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Assessment of Opportunities and Challenges to Established Community Based MRV: Study in the Bale Mountain Eco-region REDD+ Project, Southeastern Ethiopia

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ABSTRACT
Though communities are supposed to participate in the whole processes of REDD+ implementation, there is no strong community based monitoring, reporting and verification (MRV) system fitting the context of REDD+ processes. This study asses opportunities and challenges of developing appropriate community based MRV in Bale Eco-region REDD+ project. Data were collected through survey questionnaire administered to 154 sampled households and supplemented by focus group discussion and key informant interviews.Opportunities and challenges were discussed through percentage and frequency results of variables. Accordingly, about 27.9% of sampled households were participating in forest patrolling activity, 1.3% of the respondents can take GPS for boundary demarcation and other purpose and 12.3% of the respondents can record both illegal actions and development activities in the forest concession including regeneration status. 67.5% of sampled households responded that community based monitoring reporting and verification has great contribution in reducing both deforestation and forest degradation. Furthermore, about 64.3% of sampled respondents lack skills to data gathering, forest inventories, data analysis, interpretation and reporting and 26.6% of respondents lack capacities and basic infrastructure (electricity, internet, hardware, software). 62.3% of sampled households were not reporting any forest monitoring achievements, 26.6% of the respondents were reporting to Oromia Forest and Wildlife Enterprise, 4.5% of the respondents were reporting to Farm Africa and SOS Sahel Ethiopia and 57.1% of the sampled households recommended new reporting channel. The study also found that 90.3% of sampled households preferred to share benefit at household level.Binary logistic regression analysis result revealed that age, family size, marital status, education level, income from forest product, total land holding, distance from forest and benefit distribution were not influencing participation in community based MRV. Sex, Income source, MRV know-how, REDD+ awareness and MRV training were factors affecting participation in community based MRV. In summary, communities should be trained on the skills needed to undertake community based MRV. Simple data collection formats and reporting systems should be developed through participatory approach. Moreover, the government should create appropriate incentive mechanism in order for communities to strongly

undertake community based MRV.

Keywords: Community based MRV; Incentive; Binary logistic regression models; Opportunities and Challenges; REDD+.
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1. Introduction

Reducing Emissions from Deforestation and Degradation (REDD)and "REDD+," which includes forest carbon enhancement through sustainable forest management and conservation, is a critical mechanism in implementing the "global deal" negotiated at the 21st Conference of Parties (UNFCCC, 2015). If successful, REDD+ has the potential to reduce around 12 to 20% of global greenhouse gas emissions by allowing high carbon emitting countries to pay forest conserving developing countries (Visseren-Hamakers, *et al.* 2012).

There is growing support for REDD+ to be delivered through community forest management (CFM) (Klooster and Masera, 2000, Murdiyarso and Skutsch, 2006, Agrawal and Angelsen, 2009, Hayes and Persha, 2010). Under CFM, a common property regime is established where members of a well-defined group of people establish collective regulations for resource use, membership, monitoring, and sanctioning procedures (Arnold, 2001, Baland and Platteau, 2003). In part this stems from findings that CFM can lead to emissions reductions where forest use becomes more sustainable (Chhatre and Agrawal, 2009, Skutsch and Ba, 2010). Current United Nations Framework Convention on Climate Change (UNFCCC) texts and guidance documents on the technical aspects of REDD+ outline explicit roles for indigenous people and local communities in implementing REDD+ (GOFC-GOLD 2010,Epple*et al*. 2011, UNFCCC 2011a,b). The Cancun talks also stressed the need for REDD+ activities to include and promote the full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities (UNFCCC, 2011b).

REDD+ presents a unique opportunity to conserve and sustainably use the world's remaining tropical forests, and an essential component of a future REDD+ framework will be the development of transparent, accountable, and sustainable monitoring, reporting and verification (MRV) systems (Fry, 2011). MRV is an important activity for performance-based forest management, particularly if the scale of payment and incentive at the local level is to be based on carbon performance (Karky *et al*., 2014). Moreover, community-based monitoring can provide a data source for national level MRV, as well as local (Danielsen *et al*., 2011). Community forest monitoring provides a way to meet the needs of local communities and indigenous peoples. It is also an opportunity for communities to engage in measuring, reporting and verification, and for the information they collect to feed into national and international monitoring systems. The involvement of local communities in forest monitoring has been said to promote a feeling of ownership (Danielsen *et al*., 2012). It may motivate people to take on REDD+ responsibilities. When communities are responsible for forest management, it makes particular sense to involve them in forest monitoring. It has also been shown that community monitoring, reporting and verification of emission reductions can be less costly that equivalent costs of professionals or central forest departments (Somanathan *et al*., 2009). The locally recorded forest-changes offer deeper understanding of forest change processes recorded by satellites, especially the changes below the canopy. Bong *et al*. (2016) emphasize the importance of local knowledge of deforestation and forest degradation dynamics at the local level. Integrating this local knowledge is vital for MRV success because it allows for site-specific assessment and monitoring of drivers of land use change.

Local communities have been able to measure stock using standard forest inventory methods and mapping techniques based on hand-held information and communication technologies (Skutsch *et al*., 2009). They have been shown to be proficient at diameter measurements, boundary delineation, and to carry out species identification more effectively than outside professionals. Their involvement in monitoring activities is also said to enhance transparency (IGES, 2012).

Studies conducted in Ghana and Tanzania (Brashares and Sam, 2005; Danielsen e*t al*., 2011) and Philippines (Uychiaoco *et al*., 2005) show that communities themselves can collect some local forest inventory data adequately and at reduced cost than professional foresters. With proper field measurement equipment, hardware (GPS, smart phone) and software (user friendly data form) plus training , it has been shown that local communities can measure the basic variables such as DBH, height, tree species and tree count; and most importantly, they can repeat this on a regular basis. Data collection can be standardized as part of an integrative and interactive system that builds communication and sharing among the different stakeholders (e.g. villagers, government MRV agencies, civil society) (Boissière *et al.,* 2017).

Despite their economic and environmental value, the remaining forests in Ethiopia are under threat. The growing population requires more fuel wood and more agricultural production, in turn creating needs for new farmland and timber – both of which currently result in deforestation and forest degradation. Through the Forest Carbon Partnership Facility of the World Bank, a REDD Readiness Preparation Proposal (R-PP) was prepared which include projected deforestation and forest degradation figures with input from (FAOSTAT, FRA 2010),

(WBISPP 2004), IPCC, and other expert sources. Projections indicate that unless action is taken to change the traditional development path, an area of 9 million ha might be deforested between 2010 and 2030. Over the same period, annual fuel wood consumption is expected to rise by 65% – leading to forest degradation of more than 22 million tons of woody biomass. The forestry sector contributes about 25% to projected GHG emissions levels under business-as-usual assumptions and offers great abatement potential through reduced deforestation and forest degradation.

Pratihast *et al*. (2016) describe the design and implementation of web-based system to monitor the UNESCO Kafa Biosphere Reserve in Southwestern Ethiopia. Information collected through this web-based system was consistent over time and aggregated in a standardized way. Their system supports Participatory Measuring, Reporting and Verification (PMRV) because it is interactive, dependent on local monitoring data, and provides feedback to local people, some-thing highlighted as vital for PMRV (Ekowati *et al*., 2016). DeVries *et al*. (2016) give another example of knowledge integration from Ethiopia. They combined a stream of data from smart phones used by local people with Landsat time series to characterize and map deforestation and forest degradation. Vega Praputra *et al. (*2016) suggest using simple data formats, based on existing forest reporting systems, which are agreed by all stakeholders. This should include a clear description of community reporting responsibilities and benefits. However, there is no experience in Ethiopia in involving communities in forest inventory/ MRV both for monitoring and MRV for REDD+. No study that examined factors that determine participation of rural community members in community based MRV.

The greatest concern for REDD+ is to craft the appropriate incentives for forest users to sustainably undertake community based MRV and to help overcome factors affect community based MRV for REDD+ projects. Moreover, ongoing negotiation on implementation of benefit sharing has not yet well studied.

2. RESEARCH METHODOLOGY

2.1. Description of the Study Area

The Bale Mountains Eco-region lies between 5º22'–8º08'N and 38º41'–40º44'E within the Oromia Regional State in the Southeast Ethiopia. The main central area of the Bale Eco-region is a high plateau, much of which is over 3000 m asl with several peaks rising from it. The highest peak in the eco-region is TulluDimtu (4377m), the second highest point in Ethiopia. South of the plateau the land falls steeply to the Harenna Escarpment and further into the Somali and Borana lowland plains, and further into the Indian Ocean.

The BMER is found within one of the Afromontane forests. Sixteen districts (locally known as Woredas), namely Agarfa, Dinsho, Adaba, Dodolla, Goba, Sinana, Gololcha, Gasera, Delo Mena, Kokosa, Berbere, HaranaBuluk, Nansebo, MadaWalabu, Goro and Guradhamole form the BMER. The forests in the BMER are mainly high forests composed of six forests formerly designated as "forest priority areas", namely, AlosheBatu, Goro Bale, HaranaKokosa, Kubayu, MennaAngetu and AdabaDodolla (Hailemariam *et al*., 2015).

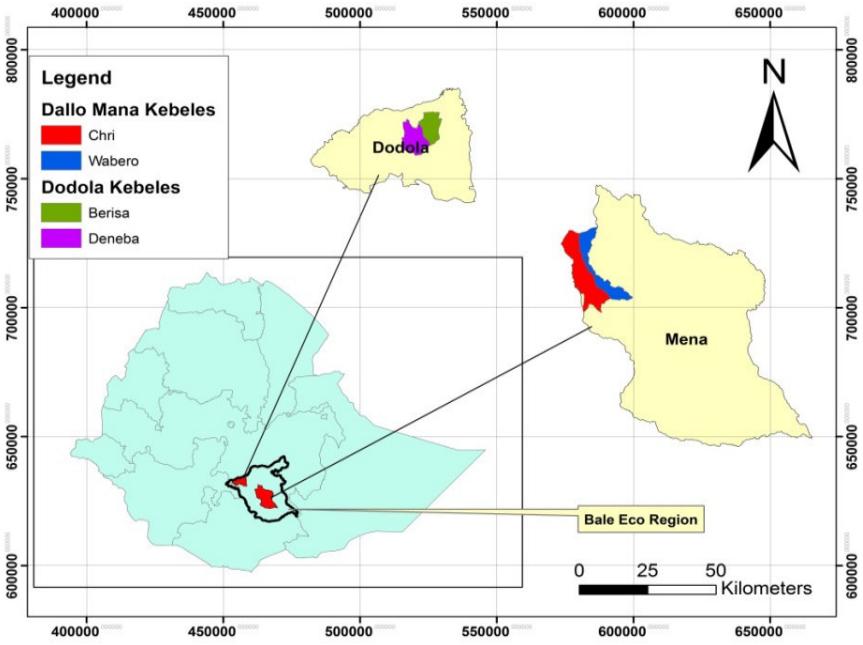


Figure 1: Location map of study area

2.2. Sampling Design and Procedures

Bale REDD+ phase II is being implemented in 11 woredas of Bale eco-region. In this study, a three stage sampling technique was used. During the initial step of the sampling, out of the 11 Bale REDD+ phase II project intervention woredas, two woredas, one from highland and one from lowland selected purposively. These are Dodola and Dello mena woredas which has 9 and 7 REDD+ CBOs respectively. During implementation of Bale REDD+ project, CBOs were capacitated to collect and report data related to forest management, but all are not doing the same. Based on this, 4 REDD+ CBOs were purposively selected based on performance record of the CBOs so far. One poor performing and one good performing kebeles selected from each woreda. Of course, according to FARM Africa and SOS Sahel Ethiopia all CBOs' performance should be equal as the support for them is equal. CBO performance identified based on organizational capacity assessment tool (OCAT) analysis result that has been used by FARM Africa and SOS Sahel Ethiopia. FARM Africa and SOS Sahel Ethiopia are the pioneer organizations to develop and popularize OCAT tool. The required sample sizes were administered based on rule-of-thumb i.e. ≥50 +8m.Where N=sample size, m=number of explanatory variables (Greene, W.H., 1997). For this study, numbers of explanatory variables were 13. Accordingly, sample households from each PA were distributed randomly using probability proportional to size technique. Accordingly, a total of 154 physically identified sampled households had been contacted for the detailed socio-economic and community MRV participation survey.

Table 1: Study sample size determination

Kebele	**CBO Name**	**CBO Members**			**Proportionally distributed sample size**		**Valid Percent**
		Male	Female	Total			
Cirii	Birbirsa	1246	357	1603	154	82	53%
Wabero	Baddesa	644	153	797	154	41	27%
Deneba	Deneba	332	110	442	154	22	14%
Berisa	Berisa	143	27	170	154	9	6%
Grand Total		2365	647	3012		154	100%

Source: Own survey result, 2018

2.3. Data Collection Method

The questionnaire used to collect data consists of four main parts. The first part investigates socio-economic factors dynamics of the households targeted for the study. This is important because it provides the characteristics of the households that are participating in the community based MRV. The second is about opportunities and challenges of community based MRV. The third part is about incentive mechanisms to support community based MRV and the last section is concerned with factors that determine community participation in MRV.

Respondents asked if they are aware of climate change, community based MRV, REDD+ programme, what they are doing with REDD+ and the economic incentives it provided. They were also asked if they are participating in the community based MRV and factors challenged them to undertake community based MRV effectively.

To obtain the necessary information, both quantitative and qualitative data collected and analyzed. Secondary data were obtained through review of relevant literature from Internet including resource materials such as journals, annual reports, books, workshop proceedings, periodicals, CFM reports, Bale REDD+ project reports and OFWE and OEFCCA reports. In addition to this, the data was supplemented by FGD and KII interview to generate qualitative information.

2.4. Data Analysis

In this study, descriptive statistics and econometric techniques were employed. Data analyses were performed using SPSS V.20 software.

2.5. Descriptive statistics

Descriptive statistics was used to explain Social, Economic, Technical and Institutional characteristics of sampled household. These included minimum, maximum, mean, standard deviation, percentage and frequency of occurrence of variables under study. The statistical significance of the variables both dummy and continuous tested using t-tests to check the significance level of the determining factors.

2.6. Econometrics Analysis

To analyze factors determining community participation in community based MRV logistic regression analysis method was employed. Binary logistic regression is useful for situations in which we want to be able to predict the presence or absence of a characteristic or outcome based on values of a set of predictor variables. It is similar

to a linear regression model but is suited to models where the dependent variable is dichotomous. Following Wiley (2000) fitting logistic regression model employed as follows.

Suppose we have a sample of n independent observations of the pair (x_i;.y_i;). i=1,2, ... ,n, where y_i; denotes the value of a dichotomous out-come variable and x; is the value of the independent variable for the i^{th} subject. Furthermore, assume that the outcome variable has been coded as 0 or 1, representing the absence or the presence of the characteristic, respectively. To fit the logistic regression model for the study the following logistic regression model specified.

$$\boldsymbol{\Pi(x) = \frac{e^{\beta_0+\beta_{1x}}}{1+e^{\beta_0+\beta_{1x}}}} \text{---------- (1.1)}$$

The logit transformation of equation (1.1) was defined as follows.

$$\boldsymbol{g(x) = ln\left[\frac{\Pi(x)}{1-\Pi(x)}\right] = \beta_0 + \beta_{1x}} \text{---------- (1.2)}$$

The importance of this transformation is that g(x) has many of the desirable properties of a linear regression model.

In dichotomous outcome variablethe value of the outcome variable given x can be expressed as y = л (x)+e. Here the quantity e may assume one of two possible values. If y = 1 then e=1-л (x) with probability л (x), and if y=0 then e=-л (x) with probability 1- л (x). Thus, e has a distribution with mean zero and variance equal to л (x)[1-гл (x)]. That is, the conditional distribution of the outcome variable follows a binomial distribution with probability given by the conditional mean, л (x).

2.6. Description of variable

Table 2: Description of variables and a priori expectation, Decision to Participate in Community Based MRV

No	Variable	Expected sign
1	Sex	+/-
2	Age of CBO member	+
3	Family size	+
4	Marital status	+/-
5	Level of Education	+/-
6	Income source	+
7	Access to forest product	+
8	Land holding	+
9	Distance of homestead from the forest	-
10	MRV Know-how	+
11	Awareness on climate change and REDD+	+
12	Training on community based MRV	+
13	Benefit distribution	+

$^{+}$Priori positive sign; $^{-}$Priori negative sign; $^{+/-}$Priori positive or negative sign

3. Result and Discussion

3.1. MRVActivities

Table 3: Activities communities can do during monitoring, reporting and verification

Variables	Frequency	Percent
Forest patrolling	43	27.9
Taking GPS for boundary demarcation and other purpose	2	1.3
Recording both illegal actions and development activities in the forest concession including regeneration status	19	12.3
I can't do any of them	90	58.4
Total	154	100.0

Source: Own survey result, 2018

The analysis result in table 3 shows that about 27.9% of sampled households stated that they were participating in MRV activities only through forest patrolling. About 1.3% of the respondents reported that they can take GPS for boundary demarcation and other purpose and 12.3% of the respondents responded that they can record both illegal actions and development activities in the forest concession including regeneration status. At a distance of these results, about 58.4% of the sample households did none of the MRV activities expected from them.

Danielsen *et al*. (2011) identified that communities themselves can collect some local forest inventory data adequately and at reduced cost than professional foresters.

3.2. Perception on the Contribution of Community Based MRV

Table 4: Perception on the contribution of community based MRV

Variables	Frequency	Percent
It contributes to sustainable forest conservation	50	32.5
It reduces both deforestation and forest degradation	104	67.5
Total	154	100.0

Source: Own survey result, 2018

About 67.5% of sampled households perceived that forest MRV has great contribution in reducing both deforestation and forest degradation. Whereas, the remaining 32.5% sampled households answered that community MRV contributes to sustainable forest conservation.

3.3. Challenges of Community Based MRV

Table 5: Challenges of community based MRV

Variables	Frequency	Percent	Valid Percent
Community based forest MRV not implemented yet	10	6.5	6.5
Lack of local capacities and basic infrastructure (electricity, internet, hardware, software)	41	26.6	26.6
Lack of skills to data gathering, inventories, data analysis, interpretation and reporting	99	64.3	64.3
No external stimuli	3	1.9	1.9
Feedbacks/Reports do not reach back local communities	1	.6	.6
Total	154	100.0	100.0

Source: Own survey result, 2018

As indicated in table 5 about 64.3% of sampled respondents stated that lack of skills on data gathering, forest inventories, data analysis, interpretation and reporting are major factors that are challenging the effectiveness of community based MRV. Lack of local capacities and basic infrastructure were identified as the second rank with 26.6%.

3.4. Reporting System for Community MRV

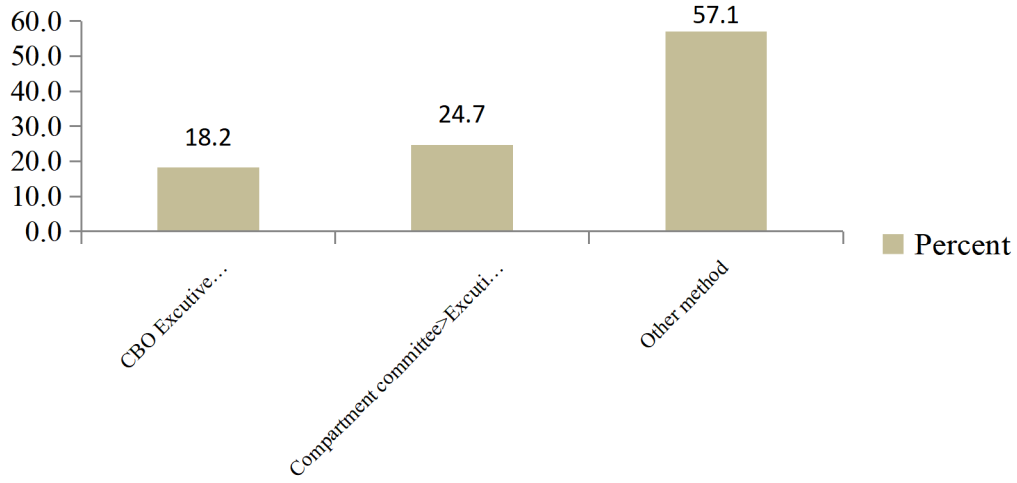
Table 6: Organizations to which communities are reporting forest monitoring achievements

To which organization you are reporting?	Frequency	Percent	Valid Percent
Oromia Forest and Wildlife Enterprise (OFWE)	41	26.6	26.6
Oromia Environment Forest and Climate Change Authority	1	.6	.6
Cooperative Promotion Office	9	5.8	5.8
Farm Africa and SOS Sahel Ethiopia	7	4.5	4.5
Don't report	96	62.3	62.3
Total	154	100.0	100.0

Source: Own survey result, 2018

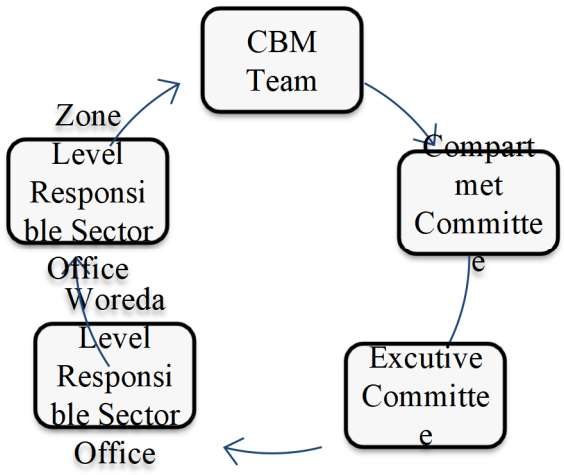
The analysis result shown in table 6 revealed that about 62.3% of sampled households replied that they are not reporting any forest monitoring achievements. Apart from this, 26.6% of the respondents answered that they are reporting some forest monitoring activities such as forest patrolling and illegal actions with forest to OFWE. About 4.5% of the respondents answered that they are reporting to Farm Africa and SOS Sahel Ethiopia.

3.5. Reporting Channels



Source: Own survey result, 2018
Figure 2: Reporting Channels

The analysis result from figure 2 revealed that 57.1% of the sampled households stated that reporting channels should be other than reporting channels mentioned for choices. This means CBO executive committee>government office and compartment committee>executive committee>government office were choices provided but these choices got 18.2% and 24.7% respectively. There are two rationales when recommending other method. First, respondents said that there should be other party/body that can even monitor compartment committee and secondly, they have information about CBM system developed by Bale REDD+ project. The project proposed CBM team which is answerable to the compartment committee. Both CBO executive and compartment committee members will not be a part of the CBM team. The respondents also believe that CBM team is important to make responsible both CBO compartment and executive committee members and reporting system will also more comprehensive. According to key informants, CBM system started by Bale REDD+ project and FZS is important if it is supported by experts from relevant government sectors. They also added that reporting should be conducted like by CBM team, compartment committee, executive committee, woreda level responsible body and zone level responsible body. The following reporting channels mentioned based on knowledge they gained during Bale REDD+ implementation. Key informants also forwarded that feedback should exist during reporting specially communities should get feedback from all responsible government bodies.



Source: Own survey result, 2018
Figure 3: Recommended CBO reporting system

Boissière *et al. (*2014) discussed that local participation should also be about reporting measurement results and monitoring to the national database. Some studies on participatory approaches propose to provide villagers with training in the use of Personal Digital Assistants (PDA) or using Short Message Service. However, there are technical issues to overcome with these suggestions, for example, PDA can stop working and mobile phone (PDA) signals are often absent in the forest. Instead of proposing a new system, they looked at what already

exists, how it could be improved, and to learn from past and current experience. There are a lot to learn from sectors not directly related to forestry, such as health care. Data collected by villagers and reported to the health center are considered accurate and are used by the national government to guide planning. The comparison between the structure and caveats in information flow systems of the health and forestry sectors should provide useful information to develop an efficient participatory reporting system.

Lotsch and Skutsch (2011) mentioned the role of governments at the national level in clarifying the reporting structure between local communities and organizations responsible for managing national databases, including what their benefits would be. Vega Praputra *et al. (*2016) also suggest using simple data formats, based on existing forest reporting systems, which are agreed by all stakeholders. This should include a clear description of community reporting responsibilities and benefits.

In Bale eco-region, FARM Africa and SOS Sahel Ethiopia already developed simple data gathering and reporting formats that includes; farm land expansion, new settlement; illegal fencing, fire incidence, illegal tree cutting & logging, wildlife poaching, charcoal making, un-authorized fire wood collection, illegal grazing, different forest development activities & forest resource utilization activities in their respective forest. For all forest monitoring formats M&E officer developed data monitoring system (Microsoft access). The system helps to easily store, manage and communicate data between all responsible bodies. This system already popularized to CBOs and all relevant stakeholders of the eco-region and CBOs are also using it. However, practical implementation of data gathering and reporting formats was not in in progress. During FGD it was mentioned that because of poor expert support and inadequate clarification on the formats, implementation of data gathering and reporting formats at ground level is not in progressive stage.

3.6. Level of Benefit Sharing

Table 7: Preference of benefit sharing

At which level do you prefer to share dividend/ benefit for maximum impact?	Frequency	Percent
Community level	15	9.7
Household level	139	90.3
Total	154	100.0

Source: Own survey result, 2018

To identify about the level (household or community) at which to award the benefit for maximum impact, sampled households were asked about their preferences on this and almost all of sampled households (90.3%) preferred household level and 9.7% community level. However,Burgess *et al.* (2010) argued that it would be difficult to differentiate rewards within a community. If there is heterogeneity of use across communities, it would seem prudent to differentiate compensation across different communities particularly if they use different forests (Komba *et al*., 2016).

Study by Komba *et al*. (2016) also suggest that it is without a doubt that REDD+ payments should be made to the major forest users or forest owners aiming to compensate them directly for the carbon benefits that well conserved forests provide. Moreover, given that global REDD+ programme payments are only made to national authorities, the government should establish the appropriate mechanism to compensate the households who manage the forests.

But there isusually a dilemma in community-based natural resource management programmes about the level (household or community) at which to award the dividend for maximum impact. This study result was also contrary to study result byKomba*et al.,* 2016).

3.7. Factors Influencing Household Decision to Participate in Community Based MRV

Participation, specifically in community based MRV and in natural resource management conservation in general is affected by different factors in the community. For this study; sex, age, family size, marriage, education, income source, income from forest, landholding, and distance to forest, MRV know-how, REDD+ awareness, training and benefit distribution were considered as factors determining community participation in community based MRV. The effects of these factors analyzed and summarized in the following table.

Table 8: Binary logistic regression model

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Sex	1.593**	.809	3.875	1	.049	4.919
	Age of CBO member	.057	.037	2.348	1	.125	1.058
	Family size	-.098	.113	.758	1	.384	.907
	Marital status	-2.624	2.038	1.658	1	.198	.073
	Level of Education	.319	.366	.760	1	.383	1.376
	Income source	-1.678*	.909	3.404	1	.065	.187
	Access to forest product	.143	.147	.945	1	.331	1.153
	Land holding	.308	.491	.393	1	.531	1.361
	Distance of homestead from the forest	.386	.313	1.528	1	.216	1.472
	MRV Know-how	3.681***	.822	20.032	1	.000	39.674
	Awareness on climate change and REDD+	1.883**	.806	5.458	1	.019	6.573
	Training on community based MRV	1.606**	.791	4.120	1	.042	4.984
	Benefit distribution	-1.001	.992	1.019	1	.313	.368
	Constant	2.339	5.942	.155	1	.694	10.369

a. Variable(s) entered on step 1: Sex, Age, Family size, Marriage, Education, Income source, Income from forest product, Total land holding, Distance to forest, MRV Know-how, REDD+ awareness, MRV training, and Benefit distribution.

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

Source: Own survey result, 2018

Binary logistic regression analysis result in table 8 revealed that age, family size, marital status, education level, income from forest product, total land holding, distance from forest and benefit distribution were not influencing participation in community based MRV. Sex, Income source, MRV know-how, REDD+ awareness and MRV training were factors affecting participation in community based MRV.

Binary logistic regression analysis model revealed that as age increased by one unit, the more likely to participate in community based MRV. The coefficient for sex is positive, so male and female more likely to participate in community based MRV. This is same for education, income from forest product and total land holding, as these variables increase by one unit, the more likely to participate in community based MRV. From logistic regression analysis we can suggest that if communities get training on the MRV, the more likely to participate in community based MRV. Awareness creation on the climate change and REDD+ will also increases participation in community based MRV. In different way, as the number of family size increased by one unit, the less likely to participate in community based MRV. This is same for marital status, coefficient for marital status is negative, and so the less likely affect to participate in community based MRV. It's assumed that the better the income source of the farmers the better they participate in in community MRV. However, the regression analysis result revealed that as income source increase by one factor, the less likely to participation in community based MRV. This seems as income source of a farmer increase the less he give attention to participation as the benefit he looks from forest is also less. Similarly, as a household gets benefit, the less likely to participate in community based MRV, but benefit distribution significantly affect participation in community based MRV.

In another way, exponent of the coefficient interprets the magnitude of the participation. Accordingly, extent of participation for this study can be interpreted as, if factors determine participation increased by one unit, x times more likely to participate in community based MRV; x is the value of exponent of the coefficient. Like this, for instance, if age increase by one factor, 4.919 times (*) more likely to participate in community based MRV. We can continue to check the extent of participation we can do same for all study variables.

4. Conclusion and Recommendation

In summary, communities of Bale Mountain Eco-region have perception that community based MRV has great contribution in reducing both deforestation and forest degradation. However, most of members of forest cooperatives/community based organizations can't doMRV activities expected from them, lack of skills on data gathering, forest inventories, data analysis, interpretation and reporting are major factors that are challenging the effectiveness of community based MRV.

Binary logistic regression analysis result revealed that Sex, Income source, MRV know-how, REDD+ awareness and MRV training were factors affecting participation in community based MRV.

Though most of sampled households preferred to share benefit at household level,there was no concertized carbon benefit sharing that could be discouraging a participation of community in community based MRV.

Therefore, it has been suggested thatcommunities should be supported and trained on the skills needed to undertake community based MRV, simple data collection formats and reporting systems should be developed through participatory approach and CBM system started by Bale REDD+ project and FZS should be strengthened and implemented at ground level with technical support from relevant stakeholders.

Last but not least, REDD+ MRV system should be substantiated with a realistic incentive mechanism. Otherwise, if people invest their time and energy in the forest monitoring activity and lastly incentive will not be materialized; unnecessary consequences could be happen such as massive deforestation and loss of trust with development practitioners.

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