Factors Influencing Effective Delivery of Extension Services on Soil and Water Conservation Practices in Western Amhara Region, Ethiopia

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Abstract

The study was conducted in Western Amhara Region of Ethiopia to determine the linkage between personal, socio-economic and institutional characteristics and effectiveness of delivery of extension services on Soil and Water Conservation (SWC) practices among smallholder farmers. Data were collected using questionnaire survey and checklist from nine kebeles and 383 randomly selected farmers. The study found that effectiveness of extension service delivery on SWC practices in the study area largely depends on the farmers' personal, socio-economic and institutional characteristics. Therefore, the study concludes that demand-driven extension service delivery is more effective when farmers' personal, socio-economic and institutional characteristics are addressed and policies and legal frameworks are in place to guide the extension service delivery. The study draws a number of policy and research implications including the development of policies and strategies that the Amhara National Regional State should approve for addressing personal, socio-economic and institutional variables of farmers as a means for effective delivery of extension services on SWC practices in the study area and areas with similar conditions.

Keywords: Extension service delivery, Effectiveness, soil and water conservation practices

Introduction

Ethiopia is an agrarian country whereby agriculture provides 47% of the gross domestic product (GDP), 80% of the employment and 60% of the export commodities (World Bank, 2012). This implies that the development of the Ethiopian economy depends heavily upon the rate of agricultural growth. Among the many institutional support services needed to catalyse the development of the sector, agricultural extension services play a critical role. Agricultural extension is now seen as playing a wider role by developing human and social capital and working with farmers towards soil and water conservation (SWC) practices to address the problem of land degradation that has posed a serious threat to the livelihoods of farmers in Ethiopia (Swanson *et al.,* 2012).

This has been achieved through extensive conservation schemes which were launched in Ethiopia including in Amhara Region (one of the nine National Regional States of Ethiopia where the study was conducted), after the famines of the 1970s. These include food for work, cash for work, local level participation, employment generation schemes with participatory demonstration, and extension and training (Mitiku *et al.,* 2006). These approaches are characterized by the use of farmer groups, incentives (such as cash and food) and public campaigns. Despite of these efforts, adoption of SWC practices by farmers in Ethiopia is considerably low. This is frequently attributed, among other things, to the top-down approach in extension delivery, emphasis on standard mainly structural SWC technologies, lack of awareness of the problem of land degradation by the land users and land security issues (EARO, 2012).

While some studies on SWC have been done in Amhara Region (for example Abera, 2013; Shimeles, 2012; and Birru, 2007), few examined factors that influence the effectiveness of the delivery of agricultural extension services. The focus of those studies was on technical aspects

of the land's physical limitations (for example, slope, soil texture and soil depth) and erosion risks. Emphasis was put on the enhancement of technical aspects (protective functions of SWC practices, either conserving the water and the soil or draining the water). In these studies, the needs, social, cultural, organizational, institutional and economic circumstances of the land users and their effect on delivery of agricultural extension services were not adequately considered (Abate, 2011).

Other studies (e.g. Tesfaye, 2003) reported on mechanical and biological factors of the land. Thus, specific areas where previous studies are inconclusive include inadequate knowledge on the state of influencing factors related to institutional arrangements through which SWC agricultural extension services are provided and demanded and limited understanding of the influence of farmers' personal and socio-economic factors. This study, therefore, intended to establish farmers' personal, socio-economic and institutional determinants for guiding effective delivery of agricultural extension services on SWC practices. Extension service delivery is effective when the knowledge acquired by farmers is transferred into practice. Practice is operationalized as the application of this knowledge in the real-life situation (Tsion *et al.,* 2014). Therefore in this study, adoption percentage of key recommended SWC practices was used to measure the effectiveness of delivery of agricultural extension services on SWC practices (Hill and Linehan, 2011).

The establishment of farmers' personal, socio-economic and institutional determinants influencing the delivery of extension services on SWC practices is essential in taking measures to alleviate the constraints to effective application of key recommended SWC practices. Identification of factors that accelerate the effectiveness of delivery of extension services on SWC practices can enhance the formulation and effective dissemination of SWC technologies. In addition, researchers and extension specialists can utilize the results of this study to improve research and extension activities. Moreover, policy makers can benefit from this study since they require micro level information to formulate suitable policies.

Research method

The study areas

This study was conducted in the North Gondar, South Gondar and West Gojam zones of the Western Amhara National Regional State of Ethiopia. Western Amhara Region was selected since it receives relatively higher rainfall and therefore it is supposed to conserve the soil and drain the water. In addition, soil erosion is a more serious concern than water harvesting in the Region (ANRS-BoA, 2012).

Research design

The study adopted a cross-sectional research design, which allows data collection at one point in time. Moreover, the design is suitable for descriptive analysis and for determining the relationships between and among variables.

Population

The study population composed of all farmers who were involved in SWC interventions that were drawn from the selected three zones. The study population also included all Development Agents specialized in natural resource management and/or agricultural extension profession from the same zones.

Sampling procedure and sample size determination

Three out of five Administrative zones found in Western Amhara Region were selected purposively based on their better performance on implementation of SWC practices. One representative district from each zone making a total of three districts was purposively selected based on the level of implementing SWC practices. Three kebeles were randomly selected, using lottery method, from each district making a total of nine kebeles on the basis of giving equal chances. The sampling unit or the basic unit of analysis was the household. Therefore, the lists of the households in the kebele registers were used as sampling frames.

Sample size for this study was determined by using Cochran (1963) formula presented below:

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where:
n = the required sample size
N = the population size = 9235
n0 = sample size for infinite population

$$n = \frac{385}{1+\frac{(385-1)}{9235}} = 383.085 \approx 383 \quad \ldots(2)$$

Thus, a total of 383 households were randomly selected for interview.

Data collection

Data were collected based on the information in Table 1 by using questionnaire survey administered face to face to farmers. Table 1 shows the key recommendations for the farm bund, upgrading and maintenance, and soil fertility management and biological SWC practices. These were obtained from community based participatory watershed development

Table 1: Scores given for the measurement of key recommended SWC practices

	Key recommended SWC practices measurement in cm and scores to be given for the actual measurement at variance with key recommendation			
Type of selected SWC practices	**Key recommendation**	**5 cm at variance with key recommendation**	**10 cm at variance with key recommendation**	**10 cm at variance with key recommendation**
Farm bund*				
Height of the farm bund	60	55 - 65	45 - 54 0r 66 - 75	< 45 or > 75
Scores	2	1	0.5	0
Base width of farm bund	100	95 - 105	85 - 94 or 106 - 115	< 85 or > 115
Scores	2	1	0.5	0
Top width of farm bund	30	25 - 35	15 - 24 or 36 - 45	< 15 or > 45
Scores	2	1	0.5	0
Channel depth of farm bund	50	45 - 55	35 - 44 or 56 - 65	< 35 or > 65
Scores	2	1	0.5	0
Channel width of farm bund	50	45 - 55	35 - 44 or 56 - 65	< 35 or > 65
Scores	2	1	0.5	0
Berm size of farm bund	15 - 20	-	-	-
Scores	2	-	-	-
Sub total	12	5	2.5	0
Upgrading and maintenance				
Repairing breaks or raising the height of bunds	Yes	No		
Sub total	2	0		
Fertility management, or				
Planting legume shrubs, or planting grasses or making and application of compost	Yes 2	No 0		
Sub total	**2**			
Grand total	**16**			

**Farm bund: graded bund, level soil bund and stone-faced soil bund*

Source: Community based participatory watershed development guideline (Lakew *et al.,* 2013)

guideline prepared by the Ethiopian Ministry of Agriculture and Rural Development (Lakew *et al.,* 2013).The researcher guided by the key recommendation checklist of SWC practices checked households' actual performance.

Relevant features of SWC technology were selected in consultation with the concerned subject matter specialists of the Office of Agriculture and Rural Development working at different levels of administrative subdivision of Western Amhara Region of Ethiopia. Then eight suitable questions were framed to invoke responses from the farmers about the selected relevant features. The various items were selected for the SWC practice test and given weights as per their importance (Table 1). So, the test considered farm bunds, upgrading and maintenance, and soil fertility management and biological SWC measures as indicated in Table 1. Farmers were asked to show the actual SWC practices on their farm land and/ or communal land and the interviewer checked for their correct application either by measuring or observing. The results were recorded by the interviewer.

The scoring pattern was two or any score depending on the subjective value judgement of the interviewer for correct practice and 0 score for wrong reply to measure the adoption percentage of the key recommended SWC practices by the farmers (Lakew *et al.,* 2013). The key recommended farm bund SWC practices (Table 1) which include, height, base width, top width, channel depth, channel width and berm size should be measured 60 cm, 100 cm, 30 cm, 50 cm, 50 cm and 15-20 cm, respectively (Lakew *et al.,* 2013).

The key recommended upgrading and maintenance of SWC practices are either repairing breaks or raising the height of bunds. The key recommended soil fertility management and biological SWC practices are planting legume shrubs, or planting grasses, or making and applying compost.

The scoring pattern was 2 score for correct practice and 0 score for wrong reply. The scoring pattern was also either 1 or 0.5 scores based on the extent of deviation of the measurement of actual SWC practice from the key recommended SWC practice. For example, the key recommended depth of channel for farm bund is 50 cm. It was decided to give 2 marks if the measured depth of the farm bund channel is 50 cm. Otherwise; it was decided to give 1 mark for anything between 45-55 cm, but only 0.5 marks if the channel is 35-44 cm, or 56-65 cm (Table 1). Then it was decided to give zero for anything below 35 cm or above 65 cm because these are obviously wrong - too shallow or too deep.

If one had correctly applied all the above eight key recommended SWC practices (Table 1), one would have scored 16 (i.e. 2x8); If one had correctly applied all the six key recommended SWC practices, one would have scored 12 (i.e. 2x6) and If one had correctly applied one key recommended SWC practice, one would have scored 2 (i.e. 2x1). Later these results were evaluated and their total SWC practice scores were calculated. The adoption percentage depends on the summation of numerical values of the correct application of the key recommended SWC practices by the farmer of the total number of key recommended SWC practices (Hill and Linehan, 2011). The minimum and maximum scores obtained were 0% and 100%, respectively. Therefore, the score range was between 0-100% which was used as a valid measurement for regression analysis.

Data analysis

As stated above, the adoption percentage was a summation of numerical values of the correct application of key recommended SWC practices. The scores obtained in different SWC practices were added up and expressed as a percentage of the total scores. Hill and Linehan (2011) mentioned the following procedures used to measure adoption percentages of key recommended SWC practices.

$$Adoption - percentage = {}^{A_i}\!/_{N} * 100$$

Where;

Ai = Number of key recommended SWC practices adopted by ith farmers

N = Total number of key recommended SWC practices

The minimum and maximum scores obtained were 0% and 100%, respectively, therefore the

score range was between 0 - 100% which was used as a valid measurement for regression analysis.

The Statistical Package for Social Sciences (SPSS) computer software was used to analyze the quantitative data. In this analysis, adoption percentage of key recommended SWC practices (dependent variable) was modelled against independent variables (personal, socio-economic, and institutional characteristics of the households) by using a multiple linear regression model.

The multiple linear regression equation was specified as follows:

$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + ... \beta nXn + \varepsilon$

Where:

Y = Effectiveness of the extension service delivery on SWC practices (adoption percentage of key recommended SWC practices)

β0 = constant (intercept)

β = regression coefficients

X = independent or predictor variables (Age, sex, education level, household size, social participation, cosmopolitanism, income, land holding size, household labour, adherence to SWC By-laws, availability of FTC, involvement in SWC extension planning, involvement in SWC extension monitoring and evaluation and contact with the Development Agent)

ε = error term

Qualitative data were used to supplement the quantitative data and were analyzed using content analysis. Data generated through semi-structured and unstructured interviews were subjected to content analysis. Content analysis was used for transcribing information collected from FGDs, KIIs and observations using notebook and tape recorder. Collected information was put into categories (themes) based on questions. The categories were then examined in detail for their relevance and those with similarities merged. The process did help to reduce the volume of tape-recorded information, written text and images.

Results and discussions

Factors influencing effective delivery of extension services (Adoption percentages) on selected SWC practices to farmers

A set of 14 independent variables (six continuous and eight discrete) were included in the multiple linear regression analysis model against a continuous dependent variable as shown in the results in Table 2. These variables were selected on the basis of theoretical explanation and the result of various empirical studies.

According to the results in Table 2, the multiple correlation coefficient measure (R=0.902) indicates that the relationship between application of key recommended SWC practices of farmers and continuous independent variables is quite strong and positive (Table 2). The results from regression analysis show a significant model at R^2=0.814 and significant F value of 0.000. This means that the model is significant and about 81.4% of the variation in adoption percentage of key recommended SWC practices of farmers is explained by the independent variables in the model. Moreover, a high R^2 value means that each of the independent variable significantly correlates with the dependent variable and have relatively low correlations among themselves. However, Table 2 shows that, out of 14 variables entered into the model, only seven of them were found to be significantly influencing farmers' application of key recommended SWC practices at different levels of significance. These variables included social participation, land holding size, sex, cosmopolitanism, adherence to SWC By-laws, availability of FTC and involvement of farmer in monitoring and evaluation.

Note however that, of the significant factors, it is social participation that contributed more to the model (Beta=0.615) followed by land holding size at Beta weights of 0.143. The remaining seven of the fourteen explanatory variables were found to have no significant influence. These findings are in line with Duvel (2007), Habtemariaum and Duvel (2003) who contend that the independent factors influence the adoption behaviour but their influence is not always consistent.

Table 2: Multiple linear regression model to explain factors responsible for the adoption percentages of key recommended SWC practices (n=383)

Variables	Unstandardized Coefficients	Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta		
(Constant)	48.608	2.745		17.707	0.000
Age	0.027	0.050	0.016	0.539	0.590
Social participation	0.431	0.022	0.615***	19.406	0.000
Income	5.505	0.050	0.030	1.134	0.258
Land holding size	-5.553	1.140	-0.143***	-4.873	0.000
Household size	-1.307	0.907	-0.153	-1.440	0.151
Household labour	2.456	1.602	0.161	1.533	0.126
Sex	-1.272	0.683	-0.063*	-1.862	0.063
Cosmopolitanism	1.356	0.532	0.080**	2.549	0.011
Adherence to SWC By-laws	4.536	1.279	0.107***	3.546	0.000
Availability of FTC	3.391	1.152	0.079***	2.943	0.003
Education level	2.143	1.381	0.058	1.552	0.122
Involvement in SWC extension planning	0.665	1.056	0.018	0.629	0.530
Involvement in SWC extension monitoring and evaluation	3.330	1.337	0.093**	2.491	0.013
Contact with the Development Agent	1.272	0.683	0.063	1.862	0.163

*Significant at the 0.1 level
**Significant at the 0.05 level
***Significant at the 0.01 level

$R=0.902$, $R^2=0.814$, Adj. $R^2=0.807$, $F=104.906$ and $P=0.001$

The next sections discuss how these factors contribute to the adoption percentage of key recommended SWC practices.

Social participation of household heads and effectiveness of the delivery of extension services on SWC practices

The output of regression analysis proved that, for every standard deviation unit increase in social participation, the farmer's score on the effectiveness of the extension service delivery index of SWC practices increases by 0.615 standard deviation units. This means that farmers who have some position in different informal and formal institutions or organizations tend to realize the importance and benefits of adopting key recommended SWC practices. It is also easier for them to access and learn the new SWC technologies and programmes. Therefore, they can be more enthusiastic and willing to apply the SWC innovations in their farms, which is in agreement with Rogers (2005).

Land holding size owned by the farmer and effectiveness of delivery of extension services on SWC practices

The output of regression analysis proved that for every standard deviation unit increase in land holding size, the household's score on the effectiveness of the extension service delivery of SWC practices index decreases by 0.143 standard deviation units. The probable reason might be that, the larger land holding

size makes farmers less efficient on their farm land. Therefore, farmers who have relatively larger land holding size will be less inclined to practice improved SWC technologies also because of the physical labour demand. This also implies that households with large size of land holding hardly seek new ideas, information and knowledge than those who have small land holding size. This finding is inline with the findings of Prager and Posthumus (2014) that farmers with smaller size of land holdings adopt recommended technologies more quickly, though not consistent with the Roger's innovation diffusion theory (2005) which states that early adopters of innovations are owners of larger land holdings.

Sex of the household head and effectiveness of delivery of extension services on SWC practices

The output of the regression analysis proved that female farmers would adopt key recommended SWC practices by 0.063 standard deviation units more than male farmers. The probable reason could be that female farmers have no other means to get out of poverty other than adopting the key recommended SWC practices. The other reason could be that male farmers are much more occupied with various other social and economic activities thus leaving SWC activities to female farmers.

This finding contradicts with the idea of (Spielman *et al.,* 2011) that male-headed households are said to have better access to agricultural information than female-headed households, which is attributed to negative influence of cultural norms and traditions. This finding was also not consistent with the Roger's innovation diffusion theory (2005) which states that early adopters of innovations tend to be males.

Farmers' cosmopolitanism and effectiveness of the delivery of extension services on SWC practices

The output of regression analysis proved that cosmopolitan farmers have higher scores for the effectiveness of the extension service delivery on SWC practices (Table 2). This implies that, degree of orientation of the households towards outside the social system to which they belong provides more chance of exposure to external information on SWC activities. This helped to increase the knowledge and skills of farmers and to bring about change in their attitude which finally led them to apply the key recommended SWC practices as supported by Rogers (2003). Farmers may be exposed to external information on SWC activities but access to it depends on their proactivity in exploiting the information.

Farmers' adherence to the SWC By-laws and effectiveness of delivery of extension services on SWC practices

The results in Table 2 show that farmers with adherence to the SWC By-laws would contribute for the effectiveness of the extension service delivery on SWC practices by 0.107 standard deviation units more than farmers without adherence. This was revealed by the increase in the adoption percentage of key recommended SWC practices by the same amount. It can therefore be said that as farmers abide by the SWC By-laws, they would be more responsible and accountable to apply the key recommended SWC practices as also reported by Yami *et al.,* (2012).

Focus group discussions with farmers and key informant interviews with experts in the study area indicated that SWC By-laws in most watersheds were formulated to protect SWC structures and area enclosures. They were also developed to institutionalize the watershed development committees. Therefore, in most cases agreed upon community SWC By-laws were developed and endorsed by kebele council and passed to the next level (district) so as to register as a legal entity and exercise its full authority. But SWC By-laws have limitations on stating the mechanisms of asset maintenance, resource utilization, financial management and promotion of self-help groups.

Availability of FTC and effectiveness of the delivery of extension services on SWC practices Over the past years, the government of Ethiopia has invested substantially in the infrastructure and resources including FTC required to create a strong agricultural extension presence. Since 2002, more than 8489 FTCs have been built at the kebele level (EEPRI, 2013). The centres

are staffed by Development Agents and are responsible for providing extension activities in rural areas. At the kebele level of the FTCs, three Development Agents are posted. Core activities concern livestock, crop production and natural resource management including SWC practices.

It can be seen from the analysis that farmers with availability of FTC would contribute for the effectiveness of the extension service delivery on SWC practices by 0.079 standard deviation units more than farmers without availability. This was revealed by the increase in the adoption percentage of key recommended SWC practices by the same amount. The findings support the idea of establishing FTC by EEPRI (2013) as one way of enhancing effective agricultural extension service delivery.

The key informant interviews with experts show that constraints were observed in the actual infrastructure and resource levels in most FTCs. The lack of operating funds has resulted in poor basic training infrastructure. Moreover, demonstration farms were not improved into learning plots. Many FTCs visited by the researcher had poor learning facilities and inadequate office space for the Development Agent. While majority of the kebeles have allocated 1 to 2.5 hectare of land to each FTC, majority of the FTCs have neither the resources nor the expertise needed to transform this land into an effective teaching and learning tool.

Farmers' involvement in monitoring and evaluation and effectiveness of delivery of extension services on SWC practices

According to the results, the coefficient of model output (Beta = 0.093) indicates that farmers who are involved in SWC extension monitoring and evaluation would contribute to the effectiveness of the extension service delivery on SWC practices by 0.093 standard deviation units more than farmers who are not involved. This was revealed by the increase in the adoption percentage of key recommended SWC practices by the same amount. The probable reason could be that Development Agents and the Watershed Development Committees that involved farmers in the monitoring and evaluation of activities might have encouraged farmers to realize the importance and benefits of adopting key recommended SWC practices.

Conclusions and recommendations

Conclusions

The study has shown that personal, socio-economic and institutional variables of farmers are key factors to the effectiveness of delivery of extension services on SWC practices. However, the existing policy strategies for effectiveness of the delivery of extension services on SWC practices emphasize on the enhancement of technical aspects (protective functions of SWC practices, either conserving the water and the soil or draining the water).

Technical aspects of the SWC practices are important but may not be complete unless personal, socio-economic and institutional circumstances of farmers are considered. There are no policies addressing personal, socio-economic and institutional variables of farmers as a means for effectiveness of delivery of extension services on SWC practices in the study area and Ethiopia at large. There is therefore a need to develop policies and strategies for addressing them in the study area and other areas with similar conditions.

The relationship between farmers' adherence to SWC By-laws and adoption rate of key recommended SWC practices is significant and positive, meaning that as farmers abide by SWC By-laws, they would apply the key recommended SWC practices. This suggests that the disobedience of farmers to SWC By-laws is the result of SWC By-laws limitations that SWC By-laws did not include rules and regulations; they were not registered as a legal entity and were therefore not legally enforceable; and they rarely mentioned the functions and accountabilities of the authorized body that is responsible to enforce the agreed SWC By-laws.

The results also indicate that availability of FTC significantly increases the rate of adoption of the recommended SWC practices. This implies that availability of FTC helped farmers attend method and result demonstrations on SWC practices. These have in turn helped farmers acquire knowledge and skills on SWC practices that might have in turn developed their confidence to apply the key recommended SWC

practices.

The relationship between farmers involvement in monitoring and evaluation and adoption rate of key recommended SWC practices is significant and positive. This implies that the non-involvement of farmers in monitoring and evaluation is a result of; Development Agents inadequate assistance to involve farmers in SWC planning, monitoring and evaluation; inactive stakeholders interaction within their organizational arrangement of monitoring and evaluation; claim of higher level planners that lower level groups have low capacity and lack of resources inventory or database for reliable long term planning; and poor coordination of farmers, Development Agents and the watershed development committees who were supposed to work together, monitor and evaluate the quality of SWC practices.

Social participation and cosmopolitanism are significantly related to adoption rate of key recommended SWC practices can be concluded that cosmopolite and social participant farmers have better knowledge, skills and attitude that resulted in applying the key recommended SWC practices. Therefore, cosmopolite and social participant farmers would contribute for the effectiveness of the extension service delivery on SWC more than farmers who are not.

Recommendations

Taken as a whole, these recommendations represent an interrelated set of actions that can be followed to strengthen the Ethiopian SWC extension system. Detailed recommendations are described below.

Strengthening adherence to SWC By-laws

Although there are efforts and actions to formulate SWC By-laws for protecting the implemented SWC practices, the community is doubtful about the enforcement. Therefore, it is recommended to increase the number of more effective community institutions such as watershed development committee and strengthening their legal entities that are responsible for the enforcement of SWC by-laws beyond the kebele administrative bodies. Agreed upon community SWC By-laws should be developed and endorsed by kebele council and passed to the next step (district) so as to register as a legal entity and exercise its full authority.

The regulations within the SWC By-laws are incomplete therefore it is recommended that the Amhara National Regional State Bureau of Agriculture should facilitate to include, the mechanisms of asset maintenance, resource utilization, financial management, promotion of self-help groups, and the functions and accountabilities of the authorized body that are responsible to enforce the agreed SWC By-laws.

Provision of resources of FTCs

The current resourcing levels of FTCs will need to be strengthened with adequate buildings and demonstration plots as well as the operating capacity of the FTCs to provide farmers demonstrations. It is recommended that the Amhara National Regional State Bureau of Agriculture should improve FTCs by allocating operating funds for training infrastructures, fulfilling the resources and the expertise needed to transform FTCs land into an effective teaching and learning tool, building high standard classroom for farmers' training and arranging significant office space for the Development Agents.

Encouraging involvement of farmers in planning, monitoring and evaluation

The watershed development committee has a significant role in monitoring and evaluating the qualities of implemented SWC practices. It is therefore recommended to the development agents to empower the watershed development committee through training and incorporating rules in the SWC By-laws that could help him to exercise its power.

Monitoring and evaluation of SWC extension services is affected by the procedure followed in planning of SWC extension services. It is therefore recommended to the development agents that planning should be based on initial SWC biophysical reality, farmers need and availability of labour to ensure that farmers are involved in the SWC extension panning. To this effect the lower level groups working at the lower level units should be empowered through capacity building programmes such as fulfilling

them with competent experts and establishing resources inventory or database for reliable long-term planning.

Periodic participatory monitoring and evaluation schedules should be in place to establish post monitoring and evaluation system for the implemented SWC practices in terms of efficiency and effectiveness. Accordingly, there is a need to setup the indicators to measure efficiency and effectiveness and to establish database for long term performance assessment to ensure that farmers are involved in the SWC extension monitoring and evaluation. It is also recommended to establish transparent and accountable system within interacting stakeholders of the organizational arrangement that is involved in the monitoring and evaluation of SWC extension services.

Strengthening SWC based farmers' group organizational arrangement

SWC based farmers' group should be functional and strong including; one to five work teams, development groups, watershed development committees and others for effective involvement of farmers; in the formulation of SWC By-laws, social participation, planning, monitoring and evaluation of SWC practices. Therefore, in order to ensure the effectiveness of the current SWC based farmers' group organizational arrangements, there should be continuous activities to maintain this setup and support them through continuous capacity development activities. Among others, they have to be institutionalized and recognized by the government to be functional; and they have to be accountable and transparent.

Development agents, the Kebele administrative bodies and Amhara National Regional State Bureau of Agriculture should give more attention to the organization of watershed development committee in terms of numbers, capacity developments and logistic requirements. This is because; it is the watershed development committee which will take over the work of SWC practices sustainably when SWC projects terminate. A combination of these measures would serve to promote the effectiveness of delivery of agricultural extension services on SWC practices.

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