranking (PWR) exercise. According to this classification, 47% of the surveyed households were poor, 33% were medium class, and 20% were better-off. Characteristically, poor households were those who, reported insufficient annual income and insufficient crop production to support the basic expenditures of the household, such as food, clothes and education. Among the basic socioeconomic criteria, there were significant differences among villages regarding land holding (p=0.03), average annual income (p=0.01), and wealth stratum (p=0.02). The average size of land held by households living in the Dano Sengota and Goban was higher than Galessa and Chilimo (0.75 and 0.825 ha versus 0.5 and 0.625 ha, respectively), which could be essentially determined by the location characteristics of the villages.

Forest resource use by the local communities

The survey result revealed that extraction of fuelwood, poles for building houses and fences, grass for livestock and grazing land, different parts of trees for human and livestock herbal medicinal values, thatching grass, wild fruits and green leaves for consumption and selling purpose and fibers for hand crafts preparation were the commonly practiced consumptive uses of forest products in the study areas. As in most other parts of the country, firewood is still one of the most important sources of household energy supply (Table 2). Regardless of the socio-economic characteristics or the *kebeles* where the respondents lived, firewood was the main source of energy in the study areas (p=0.072). In addition, nearly 27% of the material for housing and fence poles came from the forest, such as thatch for roofing material and timber for the house and furniture. The use of building poles and thatching grass has declined significantly in the study area as compared to 2-3 decades ago. This is shown by a shift towards corrugated iron roofing by households in the study area (from key informant interview) [54].

The harvest of Non-Timber Forest Products (NTFPs) resources was significantly higher for women (p<0.01) and differed within villages (p=0.04). Respondents from Dano Sengota and Galessa tended to harvest more edible and tradable NTFPs from the forest than the other two villages (Table 3) (p=0.04), which was related to the high

Resource category	Chilimo (%)	Galessa (%)	Dano Sengota (%)	Goban (%)	X^2	df	P
Fuelwood	98	97	98	97	1.72	11	0.072
Building and Fence Poles	83	87	86	80	2.21	6	0.58
Thatching Grass	54	57	62	60	3.42	7	0.05
Hand Crafts and fibers	25	34	35	31	6.76	7	0.42
Herbal Medicinal Purpose	33	27	33	22	8.87	9	0.03
Wild fruits and green leaves	27	22	20	21	8.67	11	0.02
Grass for livestock and grazing	99	98	99	99	0.57	5	0.98

Table 2: Use of forest products by local communities living around Chilimo-Gaji Forest (n=265).

Kebele Name	Sample Size	Perceived use of the Forest (%)					
		Protective Importance	Productive Importance	No importance	x^2	df	P
Chilimo	82	37	60	3	10.12	4	0.02
Galessa	76	42	50	8			
Dano Sengota	57	34	61	5			
Goban	50	36	61	3			
Total	265	37.25	58	4.75			

Table 3: Perception of local communities of the forest importance.

proportion of landless and poor women headed households and also the high natural forest coverage in Chilimo and Goban that relied on the forest to bridge the gap between household need and available crops during the latent period (p=0.02). Wild Fruits and green leaves were in some cases and households dietary supplements, and green leaves were used and medicine in some cases [55]. Fiber were used for handicraft, and its use did not differ between villages (p=0.42).

Perception of local communities towards the significance of the forest

The study showed that 37.25% (n=99) of the interviewed people perceived that the forest as a source of rain and water; habitat for various wildlife and biodiversity; and as a resource for maintaining the fertility of the land, and therefore deserves sustainable stewardship by the stakeholders especially by the local communities (Table 4). Importantly, the percentage of people who thought that the forest deserves careful stewardship was statistically different among the four villages (p=0.02). The respondents who perceived the protective use of the forest were mainly age-honored (> 61 years old) (p=0.04). The old respondents and the more educated people were generally more aware about the ecosystem function of the forest and were concerned about the consequences of completely deforestation and degradation of the forest [55-58]. Of the interviewed local residents, 58% (n=154) perceived the forest as an important source of supplementary income, and of these, majority (64%) were young and middle aged men who depended entirely on agriculture plus some cash from the forest resources. Less than five percent of the respondents (n=12) claimed that the forest did not have any importance regardless of protection.

The difference in perception between villages was statistically significant (x2=10.12, df=4, p=0.02).

Perception of local people toward the Chilimo-Gaji forest conservation

The majority of the respondents (94.925%) agreed that the forest area had improved and 69.725% agreed that the improvement of the forest condition had a positive impact on their livelihood. Regardless of the *kebeles* and socio-economic characteristics, 68.125% people were in favor of conservation of the forest, and 92% agreed that it was the local community's responsibility to safeguard the forest in their surroundings [59-61]. Nevertheless, as illustrated in Table 5, the number of responders that agreed or disagreed about the forest resource accesses restriction measure was significantly different between villages (p=0.04), 40% and 28% of the respondents from the Dano Sengota and Chilimo, respectively did not favor the implementation of restrictive measures toward the access to forest resources, while 81 and 76.5% of the respondents from Galessa and Goban , respectively, indicated that implementing restrictive measures was necessary to sustain the resources. This difference in perception can be explained by the fact that the local people in Dano Sengota and Chilimo had less diversified sources of income, and therefore the forest played a considerable role in the livelihood of these residents, either from direct resources, such as fuelwood sell logging or, from extraction of NTFPs [62-64].

Attitudinal surveys have been used in many countries to assess the success of a conservation program [17] and it is hypothesized that a high percentage of local residents having positive attitudes toward conservation indicates forest conservation success. According to the forest management contract implemented between the local communities and forest administration the extraction of timber and poles was no longer free of charge, and user fees were fixed for each amount of resource taken. Regarding this, 36% of the total respondents disagreed with the application of a forest resource gathering fee; however, the number of respondents against this policy was significantly higher in Goban than Chilimo (44 and 36%, respectively; p=0.04). These people suggested that fixing the quantity of resources that can be harvested within a given period should already be sufficient as a restrictive measure without including extraction fees. They claimed that this practice gives more rights to the people that are able to pay the extraction fee and allows them to take more resources than the people who cannot afford this fee, thereby creating unequal access rights.

Statement	Chilimo (n=)		Galessa(n=)		Dano Sengota(n=)		Goban(n=)		P-value
	Agree	Disagree	Agree	Disagree	Agree	Disagree	Agree	Disagree	
Forest cover has been improved after PFM introduced	94.2	5.8	93	7	96	4	96.5	3.5	0.72
Livelihoods are affected by the forest improvement	72	38	70.8	29.2	67	33	69.1	29.9	0.57
Establishing the Protective Area is necessary to sustain the forest in your area	73	37	77.5	22.5	60	40	62	38	0.53
It is the responsibility of the local people to protect the surrounding forests	94.6	5.4	90	10	88.6	11.4	93.5	6.5	0.89
Restriction measure must be implemented to sustain the forest	72	28	81	19	60	40	76.5	23.5	0.04
Resource extraction fees are necessary to sustain the resources	68	32	73.4	27.6	59	41	56	44	0.46
The implementation of the strict conservation zone is perquisite for the efficiency of the conservation	45	55	33	77	42	58	31	69	0.35
The forest management system solved the conflict over the forest	73.6	27.4	62	38	58.6	42.4	55.7	45.3	0.78

Table 4: Perception toward the Chilimo-Gaji forest conservation.

Statement		Chilimo (%) (n= 82)	Galessa %) (n= 76)	Dano Sengota %) (n= 57)	Goban %) (n= 50)	Total (%)	x^2	df	P
To what extend are you satisfied with the forest user's right provided to your community	Very satisfied	31	26.4	37	32.7	31.78	4.426	3	0.34
	Somehow satisfied	52.8	42	46.2	47	47			
	Not satisfied	16.2	31.6	16.8	20.3	22.2			
To what extent are you satisfied with the functioning of your forest management committee	Very satisfied	42.6	23	29.6	33	32	8.324	2	0.12
	Somehow satisfied	31	47	51.4	47.3	44.17			
	Not satisfied	26.4	30	19	19.7	23.78			
To what extend are you satisfy with the involvement of the local people in the decision making process regarding the forest	Very satisfied	22	32	40	34	32	3.876	3	0.45
	Somehow satisfied	44	46.7	33.7	45.6	42.5			
	Not satisfied	34	21.3	26.3	20.4	25.5			
To what extend are you satisfy with the participation of the local people within forest conservation activities or development activities	Very satisfied	50	44	52.6	37	45.9	12.768	3	0.03
	Somehow satisfied	32	41	34	43.2	37.55			
	Not satisfied	18	15	13.4	19.8	16.55			
To what extent are you satisfied with the development project implemented within the forest conservation program to improve your well being	Very satisfied	31.7	32.8	50	36	37.62	14.567	3	0.01
	Somehow satisfied	44	51	34.8	51	45.2			
	Not satisfied	14.3	16.4	15.2	13	14.72			
To what extend are you satisfied with the capacity building provided by the project	Very satisfied	22	17	23	31	23.25	16.872	4	0.01
	Somehow satisfied	52	43.6	37	42.7	43.82			
	Not satisfied	26	39.4	40	26.3	32.92			

Table 5: Logistic regression analysis of the relationship between demographic and socio economic factors and willingness to participate in the management of Chilimo-Gaji PFM system.

Benefits from the PFM System influenced the attitude of local people

It is widely accepted that the decision by people on whether to participate in the developmental activities or not is largely determined by their perceived benefits [65]. The results shown in this study indicated that most of the people that supported the forest PFM were those who directly benefited from the PFM. The respondents from Galessa and Chilimo, located in areas where efforts have made address the livelihood needs of the local communities and encouraged sustainable practices represented the highest level of support, and more than 67% of the interviewed residents were willing to support the PFM. In this study as well as potentially other areas, the people that benefited the most from the project (either through capacity building or direct employment) were found to be the people with more education or a socioeconomic advantage [23]. These people were the elite at the local level, and although the jobs and benefits from these projects were available to everyone, majority of the local people were unable to take advantage of them for various reasons. With the objective of selling carbon credit under REDD and eco-tourism the Chilimo-Gaji forest offers a large

opportunity for the improvement in the socioeconomic conditions of the local community and for natural resource conservation. Although, the project was implemented through community groups, the representation of poor households in the groups was negligible. This finding together with the project's inability to address disadvantaged groups' problems led to an exclusion of disadvantaged households from most of the benefits provided by the PFM.

Local satisfaction with PFM system

Among the surveyed local residents, 22.2% of the respondents claimed not satisfied with the rights provided to them by the forest user and emphasized that the period of time that they were allowed to collect resources was very limited (Table 5). The local people in the study area shared the same opinion about the low level of involvement of local people in the decision making process regarding the forest ($p=0.08$), however, this differed by gender ($p=0.03$), educational level ($p<0.01$), annual income ($p<0.01$), and age ($p=0.03$). Elder men that were more educated and had higher income comparing with the average were those who stated to be satisfy. To strengthen the communities' know-how, improve their livelihood, several capacities building related activities were initiated and implemented by the FUGs according to the needs and necessity of the local community [32]. The capacity building included training for agricultural improvement, initiation for project management, training on the sustainable management of the natural resources, and training regarding income source diversification [66].

The perception toward capacity building being developed by the project was statistically different between the villages ($p=0.01$) and between the educational levels ($p<0.01$). Among all respondents from the four villages, 31% benefited from the capacity building being initiated and developed by the project, while the rest of the respondents (69%) did not. Based on these responses, we found that a low level of understanding of the local people (44%) and a lack of awareness (31%) were the main reasons for not adopting the training given by the project developer. The third reason was simply a lack of motivation to adopt a new technique (25%).

Attitudes were examined using the responses of the respondents on the 1- 5 Likert Scale. The mean attitude index was 4.0 and Cronbach's alpha was 0.62 suggesting that it was truly additive and reflective of overall attitude. In general on a scale of 1 to 4 (least important to most important) 55% of the respondents ranked the limited land size issue as the most serious problem facing the community living around the Chilimo-Gaji forest, wildlife damage on agricultural crops (33.6%) followed by livestock predation (11.4%) and. Regulated of access to forest products is viewed by respondents (44%) as the least important problem faced by the community [67]. Although local communities are allowed to extract traditional non-timber forest products (NTFPs) for subsistence use, they require access to harvest these products for commercial purposes. Regarding the question of whether the management of Chilimo-Gaji was satisfactory, 44.6% perceived it to be unsatisfactory, while 48.9% perceived it to be satisfactory and 13.5% had no opinion In addition, the majority (91.6%) of the respondents suggested that local communities should actively participate in the management of the forest and decision making process of PFM process. Their major reasoning was that as beneficiaries (78%) they need to be involved, while only 22% based their justification for participation on the fact that they possess some management skills. When taken together, these responses indicate a desire by the community for greater participation in management of forest resources.

The results in this study revealed that majority of the respondents had a positive attitude toward conservation of the Chilimo-Gaji forest; however, the attitude toward the conservation was highly attributed to socioeconomic conditions, such as age, gender, literacy level, and land ownership. Based on the findings from this study, it could conclude that the more educated and older people were more confident to participate in the forest conservation effort than the young and those with no education. In most cases, the more educated people were those who were chosen to represent the community in the decision making process at the regional or national level, and therefore, they were more involved and engaged within the project. Because of this engagement, they clearly had some level of a willingness to support the project as compared to the others. According to the survey results, the percentage of women who supported the conservation scheme was lower than men [68]. This could be explained by the fact that women's high dependency on the forest than men and the use of forest resources by women is generally high to the collection of consumptive products and fiber for handicrafts and fuelwood sell. Therefore, women are more affected by the restriction of the forest than men and thus less supportive of the conservation schemes. Although, the annual cash income and the wealth stratum of the respondents was not associated with their attitude toward the PFM regime, land ownership was found to be one of the determining factors that affected the attitude of the residents, and because of this, people who owned more land (3 to 4 ha) tended to support the project and showed a willingness to participate. These people were not really affected by the restrictive measures of the project, since their dependency on forest resources was insignificant. In addition, people who owned more land perceived a tangible benefit from the training given by the project for the improvement of agricultural yields [44]. Among all respondents, those who received some income from timber-related activities were the most reluctant toward the forest conservation project.

Logistic regression model of variables associated with a supportive attitude toward the forest conservation system

The logistic regression analysis in Table 5 indicated that respondents from Chilimo and Galessa were more likely to have a supportive attitude toward the forest conservation project than Dano Sengota and Goban ($p=0.03$), since they were more involved and received more benefits than the other villages ($p<0.01$). Respondents who had a more favorable attitude were more likely to have a protective perception of the forest ($p<0.01$), be satisfied with the rights for forest use ($p<0.01$), have participated in capacity building ($p<0.01$), and not be economically affected by the conservation measure of the forest ($p=0.03$). Among the socio-economic characteristics of the respondents, gender ($p<0.01$), age ($p<0.01$), and education level ($p<0.01$) were associated with a favorable attitude toward the forest conservation. For this parameter, 68% of the female respondents were willing to support the forest conservation project, while only 45% of the male respondents supported the PFM system [21]. This could be explained by the fact that women perceived the forest as less important than men, since women see the forest mainly as a source of raw material for handicrafts and consumption, while men see the forest as an important source of their livelihood. In addition, men use the forest resources for income generation, including carpentry, and house construction. Aside from gender, age and the education level of the local people were associated with their supportive attitude toward the forest conservation project. Land ownership was also found to be associated with a positive attitude toward the forest conservation project ($p<0.01$), and residents that owned more land (3 to 4 ha) had a more favorable perception of the project than those who owned less. The logistic regression results (Table 6) showed that apart from income,

Variable	B	SE	Wald	df	p
kebele	-	-	11.231	5	0.02
Age (>61)	1.765	0.376	28.423	2	<0.01
Gender (female)	0.306	0.265	12.62	1	<0.01
Education(above primary)	2.01	0.435	16	1	0.01
Family size	1.987	0.651	8.62	2	0.05
Cash income	0.206	0.567	0.351	1	0.43
Wealth stratum	-	-	7.061	1	0.03
Land tenure condition	1.086	0.376	9.082	1	0.02
Perception of forest significance	0.767	0.456	11.23	1	<0.01
Use of forest resource	0.891	0.208	6.789	1	<0.01
PFM associated benefits	0.356	0.192	1.609	1	<0.01
Constant	1.871	1.208	1.861	1.762	3.821
Correction prediction	91.60%	-	-	-	-
LR Test	13.78	-	-	-	-

Table 6: Logistic regression analysis of the relationship between demographic and socio economic factors and willingness to participate in the management of Chilimo-Gaji PFM system.

all other demographic and socio economic characteristics of the households did not significantly influence their decisions to participate in the management of Chilimo-Gaji PFM system. The results show that the model predictions are correct 91.60% of the time indicating that the explanatory variables can be used to specify the dependent variable, in discrete terms (1,0), with a high degree of accuracy [15]. However, Odds ratios for these variables indicate little change in the likelihood of participation in forest management.

Conclusions and Policy Implications

This study provided an insight into the perceptions of local communities about the existing management models in the Chilimo-Gaji forest. This study attempted to explore how the socioeconomic factors, the perception regarding the forest and the forest resources, and the reception of benefits can influence the attitude and the perceptions of the local people toward forest management practices. The difference of perception is first determined by the dependency on the forest resources and then by the reception or not of individual benefit from the project. Most of the respondents were aware of the conservation of Chilimo-Gaji forest, and more than half agreed with the necessity for conserving the forest; however, being well aware of and in agreement with the necessity of conserving the forest did not necessarily generate a positive attitude towards the forest conservation project [46]. It is clear that the benefits from the project are lopsidedly distributed, and that this inequality is recognized by the local people and influences their perception of and attitude towards the PFM system. Since two decades, the people-centered management approach has been emphasized in several forest conservation policies and projects in most of the tropical countries, and yet due to differences in abilities, attitudes, and perceptions of the forest community, securing active and equitable participation from all social layers remains a challenge for all forest conservation projects. As such to the extent possible, planners and managers must ensure fair and equitable distribution of benefits of a forest carbon project similar to REDD in order to succeed. New forest management systems may need to be sought to provide information about all relevant aspects in appropriate forms to raise awareness and support the capacities of forest dependent communities to participate before any consultations start. In order to be truly democratic and participative, the forest FCs should reflect the social diversity within groups and represent the interests of all users.

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