One-into-Five Labor-Grouping for Watershed Management in Northwest Ethiopia: Farmers' Acceptable Participation and Influencing Factors

Tibebu Mosseye [a] and Mehretie Belay [b*]

ABSTRACT

Participation in community labour-sharing links promotes the interest of households to work in groups and reinforces their public affairs with client households. However, numerous factors appear to influence household participation in community labour-sharing groups in many parts of Ethiopia and elsewhere in the world. This paper presents the results of a study made on households' acceptance and participation in the One-into-five developmental groups organized by government agencies for watershed conservation purposes in Machakel Woreda, in the northwestern highlands of Ethiopia. It specifically aims to: i) identify the types of labour-sharing teams operating in the study woreda; ii) examine households' alleged participation in the One-into-five labour associations; iii) assess the areas and rates of household participation in the One-into-five developmental groups during the watershed management campaigns; iv) describe the benefits of soil and water conservation (SWC) structures installed by the new politically enforced One-into-five labour-groups; and v) appraise the factors influencing acceptable household participation in the mentioned labour- teams during the watershed management campaigns. To address the objectives, data were gathered through field observation, focus group discussion, key informant interview, and a questionnaire survey of 135 households from January to March 2015. Descriptive statistics, T-test, Chi-square test and binary logistic regression model were used to analyze the data. Debo, wonfel and One-into-five farmer labour-sharing associations that are operating in the study areas have been examined. The study revealed that over 33% of the households participate in wonfel and in the One-into-five labour-sharing teams. Over 82% of the households participate in the One-into-five farmer groupings against their will. Most households in the study areas consider watershed based SWC community works as mandatory and forced development tasks. Conversely, restoration of degraded lands, improvements in soil fertility levels after rills and gullies stabilized, and increment of crop yields were found to be the major benefits of SWC structures installed by the One-into-five labour associations. Participation in the off-farm business, the slope of the land under conservation, farmland size, and participation in the indigenous labour associations emerge to significantly and positively influence the acceptable participation of the households in the One-into-five labour-groups. Conversely, livestock asset and access to training appear to significantly decrease the households' acceptable participation in the mentioned labour team during the watershed SWC works. It is suggested that indigenous labour-sharing teams be promoted and strengthened to ease households' workloads and consolidate the established work habits instead of focusing on a top-down imposed alien and new association that cause doubts in the society.

KEYWORDS: Labour-sharing, One-into-five, Watershed management, Household participation, Ethiopia.

aDepartment of Geography and Environmental Studies
Amanuel General Secondary and Higher Education Preparatory School, Ethiopia
P.O.B: 14, Email: tibebebubrihanu@gmail.com
[b*] Corresponding author: Department of Geography and Environmental Studies
Bahir-Dar University, Ethiopia, P.O.B: 79, Email: belaymehrete@yahoo.com

1. INTRODUCTION

The economy of developing countries mainly depends on the performance of the agricultural sector. The contribution of the agricultural sector to the overall development in turn depends on how the natural resources are managed and used. Unfortunately, in the majority of these countries, the quality and quantity of natural resources are decreasing; resulting in more severe droughts and hunger (Assefa, 2009). Millions of farmers in developing countries are struggling to feed their families as they contend with land degradation. Land degradation and soil fertility depletion are particularly acute in the dry lands of sub-Saharan Africa (SSA) and cause low crop yields, poverty and hunger (Winterbottom, 2002). According to Gebre and Weldemariam (2013), Ethiopia is one of the poorest countries in the world and its economy is based mainly on agriculture. However, land degradation and soil erosion still remain to be major challenges that directly affect the performance of the agricultural sector (Bewket, 2003).

In recognition of these challenges, many efforts have been made in Ethiopia to mitigate land degradation, particularly soil erosion, through both traditional and newly introduced soil and water conservation (SWC) approaches (Haile *et al*., 2006). Of the various interventions, the largest conservation activities in the country were those implemented during the 1970s and 1980s in which the farmers were mobilized through Food-For-Work (FFW) campaign projects (Shiferaw and Holden, 1998; Bewket, 2007; Assefa, 2009). Although the food aid has helped to fight hunger in famine-stricken areas, it has not been successful in improving SWC in the long run (Amsalu & de Graaff, 2004). The reasons for this failure were personal, demographic, socio-economic, institutional and biophysical factors.

In this paper, the term watershed refers to the river catchment (basin) and the interlinked biophysical and socioeconomic resources attached to it from the area of higher ground where the river emerges to the lower area where the river ends. Watershed management thus refers to the process of managing and developing biophysical and socio-economic resources within the hydrological boundary system. It involves the careful analysis of all the resources in a river catchment and their stressors (see Davenport, 2003). Watershed conservation here particularly rests on the implementation of SWC structures on degraded river catchments; mainly in the rural areas. Nevertheless, watershed based structural SWC activities are labour-intensive (Bewket, 2007; Gebre & Weldemariam, 2013). For this reason, the local community is obliged to implement those activities in groups. According to Mazengia and Mowo (2013), farmers' group works develop personal relations and create opportunities for more collaboration, especially in labour contributions. For instance, their participation in the labour-sharing groups in the wide range of agricultural activities, including conservation works helps to solve the labour constraints of some farm households. Similarly, Belay and Bewket (2013) reported that participation in work-sharing groups can help farmers to gain support from community groups, friends, relatives, government and other agencies. However, previous conservation efforts in the community campaigns have failed to respect participatory principles (Bewket, 2001). Gebre and Weldemariam (2013) confirmed that, farmers' SWC activities implemented using community labour were considered as mandatory development works enforced by Rural *Kebele* Administrations (RKAs)[1] and Development Agents (DAs).

[1] The smallest administrative units in Ethiopia

In an effort to address these problems, the current government of Ethiopia has introduced a new community labour-sharing paradigm named; "one-into-five" community organization. For this reason, a new top-down oriented community labour organization (one-into-five farmer labour-grouping) has been widely introduced to the watershed based SWC campaigns in many parts of the country including in the study area. The new one-into-five farmer arrangements are in fact formal social networks introduced to the local community by the top government in order to get various tasks done including land management practices (MWoAE, 2014). However, the process of farmer participation in the one-into-five community labour-sharing groups in the study areas lack genuine community acceptance. As far as known to these researchers, previous study has not sufficiently examined the problem;hence, this study takes on the issue to address the knowledge gap regarding the nature and level of community involvement in one-inot-five labour-sharing groups . Indeed, attempts were made to review research reports available online regarding labour-sharing group performances in natural resource management at the watersheds. Unfortunately, the researchers found only two papers on the internet. One of these was a methodological memorandum on factors influencing the cooperation and collective action of farmers on natural resources management by McCarthy et al. (2005) in Burkina Faso. The other was a paper by Matthews-Njoku et al. (2009) focusing on issues influcing the function of agricultural development based community associations in Nigeria. But, non-of these studies dealt on the issue of one-into-five community associations.

This study evaluates households' acceptance and participation in the one-into-five labour-groups organized by government agencies for watershed conservation practices in the Machakel Woreda (District), in the northwestern highlands of Ethiopia. The specific objectives of the study were to: i) identify the types of labour-sharing teams operating in the study woreda; ii) examine households' acceptable participation in the one-into-five labour associations; iii) assess the areas and scales of household participation in the one-into-five developmental groups during watershed conservation campaigns; iv) describe the benefits of the SWC structures installed by the new politically enforced one-into-five developmental groups; and v) appraise the factors influencing acceptable household participation in the mentioned labour-teams during the watershed management campaigns.

2. THE STUDY AREA AND RESEARCH METHODS

2.1 The Study Area

This study was undertaken in Machakel Woreda which is located between 10˚19'75" - 10˚41' 00" N latitude and $37^0$16'46" - $37^0$45'42" E longitude in the northwestern highlands of Ethiopia (Leul, 2011; Figure 1). The woreda is situated at some 330 km northwest of Addis Ababa and 270 km south of Bahir-Dar, the Regional capital. Its total area is 795.59 square km and the altitude ranges from 1200 to 3200 m asl (MWoAE, 2014). The mean annual temperature varies between 8˚-24˚C and the total annual rainfall is between 1500 - 1900 mm. The rainfall pattern is unimodal mainly occurring between June and September. Red soils (Nitosols), black earths (Vertisols), brown soils (Cambisols) and Gray soils (Luvisols) are major soil types covering the study woreda (Leul, 2011; MWoAE, 2014).

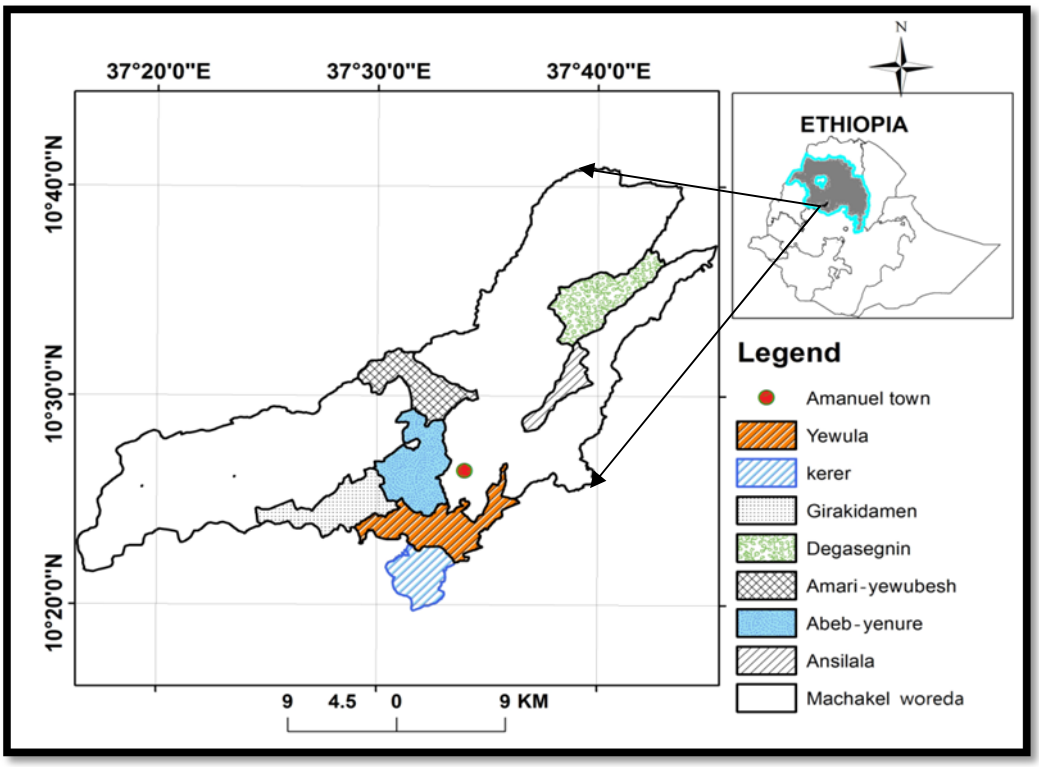

Figure 1: Location map of the study area (Adapted from Ethio-GIS, 2007)

According to projection from the Central Statistics Agency of Ethiopia (CSA, 2013), the woreda population in July 2017 was 141,574 out of which 70,019 were males and 71,555 females. The male-female sex ratio in the woreda for the mentioned period was 97.85%; indicating that females slightly outnumbered males. Out of the total population residing in the study woreda, the majority (89%) are rural, while the remaining 11% are urban dwellers.

Agriculture is the dominant economic activity and the basic livelihood of the majority of residents in the Machakel Woreda. The farming system is mainly focused on a mix of crop cultivation and animal husbandry carried out at subsistence scale mostly for household consumption and not geared to market conditions. Land, human labour and livestock are therefore the most important livelihood assets of the households. The main crops produced in the area include tef (*Eragrostis tef*), barley (*Hordeum vulgare*), wheat (*Triticum vulgare*), engido (*Avena spp*.) and maiz (*Zea mays*). Oil seeds and pulses are also among the crops grown in the study woreda. Cattle, sheep, donkeys, bees and poultry are the common types of livestock raised in the study site (MWoAE, 2014).

2.2 Sampling and Data Collection Methods

The study used the concurrent triangulation mixed method model where both quantitative and qualitative data were simultaneously gathered and analyzed. Cross-sectional data were generated from a questionnaire survey of 135 rural households, seven focus groups, 15 key informants, and two-round field observations from January to March 2015. Both probability and non-probability sampling designs were applied in the process of selecting sample households. First, 24 RKAs found in the woreda were categorized into three distinct strata namely *Dega* (temperate), *Woyna-Dega* (sub-tropical), and *Kolla* (tropical) traditional altitude zones, consisting of 8, 14, and 2 RKAs,

respectively. Second, seven RKAs: two from *Dega* (Degasegnen and Ansilala); four from *Woyna-Dega* (Yewula, Abeb-Yenure, Kerer and Amari-Yewebesh); and one from *Kolla* (Girakedamin) were selected based on geographical proximity and transport accessibility. Then 135 sample households were identified using systematic random sampling for the questionnaire survey from a stratified list of households obtained from the RKA offices. Selection was based on proportion from accross the seven RKAs. The 135 sample size was determined in light of the time and financeavilabile for the research. Fifteen key informants were purposively selected from RKA leaders and elders (one from each for each RKA) and one expert from the Woreda Office of Agriculture for detail informal discussions. A total of 42 focus group participants (six from each RKA) were also purposively chosen from One-into-five farmers' development groups and elders (two from each in each RKA) and from RKA leaders and development agents/DAs (one from each in each RKA).

The quantitative data were gathered using survey questionnaires comprising both open and close ended items. The questions were designed to generate information related to the extent of households' acceptance and participation in the labour-sharing groups, and the contribution of the farmers' labour teams to the SWC activities, and to the farming systems. The questions were pretested and administered by the lead researcher, extension workers (DAs) and high school graduate enumerators that were recruited from each sample RKAs. Side-by-side, focus group discussions (FGDs), key informant interviews and field observations were conducted by the lead author so as to generate qualitative evidence that complement the quantitative information .

2.3 Data Analysis Methods

Descriptive statistics, Chi-square test, T-test & binary logistic regression were used in the quantitative data analysis. The binary logistic regression statistical technique was used to show the probability of a dichotomous outcome related to a set of explanatory variables. It was chosen for its ease to manage and handle the nominal data (the dichotomous response variables) with regard to farmers' perceived acceptable participation decisions in the One-into-five labour associations that are intricate to manipulate via the use of linear multiple regression models. Besides, the model is fairly easy to manipulate mathematical operations using the Statistical Package for the Social Scientists (SPSS). Hence, by using the binary logit model, it was possible to identify the variables that influence the acceptable participation in the one-into-five labor teams (accept/participate or not accept but forced to participate in the labor team). The model can be specified as under for the acceptable participation in the one-into-five labor organization:

$$ln \frac{Y}{1-Y} = A+B1X1+B2X2+B3X3...BtXt$$

$$logit\ (Y)= A+B_1X_1+B_2X_2+B_3X_3...B_tX_t$$

Y = probability of participating in the one-into-five labor-team by the household (i.e. belonging to category 1)

$\frac{Y}{1-Y}$ *= odds*

A = constant (intercept)

t = number of explanatory factors

B_1B_t *= are slope parameters (regression coefficients)*

Accordingly, the above binary logistic regression model was employed in this paper to compute the factors expected to influence the acceptable participation in the one-into-five labor-sharing teams in the study woreda. The analysis was done for all 135 sample households. In using the regression

model, the degrees of explanatory power of the independent variables were first checked using the Chi-square test and T-test. Then, variables that showed significant responses were used further in the regression model. Additional checks of data fitness to the binary logit model were also made using the Hosmer and Lemeshow (1989) goodness-of-fit statistics, Pearson's Chi-square and the classification table releases. Colinearity and multicolinearity between explanatory factors was also checked using correlation matrices and variance inflation factor (VIF). The household survey data were coded and entered into the SPSS (SPSS Version 16) and then run at 95% level of confidence.

The variables used in the analysis: The dependent variable used in this study is households' acceptable participation in the one-into-five farmer labour-sharing groups on watershed based SWC works. It has a dichotomous character representing the observed status of the household in the choice of participation decisions in the one-into-five labour-sharing group. For that, 1(one) stands for voluntarily (acceptable) participation in the labour-sharing team & 0 (zero) for indirectly forced (non-acceptable) participation in the labour team. A number of explanatory variables (Table 1) expected to influence households' acceptance and willingness to participate in the one-into-five farmer groups for SWC works were chosen for the study based on the literature cited elsewhere above and some others (e.g., Bewket, 2001, 2003, 2007; Ertiro, 2006; Amsalu & de Graaff, 2007; Assefa, 2009; Gebre & Weldemariam, 2013; Mazengia & Mowo, 2013; Tamiru, 2014). These cited authors, in fact, have not studied one-into-five labour teams directly, but their studies on determinants of farmers' participations in the SWC practices helped to identify potential factors influencing households' participation in the one-into-five labour-sharing groups as their studies have similarities with the SWC studies in the watersheds. The explanatory variables identified in these ways are thus classified into four types of factors: demographic, bio-physical, socio-economic and institutional, in line with the categories adopted in Belay and Bewket (2013).

Table 1 Definition of explanatory variables

Variable	Description	Sign
Demographic variables		
SEX	Male headed households are expected to participate voluntarily in one-into-five groups than female-headed households (1 if male, 0 otherwise)	+
AGE (in years)	Aged farmers often participate voluntarily in the one-into-five SWC works, but young farmers sometimes participate more than aged ones.	±
EDUCATION	Acceptable participation in the one-into-five groups increases with educational level of the household heads (1 if literate, 0 otherwise)	+
FAMLYSIZ (number of household members)	Acceptable participation in the one-into-five groups increases with family size of the households, but sometimes households with many family members may decline to voluntarily participate.	±
Bio-physical factors		
FARMSIZ (in ha)	An increase in farmland size often encourages farmers' acceptable participation in the one-into-five work groups.	+
WTDIST (in minutes)	An increased walking distance from home to watersheds	-

	under SWC discourages farmers' voluntary participation in the Onoe-into-five labour-groups.	
SLOP	Slope category of lands where the current conservation works are carried on (1 if steep, 0 otherwise)	+
Socio-economic factors		
OFFACTV	Involvement in off-farm activities may enhance or limit farmers' acceptable participation in the one-into-five groups (1 if voluntarily involved, 0 otherwise).	±
LIVSTOK (in TLU*)	Livestock holding of the household may increase or decrease acceptable participation in the one-into-five groups	±
Institutional factors		
CONTDA	Increased contact with DAs encourages farmers to voluntarily participate in the one-into-five labour-groups (1 if contact with DAs, 0 otherwise)	+
TRAING	Farmers' access to training on SWC practices motivate their acceptable participation in the one-into-five labour-groups (1 if trained, 0 otherwise)	+
INDLBSHNG	Involvement in indigenous labour- groups may increase or decrease farmers' acceptable participation in the one-into-five groups (1 if involved, 0 otherwise)	±

*TLU: Tropical Livestock Unit

Qualitative data collected through FGDs, key informant interviews and observations were concurrently analyzed with the quantitative data so as to augment the quantitative results.

3. RESULTS AND DISCUSSION

3.1 Types of Labour-sharing Associations operating in the Study Woreda

Membership in indigenous labour-exchange groups (*Wonfel* & *Debbo*) and in the one-into-five farmers' labour-sharing groups may solve labour constraints of various agricultural activities including the watershed based SWC practices. Three community labour-sharing associations (*Debo*, *Wonfel* & One-into-five) were found to be practiced by farmers in the study areas (see Table 2). According to the Ministry of Agriculture and Rural Development of Ethiopia (MoARD, 2010), *Debbo* is the main type of social-labour network that explains the mutual voluntary labour assistance among client farmers in a community. A land user who seeks *Debbo* assistance prepares local food and drinks (*Tella or Areky*) to the land users who assist him with their labour. Anyone in the community participates in the labour-sharing group with the hope of getting similar assistance on return. *Wonfel* is another form of labour-sharing association organized by the members of the community for sharing labour during watershed based SWC works. In this labour association, each member of the group has equal opportunity for getting shared-labour to perform the watershed based SWC works.

"One-into five" groups/teams are formal people groupings organized by the order of government to perform different tasks set by the government agencies. Similarly, one-into-five farmer arrangements are formal social networks introduced to the local community of farmers by the top

level government in order to get various tasks done. These networks are the lowest levels of farmer labour-sharing organizations and mainly consist of a total of six members with an influential and/or 'model farmer' appointed a group leader to lead his fellow farmers in the implementation of watershed based SWC activities (MWoAE, 2014). These arrangements are quite different from the indigenous labour-sharing groups because they are top-down imposed government approaches and are totally new experience to the local community. The DAs, Farmers' Development Committees (FDCs) and RKA officials organize all farmers in their villages to form one-into-five farmer arrangements and set rules and regulations to manage the farmers in the labour-groups (MWoAE, 2014). One-into-five farmer-labour-groups are therefore labour associations established in the rural areas to fulfill government purposes.

Table 2: Types of community labour-sharing teams operating in the study areas

Types of community labour-sharing groups	Frequency	Percent
Wonfel only	12	8.9
Debbo only	3	2.2
One-into-five only	27	20.0
Wonfel & *Debbo*	5	3.7
Wonfel & One-into-five	45	33.3
Debbo & One-into-five	6	4.4
All groups (Wonfel, Debbo & One-into-five)	37	27.4
Total	135	100.0

Source: Field survey (March, 2015)

As indicated in Table 2, a total of 135 households were interviewed to identify the type of community labour-sharing groups (farmer groupings) operating in the study areas. All interviewed households reported that they participate either in one or more of the farmer groupings to perform various farm activities. Over 33% of the respondents reported that they participate in both *Wonfel* & One-into-five farmer groupings. Some 27% of them acknowledged that they are involved in all the farmer groupings (*Wonfel*, *Debbo* & One-into-five) to carry out a wide range of agricultural activities including the watershed based SWC works. Other 20% interviewed households indicated that they participate only in one-to-five farmer groupings while 8.9% of the households said they participate in *Wonfel* only. A small number of respondents (2.2%) replied that they participate in *Debbo* labour only. The proportion of households involved in both *Wonfel* & *Debbo* was about 3.7%, while the remaining (4.4%) claimed to particpate in both *Debbo* & One-into-five farmers' groups.

The result obtained from FGDs was similar with what has already been reported in the preceding paragraph that all households were participating in one or more work-sharing groups. However, in the FGDs, households stated that the performances of community work-sharing groupings are limited to some agricultural activities. Most households agreed that indigenous labour-sharing groups (*Wonfel* & *Debbo*) are commonly preferred and operate in different agricultural activities such as plowing, weeding, harvesting and threshing. One-into-five farmer groupings are mainly focused on the implementation of watershed based SWC works which are planned to be carried out every year from January to March through government led seasonal campaigns. Although the current government extensively promotes for the establishment of the one-into-five community

networks in the entire farm and non-farm activities, its performance in most of the activities in the study areas observed were found to be limited compared to the indigenous community networks (*Wonfel* & *Debbo*).

3.2 Households' Willingness to Participate in the One-into-five Labour Teams

SWC work has been a central agenda for the past few decades in many parts of Ethiopia with the objective of rehabilitating degraded environments and to prevent more degradation in the watersheds. In recognition of this, the successive governments of Ethiopia organized various community labour campaigns at different times to establish SWC structures on the degraded watersheds. The present government of the country has also launched the new "one-into-five" farmers' development grouping network as an approach to implement SWC measures on watershed based catchments rather than on individual plot level actions. According to Bewket (2003), the voluntary participation of the farmers is one of the most critical elements for the success of SWC interventions. However, the survey in the study woreda indicated that only 17.8% of the total households were participating willingly in the one-to-five farmers' arrangements that were designed to carry out watershed based SWC works by the local governments. Conversely, 82.2% of the households were participating in one-into-five conservation works against their will (Table 3). This implies that the top-down government sponsored labour arrangement in the study area has little acceptance by the community.

Table 3: Households' readiness to participate in the one-into-five farmer groupings

Perceived participation	Frequency	Percent
Voluntary	24	17.8
Forced	111	82.2
Total	135	100.0

Source: Field survey (March, 2015)

As learnt from the FGDs, the one-into-five farmer groups that were initially formed to carry out SWC projects become mere political organizations than being community development groups. Some farmers also indicated that they were reluctant to participate in one-into-five farmers' development groups as some political activities are intermingled within the SWC works. Key informant interviews and FGDs noted that one-into-five groupings prevail not only in the SWC and agricultural works. They also operate in the civil service, in the National Army, in the teaching and learning processes at the schools and Universities and even in the manufacturing and business enterprises. As observed during the field work, most people perceive the structure as a political tool imposed by the ruling party (Ethiopian Peoples' Revolutionary Democratic Front/EPRDF) to handle and run all government activities and to control the political affiliations of the people emanating from its desire to stay in power for long. Hence, most FGDs and key informant participants conclude that one-into-five groups focus on performing political missions than solving real community problems.

As observed during the field survey, the task of facilitation and implementation of the watershed based conservation technologies were given to the DAs. The DAs assisted by FDCs and RKA leaders organize the one-into-five rural labour teams through directives and often without the will of the farmers, and intervene in resolving problems related to absenteeism during conservation working days. Each household (the head or any adult family member) was expected to come for the

conservation work on specified dates and times. The conservation works in the study areas underway every week during the dry season of each year usually between January and March when the farmers become less busy in their farm activities. As observed in the field, the technologies that were under implementation included soil and stone bunds (Figure 2), fanyaa juu terraces, cut-off-drains, water-ways, check-dams and trenches. However, most of the watershed based SWC works were carried out using forced one-into-five farmer labour campaigns. Neverthelses, conservation structures implemented through such forced labour campaigns appear not sustainable as is learned from past literature (e.g. see Shiferaw & Holden, 1998, 1999, 2000; Osman *et al*., 2000; Zeleke *et al*., 2006). According to these authors, the conservation structures which were erected through the use of forced labour campaigns in the 1970s and 1980s were ended fiasco in most of the drought affected areas of Ethiopia. This had happenned because the structures were built without the will of the local people, and hence, the farmers themselves destroyed the structures soon after the fall of the Derg government.

Figure 2: Land treated with structural SWC practices (Photo by the lead author, March 2015)

Households were asked to comment on what would occur if they fail to participate in the labour-sharing groups during implementation of watershed based conservation works. This can indirectly measure whether they are voluntarily participating in the one-into-five farmer arrangements in SWC works. Accordingly, the majority of the surveyed households (42.2%) replied that they would be penalized to pay Ethiopian Birr (ETB) 50.00 for each day they are absent (1 US$≈ 20 ETB during the time of the survey) an amount which was set by the FDCs and the local farmers as compensation for the lost labour, while 37% of them reported that they would be obliged to do the work on other working days. Other 8.1% of the respondents reported that they would be deprived from social services (e.g. access to fertilizers) and 3% reported they would be taken to prison. For the rest 9.6% respondents, nothing would happen to them if they fail to participate in one-into-five conservation works (Table 4). As learnt from FGDs, if a household failed to appear in the one-into-five labour-

group during watershed based campaigns for non-valid reasons, he/she would be fined ETB 50.00 for each day of absenteeism. But, if one could present a valid reason for the absenteeism, he/she was simply made to do the work on another day. A farmer during FGD also explained that there is no harm in forcing farmers to participate during conservation works as it allows them to take up something for their own benefit. This indicate that the majority of the farmers considered SWC activities that were underway through one-into-five farmer groupings as mandatory development works in which the RKAs and the DAs force the farmers to participate. This was exactly what was practically observed in the study area. Therefore, this finding proves that the majority of the households were participating in one-into-five farmer arrangements during watershed based SWC works against their will. The exclusion from getting some social services such as access to fertilizer reported by 8% of the households has support from other previous similar studies. For instance, Belay and Bewket (2013) indicated that DAs focus on 'model farmers' through the one-into-five farmer groups during fertilizer distribution in their study in three RKAs in northwest Ethiopia.

Table 4: Measures taken during failure of participation in SWC works

Measures taken for each day of absenteeism	№	%
Paying money set by FDCs	57	42.2
Doing the work on other working days	50	37.0
Exclusion from getting social services	11	8.1
Taken to prison	4	3.0
Nothing happen	13	9.6
Total	135	100.0

Source: Field survey (March, 2015)

3.3 Areas and Rates of Household Participation in the One-into-five Developmental Teams

Households' actual participation in SWC activities begins with soil erosion problem identification and evaluation of the already installed SWC structures. However, farmers' participation in all the SWC works showed great variation in the study areas. As shown in Table 5, out of the total households interviewed, half of them (50%) indicated that they have no participation in the identification of micro-watersheds affected by soil erosion. About 27% of them indicated that they participate rarely. Only 23% of the interviewed households claimed that they participate fully during problem identification phases of soil conservation projects. More than 78% of the households reported that they have no any involvement in the planning and designing phases of SWC works in their respective RKAs. In the implementation phase of SWC work plans, the majority of the respondents (85.2%) reported that they participate regularly and 9.6% of them remarked that they participate rarely. Others (some 5.2%) reported that they have no participation in one-into-five labour-sharing groups in implementation of watershed based SWC structures. On the other hand, 52.6% households reported that they have no participation in monitoring and evaluation of the already installed SWC structures. Other 25.2% respondents indicated that they participate regularly and the rest (22.2%) stated that they have no involvement in the evaluation stages.

The finding of this study indicates that households' participation in the watershed based SWC works through the one-into-five development networks was limited to only the implementation of structures designed by the DAs in the RKAs. The result is in line with Bewket's (2001) in a study

conducted at Chemoga watershed. The report noted that SWC practices did not respect participatory principles, and was thus a conventional top-down type. Therefore, households' genuine participation in the one-into-five farmer networks beginning from the problem identification to the monitoring and evaluation is an important precondition for sustainable use of the SWC structures in the watersheds.

Table 5: Areas and rates of household participation in the One-into-five developmental groups

Types of activities:	Frequency	Responses			
		Regularly	Rarely	Never	Total
Identification of soil erosion	Count	31	37	67	135
	Percent	23.0	27.4	49.6	100.0
Planning and designing SWC works	Count	11	18	106	135
	Percent	8.1	13.3	78.5	100.0
Building SWC structures	Count	115	13	7	135
	Percent	85.2	9.6	5.2	100.0
Monitoring and evaluation	Count	34	30	71	135
	Percent	25.2	22.2	52.6	100.0

Source: Field survey (March, 2015)

3.4 Benefits of Soil and Water Conservation Structures Installed by One-into-five Groups

The benefits of some long-term practices like SWC may not be recognized within short periods of time. Although most of the households' claimed that they do not accept and were forced to participate in the one-into-five labour networks, almost all of the interviewed households' reported that the installed structures have significantly been contributing to the restoration of the degraded watersheds. Over 50% of the interviewed households acknowledged that previously degraded lands were partially restored through the collective actions of the one-into-five farmer networks (Table 6). Some 24% of the respondents perceived the relative improvement of soil fertility after rills and gullies stabilized by one-into-five farmers' groups. Over 14% of the surveyed households witnessed increment of crop yields following their participation in SWC through one-into-five labour-sharing groups. Other respondents observed improvements of soil moisture and workability, and crop growth along the structures and vegetation cover in the watersheds. These respondents account for 5.2%, 4.4% and 1.5% of the total participants, respectively. These perceived benefits of the SWC structures conform withthe reports of Gidey (2015) in Tigray, northern Ethiopia.

The result of this finding indicates that most households' acknowledge that the structures built by the one-into-five farmers' groups can provide certain benefits although they are forced and top-down oriented. However, in the FGDs, most farmers explained that their doubts on the sustainability of SWC structures constructed by one-into-five farmer groups emanated from the forced (non-acceptable) labour groupings and campaigns. The FGDs suggest enforcing measures (obligations to maintain the structures or pay money for destroying the structures) be considered so as to protect the conserved watersheds from damage.

Table 6: Benefits of SWC structures installed by One-into-five farmer groups

Perceived benefits	Responses	
	Frequency	Percent
Increase annual crop yield	19	14.1
Rehabilitate degraded lands	68	50.4
Prevent rill and gully formation	33	24.4
Improve vegetation covers of the watersheds	6	4.4
Improve crop growth along the structures	2	1.5
Keep soil moisture longer	7	5.2
Total	135	100.0

Source: Field survey (March, 2015)

3.5 Description of Factors Influencing Participation in One-into-five Developmental Groups

This part of the paper presents the demographic, biophysical, socioeconomic and institutional factors that influence households' participation in the one-into-five labour-sharing groups in the study woreda. Accordingly, the influence of each specific variable is discussed sequentially.

Sex: Of the total 24 households, who voluntarily participated in the one-into-five farmers' labour-sharing groups during watershed based SWC works, 87.5% were male-headed and 12.5% were female-headed. On the other hand, out of 111 households who were participating against their will in the ongoing one-into-five farmer labour-sharing groups for watershed based SWC works, 88.7% were male-headed and the rest 11.3% were female-headed (Table 7). This indicates that the proportion of male-headed households was very high (>87%) in both the forced and the voluntary participants of the one-into-five farmer labour-sharing groups. The result of the Chi-square test showed that there is no statistically systematic relationship ($\chi 2 = 0.012$, $p > 0.05$) among male and female-headed households regarding participation in the one-into-five community labour-sharing groups in the watershed based SWC developments. This shows that type of participation in one-into-five labour-sharing groups does not systematically differ across the sex of household heads in the study areas (Table 7).

Age: The minimum and maximum ages of household heads were 23 and 73, respectively and the average age was 43 years with a standard deviation of 10.12. The independent-sample T test result showed that the mean age of voluntary participants was higher (≈47 years) and lower for forced participants (≈42 years) indicating a statistical difference at $p < 0.05$ ($t = 2.52$) between the two groups. This indicates that there is a significant mean age difference between voluntary and forced participants in the one-into-five farmer labour-sharing groups during implementation of watershed based SWC (Table 8). This implies that households led by aged farmers show willingness to participate in the one-into-five farmer groupings in the watershed based SWC works than the younger ones. The reason is probably due to the experiences of older farmers to perceive erosion problems and their limited participation in off-farm activities.

Education level: In this study, the education level of household heads was divided into two groups as shown in Table 7. Out of the total sample household heads, about 79% of the voluntary and 46.8% of the forced participants were unable to read and write (have never been at school) which was similar with what was reported in Gebre and Weldemariam (2013). This indicates that the

agricultural sector of the study area is still dominated by illiterate farmers. About 20.8% of voluntary and 53.4% of forced participants in the one-into-five farmer groupings for SWC works were able to read and write. The result of the Chi-square test (Table 7) showed a statistically significant association between literacy status and participation in the one-into-five labour-sharing groups during SWC campaigns ($\chi2 = 7.827$, $p < 0.05$).

Table 7: Categorical variables by type of participation in the One-into-five farmer groups

Categorical variables	Categories	Type of participation		$\chi2$ Value
		Voluntary % (n=24)	Forced % (n=111)	
Sex of household head	Male	87.5	88.3	$\chi2 = 0.01$
	Female	12.5	11.7	P = 0.914
Education level of heads	Illiterate	79.2	46.8	$\chi2 = 7.83$
	Literate	20.8	53.2	P = 0.005
Land slope where SWC is adopted	Gentle (≤15%)	50	78.4	$\chi2 = 8.13$
	Steep (>15%)	50	21.6	P = 0.004
Participation in off-farm activities	Yes	8.3	51.4	$\chi2 = 14.84$
	No	91.7	48.6	P = 0.000
Contact with Das	Yes	91.7	66.7	$\chi2 = 6.00$
	No	8.3	33.3	P = 0.014
Training access	Yes	70.8	22.5	$\chi2 = 21.49$
	No	29.2	77.5	P = 0.000
Involvement in *Wonfel & Debbo*	Yes	62.5	89.2	$\chi2 = 10.70$
	No	37.5	10.8	P = 0.001

Source: Field survey (March, 2015)

Family size: The minimum and maximum family sizes of surveyed households were 2 and 9, respectively. The average family size was 5.04, which is almost equal to the 5.6 reported in Belay and Bewket (2013) for three RKAs in northwest Ethiopia. The T-test result showed that the mean family size of voluntary participants was higher (5.88 members) and lower for forced participants (4.90 members) indicating a statistical difference ($p < 0.05$) between the two groups (Table 8). As learnt from FGDs, farmers with small family sizes were reluctant to participate in the labour-sharing groups for watershed based SWC practices due to the lack of labour required to cover other farm activities.

Farmland size: As indicated in Table 8, the minimum and maximum land holding of the surveyed households were 0.25 ha and 3 ha, respectively (excluding lands contracted from others). The mean holding size in the study area is 1.28 ha which is smaller than the 1.7 ha reported in a study conducted at Beressa watershed, central highlands of Ethiopia (Amsalu & De Graaff, 2004) but nearer to 1.42 ha recently reported for three RKAs in the northwestern highlands of Ethiopia (Belay & Bewket, 2013). The independent-sample T-test result (Table 8) showed that the mean farm size holding of voluntary and forced participants was different 1.68 and 1.24 ha, respectively ($P < 0.05$). This indicates that households with large farmland sizes can participate voluntarily in the one-into-five farmer labor-sharing groupings in the watershed based SWC works than households with smaller farm sizes. Similarly, Amsalu and De Graaff (2007) noted that, farmers with large farm

sizes were more likely to participate in conservation works in a study conducted at Beressa watershed, central highlands of Ethiopia.

Watershed distance from home: Households' participation in the one-into-five groupings on the SWC works was examined by travel distance of the watersheds (in minutes) where conservation activities were carried on from their residences. As indicated in Table 8, the minimum and maximum travel distances of watersheds from home were 5 minutes and 35 minutes, respectively. The average travel distance of watersheds was 21.7 (in walking minutes) with standard deviation of 6.92. The independent-sample T-test result (Table 8) showed that the mean watershed distance from home was almost similar for voluntary and forced participants (an average of 22 minutes for both, $P > 0.05$) indicating a non-statistical mean difference between the two groups.

Table 8: Continuous variables by type of participant household groups

Continuous variables	Type of participation				Independent Samples T-test
	Voluntary		Forced		
	Mean	SD	Mean	SD	
Age (years)	47.4	9.5	41.9	9.8	t = 2.52 p = 0.01
Family size (number)	5.9	1.2	4.9	1.8	t = 2.55 p = 0.01
Livestock holding (TLU)	4.8	1.7	5.6	1.7	t = -2.00 p = 0.05
Farmland size owned (ha)	1.7	0.6	1.2	0.7	t = 2.97 p = 0.00
Watershed distance (walking minutes)	21. 7	6.7	21.7	7.0	t =0.03 p = 0.98

Source: Field survey (March, 2015)

Land slope: The response of the households showed difference among voluntary and forced participants in the new one-into-five farmer arrangements with regard to the perceived slope of land where watershed based SWC structures were installed. As shown in Table 7, the proportion of households that implemented watershed based SWC works on steep lands was higher (50%) for voluntary participants than the forced ones (21.6%). However, the proportion of households who implemented watershed based SWC activities on gently sloping lands was higher (78.4%) for forced participants compared to voluntary ones (50%). Chi-square test result (Table 7) showed that there is statistically significant association between voluntary and forced participants across conserved land slope ($\chi2 = 8.127$, $p < 0.05$).

Off-farm work: One of the major intentions of the survey was to investigate if there was relationship between household participation in the one-into-five groups and off-farm activities. Out of the total forced participants, the majority (51.4%) were involved in various forms of off-farm activities like petty trading, weaving, livestock fattening, preparing and selling local alcoholic drinks (*Areki* and *Tella*), daily labour works, and collecting and selling of firewood. The remaining (48.6%) of the forced participants were not involved in any of those off-farm activities. Conversely, the majority of voluntary participants (91.7%) were not involved in any of the off-farm activities (Table 7). The result of the chi-square test (Table 7) showed that there is statistically significant relationship between voluntary and forced participation in off-farm activities ($\chi2 = 14.285$, $p < 0.001$). The result is in line with Assefa's (2009) finding in a study at Koga watershed, northwest Ethiopia.

Livestock: Livestock are the major assets of the households in the study *woreda* and play important role in crop production. Survey results showed that the average holding of livestock in the study areas is 5.42 TLU. This is much larger than the mean TLU (3.66) reported in Belay and Bewket (2013) for three RKAs in northwest Ethiopia. Mean TLU for voluntary and forced participants were calculated at 4.8 and 5.6, respectively. T-test comparisons indicate that there is statistical livestock holding difference between voluntary and forced participants ($p < 0.05$) of the one-into-five farmer groups (Table 8).

Contact with DAs: Most of the respondents in the study area had contact with extension agents (DAs). As shown in Table 7, the majority of households who had no contact with extension agents were participating against their will in the one-into-five farmer groups for watershed based SWC works. Among households that were participating willingly, over 91% had frequent contact with extension agents. The proportion of farmers who had no contact with extension agents was higher (33.3%) for forced participants than the voluntary ones (8.3%). Chi-square test results ($\chi2 = 6.004$, $p < 0.05$) showed statistically significant association between farmer participation in the one-into-five groups and the perceived contact with DAs. This finding is in line with a study by Ertiro (2006), in Anna watershed, Hadiya Zone, Ethiopia.

Access to training: In the study areas, the *woreda* office of agricultural extension (MWoAE, 2014) has made efforts to motivate farmers through providing training related to SWC practices and the benefit that could be earned from them. As can be seen in Table 7, the proportion of households who received training about soil erosion and structural SWC practices was higher (70.8%) for voluntary and lower for forced (22.5%) participants of the one-into-five farmer groups. Conversely, the proportion of farmers who had no training access was higher (77.5%) for forced participants than for the voluntary ones (29.2%). Chi-square analysis indicated that there is statistically significant difference ($\chi2 = 21.489$ and $p < 0.05$; Table 7) in receiving training between voluntary and forced participant of the one-into-five farmer groupings in the watershed based SWC campaigns.

Indigenous labour-sharing: Households were asked to indicate whether they were participating in indigenous labour-sharing groups (*Wonfel & Debbo*) to perform laborious farm activities including SWC works. The result revealed that the proportion of respondents who had *Wonfel* or *Debbo* party was higher (89.2%) for forced participants compared to voluntary ones (62.5%). On the other hand, out of the total respondents who were not involved in the indigenous labour-sharing groups, the percentage share of voluntary participants in the one-into-five farmer groupings was higher (37.5%) than that of the forced participants (10.8%). The chi-square test (Table 7) also revealed that there is statistically significant relationship between the two groups ($\chi2 = 10.701$, $p < 0.05$). In addition, during FGDs, farmers revealed that their participation in the indigenous labour-sharing parties was good enough to ease labour shortages and carry out various farm activities. This indicates that the majority of households were not happy to participate in the new one-into-five farmer groupings for watershed based SWC works. Their reason was the one-into-five farmer groupings turned into political organizations in which the existing government (EPDRF) executes some political activities at the back of the development projects. In contrast to the officially promoted one-into-five farmer's organization, the indigenous labour-teams are organized by the farmers themselves based on will and with no push from external pressure. They are often made-up of close relatives, neighborhood farmers, close acquaintances and friends and perhaps perform better and effective.

3.6 Determinants of Household Participation in the One-into-five Developmental Teams

Tables 7 & 8 above presented comparisons and descriptive statistics about voluntary and forced participation in the one-into-five farmer groupings for watershed based SWC works. There appears to be significant differences between voluntary and forced participants in respect of the following: age and education level of the household heads, family size, livestock asset, slope of the land treated, farmland size owned by the household, participation in off-farm activities, training access, contact with DAs and participation in indigenous labour-sharing groups. Hence, these variables were used in the regression analysis (Table 9). Sex of the household heads and watershed distance from home showed non-significant statistical responses in the Chi-square and T-tests, and hence, were excluded from the regression analysis.

The logit regression analyses was run using the above mentioned ten predictor variables for 135 householders to predict the farmers' perceived acceptable participation in the one-into-five labour-sharing groups (Table 9). The assessment of the packed model for the predictors distinguished as voluntary (acceptable participation) and forced (non-acceptable participation) in the one-into-five farmer groups ($\chi 2 = 56.845$, df = 10, $p < 0.001$) was found statistically significant. The Negelkerke R^2 from the model summary ($R^2 = 0.565$) indicate a moderate association between the prediction and the grouping variables. In a perfect model, the overall correct prediction can be 100 %. In this study, the overall success of the prediction was found to be 89.6 % (62.5 % were correctly classified for the voluntary and 95.5 % for the forced participants) indicating a statistically significant better fitting model. Our Hosmer-Lemeshow goodness-of-fit statistic also indicated a significance of P=0.97 (Table 9), which is a statistically non-significant value implying a good fitting model to our data.

The results of the binary logistic regression for the ten factors influencing farmers' participation in the one-into-five farmer groupings in the watershed based SWC works are presented in Table 9. A positive coefficient in the binary logistic regression model implies increased probability of households' willful involvement in the watershed based SWC activities through the one-into-five farmer groupings. Conversely, negative coefficient in the model implies decreased probability of households' willful involvement in the one-into-five farmer groupings. The directions of influence of almost eight of the variables entered in the model were fitting our prior expectations. But, the direction of influence of two predictors (training access and contact with DAs) that were hypothesized to encourage households' participation in the one-into-five labour-sharing groups was found negative. Out of the total 10 variables that were hypothesized to influence households' participation in the one-into-five farmer groupings and included in the binary logistic regression model, only four (TLU, off-farm activities, involvement in indigenous labour-sharing groups and training access) found significant at $P \leq 0.05$ level. Other two variables (farmland size and slope) were also found to contribute a moderate significant influence on the criterion variable (at $P \leq 0.1$ level). The rest four variables (household heads' age, and literacy status, family size and contact with DAs) were found non-significant even at $P \leq 0.1$ level.

Livestock: Livestock was hypothesized to have a dual influence on households' decisions to participate in the one-into-five labour-sharing groups. The result was found to be significant

(P=0.01) and negative (Table 9). Its negative coefficient implies that an increase in livestock would decrease the probability of households' willful participation in the one-into-five farmer groupings during SWC works by a factor of 0.576 (odds ratio). Households with large livestock heads would focus on their herds instead of involving in SWC works and this might have limited their participation in the mentioned labour-sharing groups. Similar negative influences were reported in the studies of Amsalu and de Graff (2007) and Anley *et al.* (2007) in central and western Ethiopia, respectively. The result has thus support from previous studies.

Off-farm activities: Households involvement in the off-farm activities was hypothesized to influence their participation in the one-into-five farmer groupings during watershed based SWC campaigns in either direction. The direction of influence of this variable was then found positive and significant (Table 9). The positive coefficient of this factor indicates that households willful participation in the one-into-five groupings increases by a factor of 12.083 (odds ratio) with a unit increase of their involvement in off-farm activities. This has support from the study of Kahsay (2011) that reported environmental friendly income generating activities were viewed as incentives in many ways to positively influence households' participation on land management in northern Ethiopia. Contrary to this, involvement in the off-farm work appeared to decrease households' decisions to involve in the SWC activities in central and western Ethiopia (e.g. Amsalu & de Graff, 2007; Anley *et al*., 2007). These studies noted that farmers involved in the off-farm works never get time to apply SWC structures.

Participation in Indigenous Labour-sharing Groups: Involvement in indigenous labour-sharing groups is the second strongest variable with a Wald value of 6.956 that influences households' participation in the one-into-five groupings during implementing watershed based SWC works. The direction of influence of households' involvement in indigenous labour-sharing groups was found to be positive. This indicates that households who are involved in the indigenous labour-sharing groups were more likely to participate willingly in the one-into-five farmer groupings during SWC works at a factor of 7.513 (odds ratio, Table 9). This is probably due to the fact that households who benefited from indigenous labour-sharing associations may be encouraged to participate in the new one-into-five farmer groupings expecting better achievements from the new labour organization. Belay and Bewket (2013) indicated that 80% of the households in three RKAs in northwest Ethiopia were involved in *Wonfel* & *Debo* to access labour support from community groups and government agencies.

Table 9: Model Summary of the Binary Logistic Regression.

Explanatory variables	B	S.E.	Wald	Sig.	Exp(B)
AGE	-.051	.048	1.105	.293	0.950
EDUCATION	.955	.771	1.534	.215	2.599
FAMLYSIZ	.040	.274	.021	.884	1.041
FARMSIZ	1.145	.685	2.799	.094	3.143
SLOP	1.213	.681	3.171	.075	3.365
OFFARM	2.492	.953	6.839	.009	12.083
LIVSTOCK	-.551	.213	6.707	.010	0.576
INDLBSHNG	2.017	.765	6.956	.008	7.513
CONTDA	-.787	.964	.666	.414	0.455
TRAING	-2.199	.754	8.517	.004	0.111
Constant	-.497	1.982	.063	.802.	0.608
Model- $\chi 2$		56.85		0.000	
-2 Log likelihood		69.51[a]			
Overall prediction		89.6			
Forced		95.5			
Voluntary		62.5		0.98	
Hosmer-Lemeshow statistic					
Nagelkerke R^2		0.57			

Training access: Training was anticipated to significantly increase households' participation in the one-into-five labour-sharing groups expecting that they could be motivated by agricultural experts and political cadres during the training. Accordingly, the binary logistic regression result (Table 9) showed an odds ratio of 0.111 for households' training access and a Wald value of 8.517 which indicates the strength of its influence on households' participation decisions in the one-into-five labour-sharing groupings for watershed based SWC works. Households' training access was thus found significantly influencing households' participation decisions in the one-into-five labour-sharing groups. But, unexpectedly its direction of influence was found negative. This indicates that households who gained training access were more likely to be reluctant to participate in the one-into-five farmer groupings during SWC works at a factor of 0.111 (odds ratio) as compared to those who never received training. Perhaps because the trainings provided for households may not inspire and convince them to participate genuinely in the community labour-sharing groups for watershed based SWC works. In the FGDs and key informant interviews participants reflected their deeper suspicions on the real objectives of the one-into-five groupings. Most of them believe that its indirect political mission is stronger than its achievements in the SWC works. Hence, most consider it as a hidden political mission. Due to this, households who frequently receive training and regularly meet with DAs might have clearly felt the indirect mission of the one-into-five organization and would have decided not to voluntarily involve in the action. For instance, Belay and Bewket (2013) noted that DAs frequently use the one-into-five farmer organizations to distribute agricultural inputs.

Farmland size: The size of the farmland held by the households was found to be moderately and significantly influencing household participation in the one-into-five farmer groupings at 10% level (Table 9). The Wald value of 2.799 indicates the strength of this predictor to influence households' participation in the one-into-five groupings for watershed based SWC works. Its positive coefficient implies that an increase in the land holding size would increase

the probability of households' willful participation in the one-into-five groupings during SWC works by a factor of 3.143 (odds ratio). This is in agreement with Amsalu and De Graaff (2007) and Anley et al. (2007). In their study they noted that, farmers who hold large farmlands were found to be more likely to invest in SWC works.

Slope of land: The slope of land under conservation was also found to be significant at 10% level (Table 9). Its direction of influence was found positive and matches our prior expectation. This means, an increase in slope of the land to be conserved would also increase the probability of households' willful participation in the one-into-five farmer groupings by the odds ratio of 3.365. The slope of land appeared significantly and positively influencing household participation in the SWC in western Ethiopia (Anley *et al*., 2007). Amsalu and De Graff (2007) also reported that farmers' conservation decisions were decreasing with gently sloping lands and significantly increasing with steeply sloping lands.

4. CONCLUSIONS

This paper aimed at assessing the acceptance and participation of farming households in the new community labour-teams (one-into-five farmers' groupings) in watershed based SWC works in an Ethiopian highland district named Machakel Woreda. The study also evaluated the types of labour-sharing teams operating in the area; areas and scales of household participation in the watershed based SWC works through the one-into-five labour-groups; the benefits of the SWC structures installed through the one-into-five labour teams; and the determinants of households' acceptable participation in the one-into-five farmer arrangements during SWC campaigns. It was based on FGDs, key informant interviews, field observations and a questionnaire survey of 135 households in seven RKAs. The study revealed that only 17.8% of the households participated willfully in the one-into-five farmer groupings during watershed based SWC works compared to 82.2% households who participated in the groups against their will. The majority of the households considered SWC activities that were underway in their communities as mandatory development works in which the RKA officials and the DAs forced them to participate in implementation of the work through the one-into-five farmer groupings. The study also indicated that that one-into-five farmer groups that were initially organized to carry out SWC projects became more of a political organization than purely accomplishing community derived development works. Some political activities were also intermingled with SWC works.

The most important factors influencing households' participation in the one-into-five farmer groupings in the watershed based SWC works were off-farm activities, involvement in indigenous labour-sharing groups, training access, farmland size, livestock asset, and slope of land. Participation in indigenous labour-sharing groups (*Wonfel & Debbo*) and in off-farm activities, farmland size, and perceived land slope were found influencing households' participation in the one-into-five labour-groups significantly and positively. On the other hand, households' access to training and livestock holding showed a statically significant negative influence on households' participation in the one-into-five labor-groups to perform watershed SWC tasks. Restoration of previously degraded lands, improvements in soil fertility after rills and gullies stabilization, and increment of crop yields were among the major benefits of the SWC structures adopted by households organized under the one-into-five labour-groups. The study also showed that extent of households' participation in the one-into-five farmer groupings in watershed based SWC works was mainly focused on implementing

the structures that were designed by DAs of the respective RKAs. Households' real participation in all phases of planning, monitoring and evaluating of SWC projects was generally limited; hence, such practices did not respect participatory principles. It is recommended that indigenous labour-sharing teams be promoted into firm community institutions instead of focusing on a top-down imposed alien and new organizations that cause doubts in the society.

ACKNOWLEDGEMENTS

We wish to thank our sources of information (household heads in the study areas) for their cooperation during collecting the data. They have been patient to respond questions devoting their precious time of cultivation. Our thanks extend to the enumerators who patiently carried out the household surveys, the experts at the woreda offices of agriculture and also the DAs at the study areas.

REFERENCES

Amsalu, A., & de Graaff, J. (2004). Farmers' Views of Soil Erosion Problems and Their Conservation Knowledge at Beressa Watershed, Central Highlands of Ethiopia. *Agriculture & Human Values,* 23, 99-108.

Amsalu, A., & de Graaff, J. (2007). Determinants of Adoption and Continued Use of Stone Terraces for Soil and Water Conservation in an Ethiopian Highland Watershed, *Ecological Economics,* 61, 294– 302.

Anley, Y., Bogale, A., & Hial-Gabriel, A. (2007). Adoption Decision and Use Intensity of Soil and Water Conservation Measures by Smallholder Subsistence Farmers in Dedo District, Western Ethiopia. *Land Degradation & Development*, 18, 289–302.

Assefa, F. (2009). Assessment of Adoption Behavior of Soil and Water Conservation Practices in the Koga Watershed, Highlands of Ethiopia. *MA Thesis*, Cornell University: Bahir Dar, 62pp.

Belay, M., & Bewket, W. (2013). Farmers' Livelihood Assets and Adoption of Sustainable Land Management Practices in Northwestern Highlands of Ethiopia. *International Journal of Environmental Studies,* 70, 284–301.

Bewket, W. (2001). The Need for a Participatory Approach to Soil and Water Conservation (SWC) in the Ethiopian Highlands: A Case Study in Chemoga Watershed, East Gojjam. *Eastern Africa Social Science Research Review*, *EASSRR*, 17, 2, 43-68.

Bewket, W. (2003). Towards Integrated Watershed Management in Highland Ethiopia. The Chemoga Watershed case Study. PhD Thesis, Wageningen University.

Bewket, W. (2007). Soil and Water Conservation Intervention with Conventional Technologies in North-western Highlands of Ethiopia: Acceptance and Adoption by Farmers, *Land Use Policy,* 24, 404–416.

Central Statistical Authority (CSA). (2013). Population Projection of Ethiopia for All Regions at Woreda Level from 2014-2017. Addis Ababa, Ethiopia, 118 p.

Davenport, T. E. (2003). *The Watershed Project Management Guide*. Lewis publishers, USA.

Ertiro, H. (2006). Adoption of Physical Soil and Water Conservation Structures in Anna Watershed, Hadiya Zone, *MA Thesis*, Addia Ababa University, 116 p.

Gebre, T., & Weldemariam, D. (2013). Farmers' Perceptions' and Participation on Mechanical Soil and Water Conservation Techniques in Kembata Tembaro Zone: the Case of Kachabirra Woreda, Ethiopia. *International Journal of Advanced Structures & Geotechnical Engineering,* 02 (04), 2319-5347.

Gidey, A. (2015). The contribution of Soil and Water Conservation Practices towards Sustainable Rural Livelihoods in Tigray Region, Northern Ethiopia. PhD Thesis, Addis Abeba University, Ethiopia, 160 p.

Greene, W.H. (2003). *Econometric Analysis*, 5th edition. Prentice Hall, Upper Saddle River, New Jersey, 1056 p.

Gujrati, D.N., 1988. *Basic Econometrics*. Second edition. McGraw Hill, inc., New York. U.S.A.

Haile, M., Herweg, K., & Stillhardt, B. (2006). Sustainable Land Management: A New Approach to Soil and Water Conservation in Ethiopia. Land Resources Management & Environmental Protection Department, Mekelle University, 269 p.

Hosmer, D.W., & S., Lemeshow, (1989). *Applied Logistic Regression*. A Willey Inter-Science Publication, New York.

Kahsay, T. (2011). The Effect of Land Tenure Systems on Soil Conservation Practices in Northern Ethiopia - A Case Study of Habru District in Amhara National Regional State (ANRS), 21 p.

Leul, Y. (2011). Assessment of Problems to Sustainability of Rural Water Supply and Management Systems in Machakel Woreda, Amhara Region, *MA Thesis*, Addia Ababa University, 128 p.

Machakel Woreda Office of Agricultural Extension (MWoAE). (2014). Annual Report on SWC Works in Machakel Woreda, Amanuel, 13 p.

Matthews-Njoku, E. C., Angba, A. O., & Nwakwasi, R. N. (2009). Factors influencing role performance of community based organisations in agricultural development. *International NGO Journal,* 4 (6), 313-317.

Mazengia, W., & Mowo, J. (2013). Role of Collective Actions in Integrated Soil and Water Conservation: The Case of Gununo Watershed, Southern Ethiopia. *African Journal of Water Conservation & Sustainability,* 1(5), 081-093.

McCarthy, N., Dutilly-Diané, C., & Drabo, B. (2005). Cooperation, Collective Action and Natural Resource Management in Burkina Faso: A Methodological Note: in CGIAR (2005 Ed) Collective Action and Property Rights for Sustainable Rangeland Management. CAPRi Research Brief, Consultative Group on International Agriculture (CGIAR), Washington DC. 26p.

Ministry of Agriculture and Rural Development (MoARD). (2010). Sustainable Land Management Technologies and Approaches in Ethiopia. Addis Ababa, 321 p.

Osman, M., Skowronek, A., & Sauerborn, P. (2000). Land and Water Resources Management in Ethiopia: What Did We Learn, Where Do We Go? Deutscher Tropentag proceedings, 10 pp.

Shiferaw, B., & Holden, S.T. (1998). Resource Degradation and Adoption of Land Conservation Technologies in the Ethiopian Highlands: A Case Study in Andit Tid, North Shewa. *Agricultural Economics,* 18, 233-247.

Shiferaw, B., & Holden, S.T. (1999). Soil Erosion and Smallholders' Conservation Decisions in the Highlands of Ethiopia. *World Development,* 27, 739-752.

Shiferaw, B. & Holden, S.T. (2000). Policy Instruments for Sustainable Land Management: the Case of Highland Smallholders in Ethiopia. *Agricultural Economics,* 22(3), 217–232.

Tamiru, T. (2014). Determinants of Structural Soil Conservation Sustainability in Debre Elias District, North Western Ethiopia. *MA Thesis*, Bahir-Dar University, 95 p.

Winterbottom, R., Reij, C., Garrity, D., Glover, J., Hellums, D., Mcgahuey, M., & Scherr, S. (2013). Improving Land and Water Management, Working Paper*, Installment 4 of Creating a Sustainable Food Future. Washington, DC: World Resources*, 44 p.

Zeleke, G., Kassie M., Pender J., & Yesuf, M. (2006). Stakeholder Analysis for Sustainable Land Management (SLM) in Ethiopia: Assessment of Opportunities, Strategic Constraints, Information Needs, and Knowledge Gaps. 2nd draft. Environmental *Economics Policy Forum for Ethiopia* (EEPFE), Addis Ababa, 96 p.