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Assessment of Farmers' Participation in Watershed Development: The Case of Kindo Koyisha Woreda, Wolaita Zone, Southern Ethiopia

Mekonen Debara[1*], Teklu Gebretsadik[1]
[1]South Agricultural Research Institute, Hawassa Agricultural Research Center, Departments of Agricultural Economics, and Technology Transfer, Hawassa, Ethiopia

Abstract: The assessment of farmers' involvement in watershed development in the case of kindo koyisha woreda is the main focus of this study because there hasn't been a comprehensive study done yet. The study also looks at what influences watershed development in the research area. 120 sample respondents were chosen from two kebeles using a purposive selection approach. Both primary and secondary sources were used to gather the data. Focus groups and sample surveys using interview schedules are two of the data collection techniques used. According to the outcome descriptive statistics, there were 27, 52, and 41 respondents who participated at low, medium, and high levels, respectively. Nine of the 17 variables included in the model were found to be significant at various probability levels, according to the estimation of the ordered logit model. Farmers' participation in watershed development was positively and significantly correlated with age, respondents' education level, sex, family size, farm size, extension service, and training. Contrarily, at various probabilities, the distance to the watershed and the reliance ratio were negatively and significantly connected to farmers' involvement in watershed development. The findings of this study and other observations showed that community involvement was essential for the success of watershed improvement initiatives. Hence, the kindo koyisha woreda Agricultural office has to facilitate participatory watershed development that responds to the needs and priorities of the local community in a way that balances the production and protection objectives.

Keywords: Watershed development, Farmers 'participation, Wolaita zone, ordered logit model.

Research Paper

***Corresponding Author:**
Mekonen Debara
South Agricultural Research Institute, Hawassa Agricultural Research Center, Departments of Agricultural Economics, and Technology Transfer, Hawassa, Ethiopia

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1. INTRODUCTION

The foundation of the Ethiopian economy is agriculture. Initiatives to control watersheds have been undertaken in Ethiopia since the 1970s. Community-based alternatives have replaced top-down infrastructure solutions as the fundamental strategy. In the form of institutional arrangements that enable and encourage collaboration among public agencies at all levels, policies that support decentralized and participatory development, and a strategy for managing natural resources that takes into account regional law and tenure customs, there is now a supportive policy and legal framework (MoARD, 2005). Participatory watershed management is essential for success. This is one of the lessons learned from decades of centrally planned watershed development projects that have failed. Locals were forced or paid to engage in terracing, bundling, destocking, and other technical measures that outside experts believed would reverse watershed degradation (IDB, 1995; Kerr *et al.*, 1996; Pretty and Shah, 1999). Participation is therefore anticipated to accomplish what compulsion and subsidies were unable to, namely increase the success and sustainability of watershed development.

Since participation can take many forms, from ideas to material contributions, community involvement in the development process is crucial for sustaining government expenditures. Furthermore, a development process that doesn't have full community involvement might not be long-lasting. Large-scale agricultural land degradation is significantly threatening the livelihoods of millions of people. Large investments have been made in watershed management throughout Asia, Africa, and Latin America in an effort to solve this issue (Lal, 2000). By participating, stakeholders imply that they will collaborate to establish criteria for identifying priority limitations, assess potential solutions, suggest technologies and policies, and track and assess impacts.

The primary goal of the study is to analyze the degree of farmer involvement in watershed development activities, from planning through implementation, monitoring, and evaluation, and to pinpoint the barriers to and opportunities for farmer involvement in watershed development. Therefore this research aims to assess farmers' participation in watershed development in Kindo Koysha woreda, wolaita zone and to identify factors that determine the farmers' participation on watershed activities in the study area.

2. METHODOLOGY

2.1. Description of the Study Area

2.1.1. Geographical Location

Wolaita Zone is one of the 14 Zones in the Southern Nation Nationalities and Regional State. It is roughly located 6.4^0 -7^0 N and 37.4^0 - 38.2^0 E. the boundary areas are Kambata Tambaro in the north, Sidama Zone in the East, Gamo Gofa Zone in the South, Dawro Zone in the West. The Zone has total population of 1,691,867 (CSA, 2000). Area of the Zone is 451170 hectare or 4511.7 km^2. The zone has 12 rural districts and three town administrations.

The study was conducted in Kindo koyisha is one of the 12 woredas in Wolayta Zone, which is situated in SNNPR. It is about 410 kilometers from Addis Ababa to the south and about 36 kilometers from wolayta Soddo to the west. The woreda is bounded by Boloso sore and Boloso Bombe woredas in the North, Damot Sore and Soddo Zuria woredas in the East, River Omo and Dawro Zone in the West, and Kindo Didaye and Ofa woredas in South.

There are three agro ecological zones in the zone, out of which high land accounts 8%, mid land 20%, semarid 36% and low land 36%. As far as land usage concerned from 52,630 hectare, 24,313 hectare cultivated, grazing 2500, forests and bushes 16,361 and 10,452 hacter affected by soil erosion and land degradation from the total area of the woreda. DoARD, 2015. The average maximum and minimum land holding is 0.5 and 0.125 hectare respectively. The woreda has social service of health: 1 hospital, 4 health centers, and 25 health posts. Education sector; 42 Primary school, 4 Secondary school, 1 Preparatory. According to the census result of 2007, there are 23 rural Kebeles and 2 reform Town Kebeles.

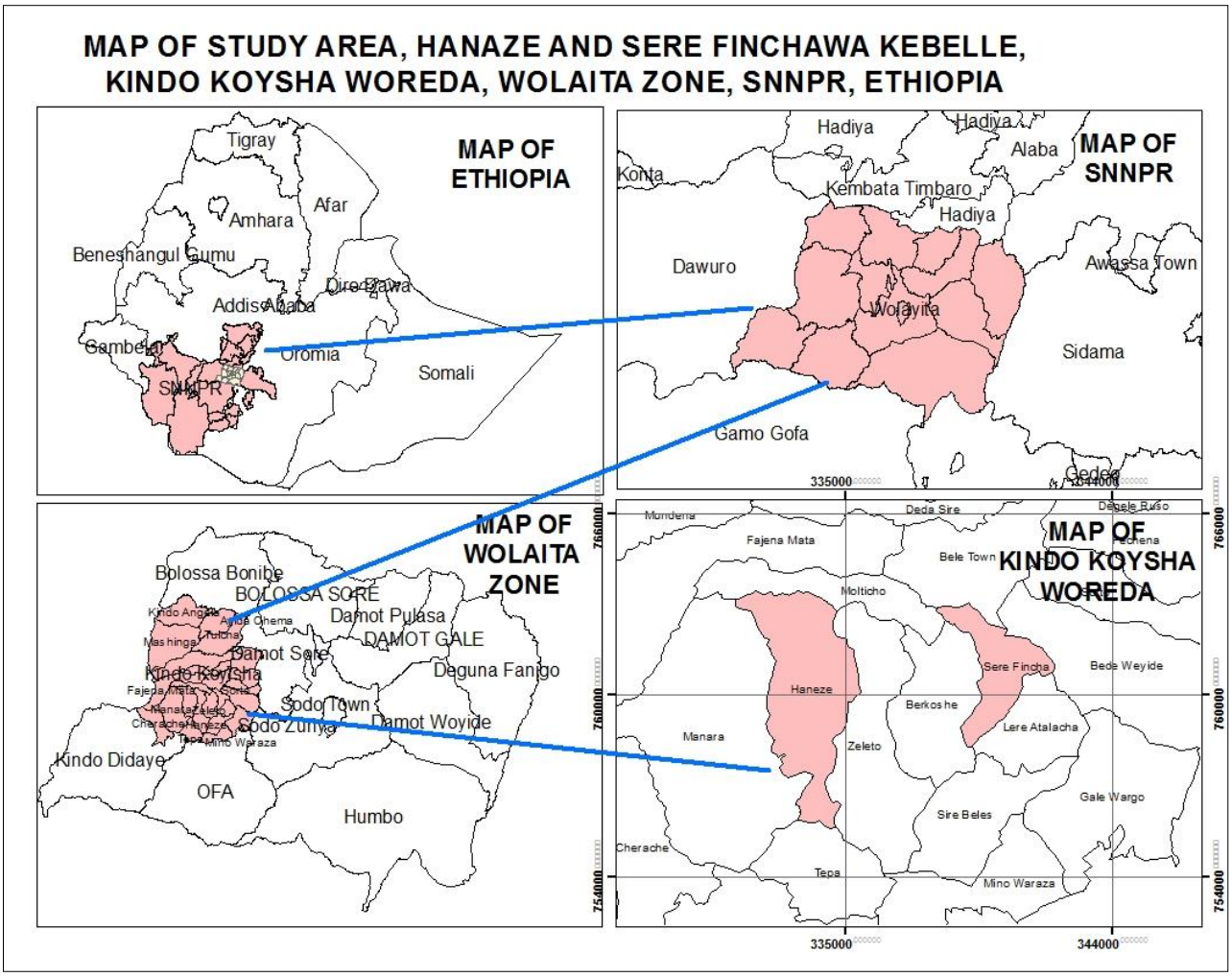

Figure 1: The map of the study area (*Source: CSA and map of Ethiopia agency 2011*)

2.1.2. Population and Agricultural Characteristics

According to census of CSA of Ethiopia the number of population of the woreda is about 115,100 and out this male are 56,000 (48.7%) while female 59,100 (51.3%). The woreda is densely populated with largely Christian and wolayita nationality and the common language is also wolitagna.

The main industry driving the study area's economy is agriculture. However, a number of issues, such as the old farming method, the depletion of natural resources, the uneven distribution of rainfall, and the restricted application of contemporary agricultural technologies, limit the generation of agricultural output. The fragmentation and shrinkage of farms brought about by rapid population increase have had a significant impact on food crop yield and productivity. Maize, barely, teff, sorghum, fruits, vegetables, etc., in addition to chat, ginger, coffee, and sesame, are the principal crops grown in the region.

2.1.3. Topography, Altitude and Climate

About 90% of the woredas is mountainous and undulating topography and the rest of 10% is flat and valley with the altitude ranges from 700-2200 masl. The total land coverage of the woreda is 52,630 hacter and there are four types of soil which are clay, loam, sandy and graves or stony soils. DoARD, 2015.

There are three agro ecological woreda such as dega (high altitude) about 8% winadega (middle altitude) covers about 20%, semiarid 36% and kola (lowland) accounts for about 36%. The annual average rain fall is about 800mml per year. The minimum and maximum temperature of the area ranges from 21- 37°C respectively. DoARD, 2015.

2.2. Sampling Techniques

2.2.1. Sample Size

To determine sample size the mathematical formula used. Taro Yamane, 1970 has suggested the following mathematical formula for determining sample size.

$$n = \frac{N}{1 + N(e)^2}$$

Where, N is the total number of farmer participates in watershed development at household level are 1239, confidence level of 95%. Based on this, the error term would equal to 5%. Using the total population of 1239 and the level of precision of 8.7%, the sample size was calculated as follows.

$$n = \frac{1239}{1239(0.087)^2} = 119.5$$

Hence, out of the total population of 1239 farmer participating in watershed development at in two kebeles, a sample size of 120 was taken. To identify the 120 participants a systematic random sampling technique was used.

2.2.2. Sampling Design

Both probability and non-probability sampling techniques were used in this investigation. The Kindo Koysha woreda served as the site of this study. The deliberate selection of the research area, which took into account the degree of farmer involvement in watershed development and the substantial efforts made toward land acquisition, was justified by:

- It is one of the woredas in the region where watershed development practices have begun earlier (i.e. since 1996 and before) by different projects;
- It is one of the area of the zones where more land is being covered by watershed development with the support of projects, and farmer participation in watershed development without payment is practiced in the woreda. Therefore, it is hoped that adequate information can be gathered from such long years' experience of the farmer.

In light of this, two of the 23 rural kebeles in the woreda were purposefully chosen, with the presence of farmers participating in local development practices serving as the criterion for selection. The development land was set aside specifically for farmers to manage and profit from. In other kebeles, farmer involvement in watershed development projects was noted, but only two kebeles—Hanaz and Serefinchawa—received additional attention. These two kebeles were deliberately chosen. So, 19 years ago, a research that established watershed development was conducted in this region.

The respondents were chosen using a systematic random sample from an already existing list of farmers who participate in watershed improvement and stratified by the gender of the farmer in their family. By employing a purposively sampling technique, the farmers who take part in watershed improvement were also chosen from two kebele in the communities. Lastly, from Hanaz (kebele 1) male (632) and woman (79) then total farmer in kebele 1 were 711 and Serefinchawa (kebele 2) male (456) and woman (72) then total farmer in kebele 2 were 528 by using stratified sampling. The total farmer number of participates in watershed development at household level were 1239. To select the number of sample used Yamane mathematical formula 120. The number of sample in each Kebele had been determined by probability proportional to size (PPS). To get quantitative information the researcher used interview schedule for a total of 120 respondents.

2.3. Data Type and Source

For the purpose of this study, both qualitative and quantitative data were collected from primary and secondary sources.

2.4. Data Collection Methods

The context of the specific research objectives was used to construct the interview schedule, and data were collected utilizing the survey method. For the purpose of gathering pertinent data for the real survey, an exploratory survey was first conducted. Focus group discussions were used as an addition to this. Key informants were interviewed, and observations were made by the researcher.

Enumerators who were employed of Agricultural and Rural Development Office and familiar to the area and language was recruited from the study area and trained on the objectives, methods of data collection and interviewing techniques to assist the researcher in collecting the desired data. These enumerators were also familiar to the culture of the farming community and they had been experienced in watershed development. Before effecting the data collection by using personal interview technique, pretesting of the interview schedule was carried out with the enumerators to assess whether the questions are clear and relevant and to know whether the enumerators can administer the Interview Schedule without difficulties. Necessary modifications were made in the Interview Schedule after pre testing.

Secondary data were also obtained from reports, relevant studies, books and documents from concerned offices.

2.5. Data Analysis

2.5.1. Descriptive Statistics

Descriptive statistics were used to have clear picture of the characteristics of sample units. By applying descriptive statistics one can compare and contrast different categories of sample units (farmer's respondents) with respect to the desired characteristics. In this study, descriptive statistics such as mean, standard deviation, percentages and frequency of occurrence were used with F-test for continuous variables $_t$-test for dummy/discrete variables to see the existing relationship between explanatory variables and farmers' participation level.

3. RESULT AND DISCUSSIONS

3.1. Socio-Demographic Variables

Age, family size, year of membership, education level and sex of respondents

One of the factors this study considers to be significant is age. It was anticipated that it would be a valuable resource for experience in people's daily lives, increasing farmers' involvement in the development of the watershed. The respondents were between the ages of 19 and 87. The sample respondents' average age was 51.3 years, as shown in Table 1. the average age of Low, and High levels of participation categories were found to be 57.5, 48.75, and 42.84 years respectively. But the result obtained from this study is completely different from the expectation. This is because those member respondents who are under the low participation categories have large mean age value than those from respondents in the high categories. The result of mean test using one way ANOVA also indicates there is statistically significant mean difference (F=4.872 and P=.091) among the respondents with 10% probability.

Table 1: Age, family size, years of membership, and education level of respondents

Variables	Participation Categories			Total	F – value
	Low	Medium	High		
	Mean	Mean	Mean		
Age	57.5	48.75	42.82	51.3	4.87**
Family size	7.93	7.42	6.93	7.37	0.47(NS)
Dependence ratio	0.37	0.36	0.35	0.36	0.33(NS)
Education level	3.62	2.38	2.86	2.9	0.530**
	Low	Medium	High	Total	χ^2– value
Sex					0.043***
Male	21	44	40	105	
Female	2	5	8	15	

Source: Computed from own survey data (2017)

The number of people living in a household is referred to as family size in this study. The family size of the respondents ranged from 1 to 15. The mean family size of the sample respondents in the study area was found to be 7.37 (Table 1). The respective average family size for low, medium, and high participation categories was 7.93, 7.42, and 7.15 respectively. The results of one way ANOVA (F=0.47 and P=0.36) show that there is no significant mean difference of family size among the different participation groups.

Table 2: Perception of farmer in watershed development

No	Activities	Mean	Std	Var	Rank
1	WSD reduces runoff	4.83	0.37	0.14	1
2	WSD conserve soil	4.8	0.4	0.16	2
3	WSD improves vegetation covers	4.75	0.42	0.18	3
4	WSD conserves moister	4.51	0.54	0.3	4
5	WSD help to better yield crop availability	4.16	0.737	0.535	5
6	WSD improves ground water	3.95	1.04	1.08	6
7	WSD help to fuel availability	3.91	0.731	0.543	7
8	WSD help to fodder availability	3.83	0.71	0.51	8
9	WSD create income generation possibilities	3.8	0.67	0.49	9
10	WSD increase livestock rearing	3.62	0.48	0.23	10

Source: Computed from own survey data (2015)

The participant farmer perceive the impact of watershed development on the items that it reduces runoff 4.83, it conserves soil 4.8, it improves vegetation covers 4.75 and it conserves moisture 4.51 more than other items Table 2. As revealed in the Table 2 the participant on perception on watershed development ranks first, second, third and fourth respectively. It was also revealed during group discussion that due to the reason of the physical and biological activities implemented on the site and the reduction of free grazing, the reduction of runoff is high. This reduction in runoff results in the conservation of soil, improves vegetation covers and moisture. The farmer also explained during group discussion that watershed development protects from degradation. They perceive about its impact by observing surroundings and the programmers implemented by safety net, action aid and SOS project for long period of time and from their neighboring participant farmer's benefits. The result of ANOVA on the perception of the participant farmer on these items of impact of watershed development showed that they are perceived good. This difference may be resulted from the difference in direct involvement of farmer in the activities by the participated farmer.

Soil and water conservation measures adopted in the watershed development projects were helpful in augmenting water storage capacity and improving local water resources by reducing the rate of runoff, and increasing the ground water recharge. (Butterworth *et al.*, 2001).

3.2. Factors Influencing Farmers' Participation on Watershed Development

Determinants of farmers' Participation in watershed development

Farmers' involvement in various watershed development efforts is thought to be influenced by a variety of sociodemographic, economic, institutional, and psychological factors. In order to describe how people participate in watershed development, various variables across various time periods and spaces are significant. In the research area, a variety of factors are expected to have an impact on how farmers participate in various watershed development initiatives. Before running the model, it is essential to check for multicollinearity or associations among the potential independent variables. If there is an issue with multicollinearity among the variables, then one variable masks the impact of the other. Therefore, all continuous and dummy/discrete variables have been examined for the multicollinearity assessment.

For this particular study, Variance Inflation Factor (VIF) was used to test the association between the hypothesized continuous variables. The larger the value of the VIF, the more it is troublesome. As a rule of thumb, if the VIF of a variable exceeds 10 and exceeds 0.95, that variable is said to be highly collinear (Gujarati, 1995). According to Gujarati (1995), VIF can be computed using the formula, is the squared multiple correlation coefficient between and the other explanatory variables. Similarly, there might also be association between qualitative (dummy) variables, which can lead to the problem of multicollinearity (the degree of association between dummy variables). To detect this problem, coefficients of contingency was computed. Contingency coefficient value ranges between 0 and 1, where zero indicates no association exists between the variables and on the other hand if the value is close to one, then it indicates there is high degree of association between the variables. According to Healy (1984), the dummy variables are said to be collinear if the value of contingency coefficient is greater than 0.75. The contingency coefficient was computed by the following formula,

$$C = \sqrt{\frac{\chi^2}{n+\chi^2}}$$

Where, C is coefficient of contingency, χ^2 is chi-square test, and n is the total sample size. Based on the stated standard given, there was no problem of multicollinearity among the variables as indicated in the appendix table (Appendix Table 1 and Appendix Table 2).

A total of seventeen explanatory variables which were hypothesised to have a significant impact on the dependent variable were put in to the ordered logit regression model. Out of which nine explanatory variables were found to be significantly influencing the participation of farmers in different activities of watershed development. These are Age of respondents (AGE), Education level (EDULEVEL), Sex (SEX), Dependence ratio (DEPRATIO), Family size (FAMSIZE), Size of farm (FARMSIZE), Distance from the watershed (DISFRWSD), Training (TRAINING) and Extension (EXTSERV).

Age of the respondents (AGE): This variable was statistically significant at 10% probability level, influencing the farmers' participation positively. According to the model output, as the age of the respondent increases by one year, the probability of farmers' participation in watershed development for low participation category decreases by 1.29% while the participation by medium and high categories increases by 0.71% and 0.58% respectively. The result is consistent with the finding of Amsalu & De Graaff (2007).

Table 3: Determinants of Farmers' Participation

Variables	Coefficient	P-value	Marginal effect		
			Low	Medium	High
AGE	-0.0196***	0.060	-0.012	0.0071	0.0058
EDULEVEL	0.0079***	0.062	-0.0782	-0.0195	0.0977
SEX	0.0484***	0.050	-0.164	-0.087	0.251
FAMSIZE	-0.0368***	0.002	-0.0203	0.0112	0.0091
DEPDRATIO	0.088***	0.069	0.01848	-0.0985	-0.02833
TLU	-9.1399	0.578	0.0024	-0.0013	-0.0011
FARMSIZE	0.0719***	0.002	-0.0465	0.0256	0.0208
FARMIN	2.92	0.357	-1.14e-06	6.28e-07	5.11e-07
DISFWSS	-0.0732***	0.041	0.0526	-0.0290	-0.0236
TRAINING	0.0194***	0.055	-0.0556	-0.0019	0.0575
EXTESERVICE	0.0816***	0.056	-0.03906	0.0953	0.0304
CREDIT	-0.8442	0.116	0.0598	-0.0398	-0.0199
USEINFO	0.2542	0.564	0.0151	-0.0088	-0.0063
YEARMEM	0.308	0.210	-0.0186	0.0102	0 .0083
PERCEPTION	1.579	0.149	-0.0816	0.0230	0.0585
ADONWTECHN	-0.4337	0.445	-0.0264	0.0147	0.0117
FARTOFARKSH	0.4680	0.548	-0.0242	0.0091	0.0151

Log likelihood = -69.695318 Prob>chi^2 = 0.0000

LR chi^2(20) = 167.98 Psudo R^2 = 0.5465

***, **, and * are significant at 1%, 5%, and 10% probability level respectively

Source: Orderd logit regression model output of own survey, 2017

Education level (EDULEVEL): This variable was statistically significant at 10% probability level, influencing the farmers' participation positively. According to the model output, as the education level of the respondent would decrease the participation level of low and medium categories by 7.82% and 1.95% respectively, but it increases the participation level of high category by 9.77%. The positive estimated coefficient of to farmers' participation in watershed development reveals that farmers in high education level have higher probability of being participate on watershed development than those farmers with lower education level. The result is consistent with results of (e.g. Tegegne, 1999; Ervin and Ervin, 1982; Noris and Batie, 1987; Pender and Kerr, 1996; Asrat *et al.*, 2004).

Sex of the respondents (AGE): Sex of the respondent was hypothesized negative to have impact on farmers' participation in different affairs of watershed development. But the result of the ordered logit model indicates positive relationship between farmers' participation level and their sex at 5% probability level. The probable reason for this could be both male and female farmers might have more participation in higher categories. According to the model output, as the a sex of the respondent would decrease the probability of farmers' participation to the low and medium categories by 1.64% and 8.7% respectively, but it increases the probability of farmers' participation for high participation category by 2.65%. The result is consistent with the findings of (ibid).

Family size (FAMSIZE): This variable was statistically significant at 1% probability level, influencing the members' participation positively. This result depicts that as the family size increases by one adult equivalent,

the probability of farmers' participation in watershed for low participation category decrease by 2.03% while the participation by medium and high categories increases by 1.12% and 0.91% respectively, as family size increase level of family participation in watershed development increase. The result is in contrary to the finding of (Shiferaw & Holden, 1998; Bekele & Drake, 2003; Tadesse & Belay, 2004) which states household with large family size seems to accept less risk in using new technologies. But the result is consistent with the finding of (Tadesse & Belay, 2004).

Dependency ratio (DEPRATIO): The result from the ordered logit model reveals that the dependency ratio significantly influence members' participation at 10% probability level negatively. The presence of more dependents in households may reduce time investing in development practice and occupied by household duties the probability of farmers' participation on watershed development for low participation category increase by 1.84% but it reduces the participation level for medium and high categories by 9.8% and 2.83% respectively. The result is consistent with the findings of Shiferaw & Holden, 1998.

Size of farm (FARMSIZE): The result from the ordered logit model reveals the significant and positive relationship between members' participation and the size of the land respondents have at 1% probability level. The implication is that farmers with large farm size actively participate in watershed development since they need to buy large farm inputs and have a potential to produce and sell agricultural product. If other variables remain constant, a unit increase in hectare of farm size decreases the probability of farmers' participation for low category by 4.65%. The same increase in the hectare of farm size increases the probability of members' participation for medium and high categories by 2.56% and 2.08% respectively. The result is consistent with the findings of (Shiferaw & Holden, 1998; Bekel & Drake, 2003; Tadesse & Belay, 2004; Amsalu & De Graaff, 2007; Kassa *et al.*, 2013).

Distance from the watershed site (DISFWSS): The result from the ordered logit model reveals that the distance from the watershed development significantly influence members' participation at 5% probability level negatively. Farmers who are relatively nearer to the watershed site participate more. This is because the proximity allows members to participate easily since it requires less time and cost in travelling. In addition, it helps farmers to know more about the benefits of watershed. An increase in the distance of the farmers from the watershed site by an hour increases the probability of members' participation for low participation category by 5.26% but it reduces the participation level for medium and high categories by 2.9% and 2.36% respectively. The result is consistent with the findings of Shiferaw and Holden (1998), Bekele and Drake (2003) and Regasa (2005).

Extension service (EXTNSRV): This explanatory variable is correlated with the probability of farmers' participation positive and significantly at 10% probability level. As the respondents believed that access to extension service have good perception to watershed development, the probability of farmers' participation for low participation category decreased by 7.06%, while the probability to medium and high categories increased by 4.53% and 2.54% respectively. The result is consistent with the findings of (Shiferaw & Holden, 1998; 2004; Rgasa, 2005).

Training (TRAINING): The result from the ordered logit model shows that training undergone in different aspects of development practices and farmers' participation in watershed development had a positive significant relationship. The coefficient of this variable is statistically significant at 10% probability level. From the marginal effects, one can understand that for one unit increase in training (i.e., going from 0 to 1), the probability of farmers participation for low and medium participation categories decreases by 5.56% and 0.19% respectively while the probability for high participation category increases by 5.75%, given that all of the variables in the model are held constant. The result is consistent with the findings of (Shiferaw & Holden, 1998; Sidibe, 2004).

3.3. Opportunities for Farmers to Improve Their Participation

Using key informants who are extension staff members of the district office of agriculture, it was possible to identify the options for farmers that encourage their participation and improve the situation. The list was then discussed in-depth during individual interviews with survey respondents.

There are six opportunities on the list. The respondent ranked the opportunities as follows: the first opportunity received six points, the second five, the third four, and the final one point. The opportunity with the highest mean score value was chosen as the most crucial opportunity for the farmers' participation after summing the scores provided by each respondent to determine each opportunity's mean score value. The following table lists the key opportunities that the key informants recognized, enumerated, and ranked.

Table 4: Rank order of opportunities given by key informants (N=6)

S. No	Opportunities	Mean score	Rank
1	Government attention to watershed development	5.5	1
2	Availability of support from DoARD office	4.8	2
3	Availability of Das in kebeles	4.7	3
4	Support from other NGOs	2.5	4
5	Market Access	2.3	5
6	Labor Accessibility	1.2	6

Source: Own survey, 2017

A perusal of Table 4 reveals that government attention to watershed development is the first opportunity for the farmers' to participate in watershed development and it scores (5.5). As it was discussed with key informants, the study area is erratic in its rainfall distribution and land degraded area that results food insecurity. In order to curb this land degradation problem and to improve the food security of the community, watershed development now a days is a key activity that should be implemented in the study area.

Degraded lands in Ethiopia constitute large parts of all regions. Some areas are more degraded than others. Unfortunately, "degradation trend" is also fast, with the higher erosion rates being recorded in the high potential areas for cultivation. This implies a need to conserve and protect watersheds across the country (MoARD, 2005).

According to MoARD (2005), the relationship between livelihoods and watersheds in rural Ethiopia is that watershed logic governs water regimes, erosion levels, biomass availability, productivity levels, the quality of infrastructure and countless other activities. As it was observed in Table 4, availability of support from District office of Agriculture and Rural Development is the second opportunity (4.8) of farmers' that motivates their participation. The support of the office is in the form of supplying dasho grass, seedlings and fodder seeds, organizing farmer in groups and associations, and technical supports. This support from the office will improve the farmer participation in watershed development. Availability of development agents in kebeles is the third opportunity (4.7) of farmers' that improve their participation. There are about 3 DAs in each kebele. One DA is responsible for the implementation of activities under his watershed site by giving technical support and consultations. But this support differs from one DA to another when there is shifting of them from one kebele to another.

The support of NGOs is another fourth opportunity for the farmers' to improve their participation. It has scored (2.5) next to availability of DAs. These NGOs like concern, catholic development organization, TDA, WFP, HABP and SIDA support the farmers' by supplying credit in revolving fund for implementing income generating activities like sheep production and fattening by using the grass from the watershed as their animal feed. The participation of farmers' in watershed development is the base for getting this credit access by these organizations. Market access is the fifth opportunity (2.3) of farmers' to participate in watershed development. Since the site is near to town, the farmers' have market access for the produces from the watershed and it is not a threat for them and this improves their participation. Labor accessibility (1.2) is the last opportunity for the farmer. The farmer can participate in watershed development by organizing their labor.

3.4. An Overview of Watershed Development Strategy of the Woreda

Since 1996, the SOS project has been doing watershed development in the Woreda in 23 Kebeles. For instance, SOS Sahel has implemented a Participatory Land Use Planning (PLUP) approach, mainstreamed the participatory element into land use planning, and introduced crops and farming practices in Woreda. SOS Sahel has also focused on integration and management aspects, self-reliance, and piloted area closure sharing arrangements and use rights. This method assisted in resolving the issue of community dissatisfaction brought on by the loss of grazing land as a result of the site's closure for development. Planning was done by assembling a team of five men and five women from various community sectors. The woreda office of agriculture and rural development approved the five-year plan that was created by this planning committee. Following approval, the group of people who lived in the watershed carried out the operations. For the purpose of carrying out activities in the watersheds, this program is still in operation in the Woreda on a food-for-work (FFW) basis. The actions taken by this program are described. Farmers' involvement in the development of the watershed was initiated at this time through consultation with them by the DAs of the kebeles, with the intention of involving farmers in the development for preventing land degradation and to support their lives by implementing income-generating activities in the watershed.

The safety net program and community mobilization are the opposite approach to watershed improvement in the woreda. In 2005, the safety net program was launched across the board in the woreda's

Kebele. The district designated 60 watersheds throughout its jurisdiction to develop over the course of the next five years by taking into account these safety net programs and community mobilizations. The surveying document was finished and the activities implementation process began for the watersheds that had been selected. The program's implementation includes engaging the community members who were food insecure in the Woreda to fill their food gaps by engaging in natural resource development initiatives. The program's objective is to develop community assets by carrying out initiatives that lessen dependence. However, due to improper control, the task was not done as expected. The community has also adjusted to calculating the number of days spent at work rather than the volume of tasks completed in accordance with the standard. The community begins to feel dependent on some activities that are improperly carried out in accordance with its standard.

The Woreda's other technique for carrying out watershed development is community mobilization. In order to begin this mode of implementation, the entire community that was an active labor force during the off-farm season was mobilized in 2011. During this mobilization, the community has its own development committee for purposes of coordination and follow-up. In the years 2011 and 2012, 20 days were spent working; in the years 2013 to 2015, 60 days were spent working. The community carried out a variety of natural resource development operations during this time. As negotiated with the key informants, watershed development was carried out on a long-term payment basis, but it raised community awareness about the need to stop land deterioration. However, the community's development activity cannot be sustained due to the incentive system for involvement in the activities. According to the discussion, gradual withdrawal from incentive basis involvement is required to achieve sustainability and participatory watershed development, and the community should hand over the development practices on its own by utilizing this mobilization. There are issues that come up in the job of developing watersheds, according to the conversation with key informants. The issues included the community's lack of a sense of ownership. The Woreda is experimenting with various solutions in an effort to tackle the issues. The watershed's land was certified in an effort to address issues with a lack of sense of community ownership. The community, which offers social services including sugar, oil, electric supply, and credit access based on their voluntary engagement in community development efforts, has also had positive experiences. In this trend, the mobilization efforts are carried out by the communities, and the outcomes are used to meet the needs of the community. This experience creates sense of ownership by the community for their sites and it should be strengthened and promoted to other areas.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1. Conclusions

Farmers are the group in the community most impacted by the degradation of the natural resource since they depend on it to meet a variety of requirements. This study's major objective is to evaluate farmers' contributions to watershed development. The study area is plagued by a number of serious problems, including soil erosion and loss of soil fertility on cultivated lands, an increase in the number of mouths that need to be fed due to excessively high population growth, low productivity levels, an alarming rate of land degradation, and environmental imbalances brought on by improper management of natural resources. According to the results, farmers with high levels of participation in the medium 43.3% and high 34.2% categories thought that the problem could only be solved by farmers actively participating in the development of watersheds. However, a number of sociodemographic, economic, institutional, and psychological factors limited their ability to act and their ability to do so. Age, education, sex, dependence ratio, farm size, distance to watershed site, contacts with extension agents, and household head training were the primary contributing factors.

According to Order Logit results, factors that were positively and significantly connected to farmers' engagement included age, respondents' education level, sex, family size, farm size, extension service, and training. The distance to the watershed and the reliance ratio, on the other hand, were negatively and significantly associated to farmers' involvement in watershed development at various probabilities.

The most significant finding from this study is that farmers participated voluntarily in all three phases of watershed development. It is important to pay attention to the target groups' influencing factors and to design and implement appropriate policies and programs that will affect farmers' participation in watershed development in their agricultural practices.

4.2 Recommendations

The Wolaita area in general and kindo koyisha woreda Agricultural office particularly has to facilitate participatory watershed development that responds to the needs and priorities of the local community in a way that balances the agricultural production and environmental protection objectives.

The findings of this study and other observations showed that community involvement was essential for the success of watershed improvement initiatives. Finally, it is crucial to remember that Ethiopia has a diverse socioeconomic, cultural, and institutional context. Because the study was site-specific, its findings could not be extrapolated to a zonal or regional level. However, the study's recommendations and policy implications can be applied to different contexts and

utilized as a foundation for additional research in other fields.

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Data Availability: All relevant data are within the manuscript

Conflict of Interest: None to declare

Authors' Contribution

Mekonen Debara collected data and drafted manuscript; Teklu Gebretsadik contributed in data analysis and editing the manuscript. Both authors have read and approved the final manuscript.

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