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Evaluation of Watershed Development Plan and Technology Adoption Level of Farmers in Amhara Region, The case of SWHISA Project, Ethiopia

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***Abstract*-** Watershed development projects in Ethiopia were very few in number. The institutional strengthening project was implemented by Food and Agricultural Organization (FAO), and was principally aimed at capacity building of agricultural technicians, experts, and development agents in the highland regions of the country. The projects used the sub-watershed as the planning unit and sought the views of local technicians and members of the farming community to prepare land use and capability plans for soil and water conservation. SWHISA Project has been implementing several interventions in the Amhara Regional State. Among others, the watershed development projects conducted in six watersheds located in South Gondar, East Gojjam, South Wollo, North Wollo and North Shewa Zones aimed at improving the biophysical and socio-economic conditions of the area. This study aimed to evaluate the watershed plans of the project and the technology adoption level of farmers. In addition to the biophysical parameters, a total sample of 40 households from each watershed was selected randomly. Generally, a total of 240 (40x6) sample households were considered. The data management and analysis was done using SPSS and Microsoft excel sheet. Accordingly, Sustainable Water Harvesting and Institutional Strengthening in Amhara(SWHISA) project tried to intervene implemented and resulted in significant changes in many of the farmers' problems. Among those plans, which resulted in significant changes, soil and water conservation works are the most effective watershed plan in all the study sites. On the other hand, most of the technologies introduced were highly and moderately adopted by farmers. Regarding sustainability, about 80 % of the sample respondents have explained their willingness to continue practicing SWHISA project interventions even in the absence of the project. From this study, it is possible to conclude that SWHISA project's plan was more or less implemented and adopted. However; the study team also recommends the Identification of potential farming households for capital-intensive technologies, strengthen monitoring and evaluation system, avoid partiality in capacity building management, and reduce dependency syndrome and Stepwise introduction of technologies.

***Index Terms*-** Soil and Water Conservation, Sustainability Technology Adoption, Watershed Development plan Evaluation

I. INTRODUCTION

Land degradation is one of the major causes of low and, in many places, declining agricultural productivity and continuing food insecurity in most parts of Ethiopia. Achieving sustainable pathways out of the downward spiral of land degradation and poverty requires that farmers adopt profitable and sustainable land management practices, or pursue alternative livelihood strategies that are less demanding for land resource. Although there has been a great deal of efforts to address land degradation problems in Ethiopia, reversing the downward spiral was difficult in much of the worst affected areas of the country. Partly, the reason for this has been the promotion of practices and technologies that were not well suited to the conditions facing farmers in their particular location, and hence are not profitable or are excessively risky.

A watershed is a topographically delineated area that is drained by a stream system or commonly defined as an area in which all water drains to a common point. It is a hydrologic unit that has been described and used both as a bio-physical unit and as a socio-economic and socio-political unit for planning and implementing resource management activities. Effective use of land and water is fundamental to growth and sustainable development. The concept of watershed management has evolved to ensure effective use of both natural and social capitals. Thus, the watershed development programmes include land, water and human resources as essential components. The watershed programme is primarily a land based programme, which is increasingly being focused on water, with its main objective being to enhance agricultural productivity through increased in situ moisture conservation and protective irrigation for socio-economic development of rural people (Joshi *et al.*, 2004, 2006).

A large portion of the rain-fed areas in Ethiopia is characterized by low productivity, high risk and uncertainty, low level of technological change and vulnerability to degradation of natural resources (Joshi *et al*, 2004). Over the years, the sustainable use of land and water has received wider attention among policy makers, administrators, scientists and researchers. Governmental, Nongovernmental and Bilateral developmental projects like SWHISA, GIZ, etc. have emphasized sustainable use of water and other natural resources. In this study, attempt has been made to investigate the impacts of development interventions made by SWHISA in six model watersheds on various bio-physical conditions of the watersheds and socio-economic situations of the community. The watershed approach is a system-based approach that facilitates the holistic development of agriculture, forestry and allied activities in the proposed watersheds. It also forms an appropriate unit for analyzing the development-linked resource problems, designing the appropriate solutions of identified problems and eventually testing the efficacy of the measures taken up.

Watershed Development Programmes (WDPs) have been initiated in Ethiopia to improve and sustain productivity and the production potential regions of the country through the adoption of appropriate production and conservation techniques. The WDP approach seeks to improve and develop all types of lands which found within a particular watershed. Development programs, envisaged under its preview include almost every activity which concerns land, water and biomass production. Experiences have shown that watershed as a base is very effective in use and management of land and water resources. With increasing awareness about the problems related to environment, of the watershed approach is becoming popular and moreover in view of their potential for growth, improvement in income levels and augmenting the natural resource base of the country (Singh, 1991).

Watershed management simply means improving the biophysical and socio-economic situation of a watershed or a catchment area, for instance, by building contour bunds, water harvesting structures (check-dams), field bunds (raised edges), supplying drinking water, building health care facilities, etc. Biophysical interventions facilitate higher land productivity through improved moisture and water availability for agriculture. Watersheds transcend households, communities and even villages, and so their sustainable development is critically linked with both inter household and inter village cooperation.

The Ethiopian government has for a long time recognized the serious implications of continuing soil erosion to mitigate environmental degradation and as a result large national programs were implemented in the 1970s and 1980s. However, the efforts of these initiatives were seen to be inadequate in managing the rapid rate of demographic growth within the country, widespread and increasing land degradation, and high risks of low rainfall and drought. Since 1980, the government has supported rural land rehabilitation, these aimed to implement natural resource conservation and development programs in Ethiopia through watershed development (MOARD, 2005).

In Amhara region, watershed management was merely considered as a practice of soil and water conservation. The success stories of early watershed projects were marked as the basis of major watershed initiatives. But only technological approaches were adopted from those early successful projects and the lessons related to institutional arrangements were neglected. The newly implemented projects neither involved nor took effort to organize people to solve the problem collectively. Where village level participation was attempted, they typically involved one or two key persons like village leaders. These projects failed due to their centralized structure, rigid technology and lack of attention to institutional arrangements.

SWHISA Project has been implementing several interventions in the Amhara Regional State. Among others, the watershed development projects conducted in six watersheds located in South Gondar, East Gojjam, South Wollo, North Wollo and North Shewa Zones aimed at improving the biophysical and socio-economic conditions of the area.

Watershed management component is among the major interventions of the technical and financial support SWHISA is rendering to the agricultural sector aiming at contributing to improve the livelihood of the people of Amhara National Regional State. One model watershed development site has been selected in each of the six SWHISA project districts with area coverage ranging from 250 ha to 540 ha.

Based on the nature of the problems identified in each watershed and the analysis made, appropriate recommendations have been given to solve the problems. The major natural resources and social problems which were identified by SWHISA project were: high population, deforestation, soil erosion, shortage of agricultural land, low productivity of the land, food and feed shortages, etc. The types of interventions identified to solve the problems were soil conservation by physical and biological measures such as water percolation structures, hillside terracing, soil bunds, check dams, cut off drain and water ways, area closure, tree and fodder plantation, compost preparation and introduction of high quality forage species, etc. On top of these, establishment of community based monitoring and follow up system and managing information (related to watershed management) by the community itself are also major focus area of the intervention.

The common plan of the project for all watersheds was focusing on the improvement of the natural resource base of the watershed for higher and sustainable productivity of the agricultural, grazing, and forest lands and improving income of the watershed households though the implementation of the later has delayed. This would be achieved through the introduction of activities such as improved variety of crops, natural fertilization (compost preparation), small scale irrigation, soil and water conservation, forestry production, pasture quality and quantity improvement and production, and introduction of cross-bred animals, etc. In addition to this, water resource development for clean water supply, and tree seedling production were also included. On the other hand, capacity building was taken as a plan through experience sharing, demonstration and continuous

training for farmers, kebele administrators, district development agents and other government bodies.

The project's specific and general objectives were stated as follows: The main objective of the project on the model watersheds management was to sustainable use of natural resources (soil, water, flora and fauna) and maintain the fertility of land through the implementation of integrated watershed management approaches. The specific objectives were:

- To increase the productivity of land through rehabilitating the degraded land and improving the water potential of the area.
- Enhance the capacity of farmers, DAs, and district experts and related institutions in the proper planning and management of watersheds.
- To bring about attitudinal change on integrated watershed management through full participation of the community and create sense of ownership of farmers on watershed development by empowering the community in their resources.
- To establish sustainable model watershed development for the area.
- To bring up the introduction of better land management, agronomic practices and introduction of high value crop, etc to ensure a higher income level of the beneficiaries within the model watershed per unit land area. Inclusion of value added activities are considered crucial in SWHISA watershed management plan since it is believed that the most efficient method to ensure sustainability of watershed development activities will be through increase in income from unit land area and additions of income generating activities in the watershed management plan'.

The objectives of this assessment were to:

- Evaluate the appropriateness of the project's strategies, approaches and objectives in terms of development efficiency, impact and sustainability with special reference to improving institutional capacity of community groups including women, partner organizations, in planning, implementing, managing and monitoring development activities
- Evaluatetechnology adoption level of farmers

II. Materials and Methods

Study area

The six model watersheds are found in six different districts namely, Minara (East Belesa), Karitawuha (West Belesa), Maywuha (Goncha), Kuri (Menzmama), Dolequi (Woreilu) and Wurba (Delanta) districts in Amhara National Regional State (Figure 1). Each watershed from each districts are selected by SWHISA experts in close consultation with partner institutions. All watersheds are entirely rain fed; where in Menz Mama, WoreIlu and Delanta have a bimodal rainfall and produce twice in a given year (belg and Meher) while in Goncha, West Belesa and East Belesa, it is a uni-modal rainfall and produce once in a year which are experiencing moisture stress and recurrent drought (Table 1). The model watersheds have many things in common and also differences by a number of biophysical characteristics. The common landform nature of all the watersheds are classified into four major features including flat plain, rolling foot slopes, hills/hill sides and mountain.

As the runoff from the mountains and adjacent foot slopes pass through those landscapes unit, large gullies reaching a depth of 3m and a width of over 5m were formed at several locations.

Regarding the socio economic description, the total population in all watersheds was 6290, of which 3188 were male and 3102 female. The livelihood of farmers in all watersheds depends on mixed farming system. Crop production and livestock are very important source of income for the watershed communities. Land degradation, as a result of high pressure of farmers and cattle population, soil erosion, poor agronomic practices and inappropriate application of organic fertilizers lead to low productivity of crops and animals. Especially, Karita, Maywuha, Minara and Kuri watersheds are severely degraded and yield is becoming less and less year after year. Surface runoff from hills and undulating areas, where land degradation is pronounced, has significantly increased due to clearing of natural vegetations and removal of other physical obstacles. Such high surface runoff has caused erosion of cultivated as well as grazing lands in the lower catchment. These areas were used to be forest land for many years back and their conversion to grazing and cultivated land not only causes loss of fertile topsoil, but also negatively affects the availability of other resources such as potentially available water resources used for livestock and irrigation purposes.

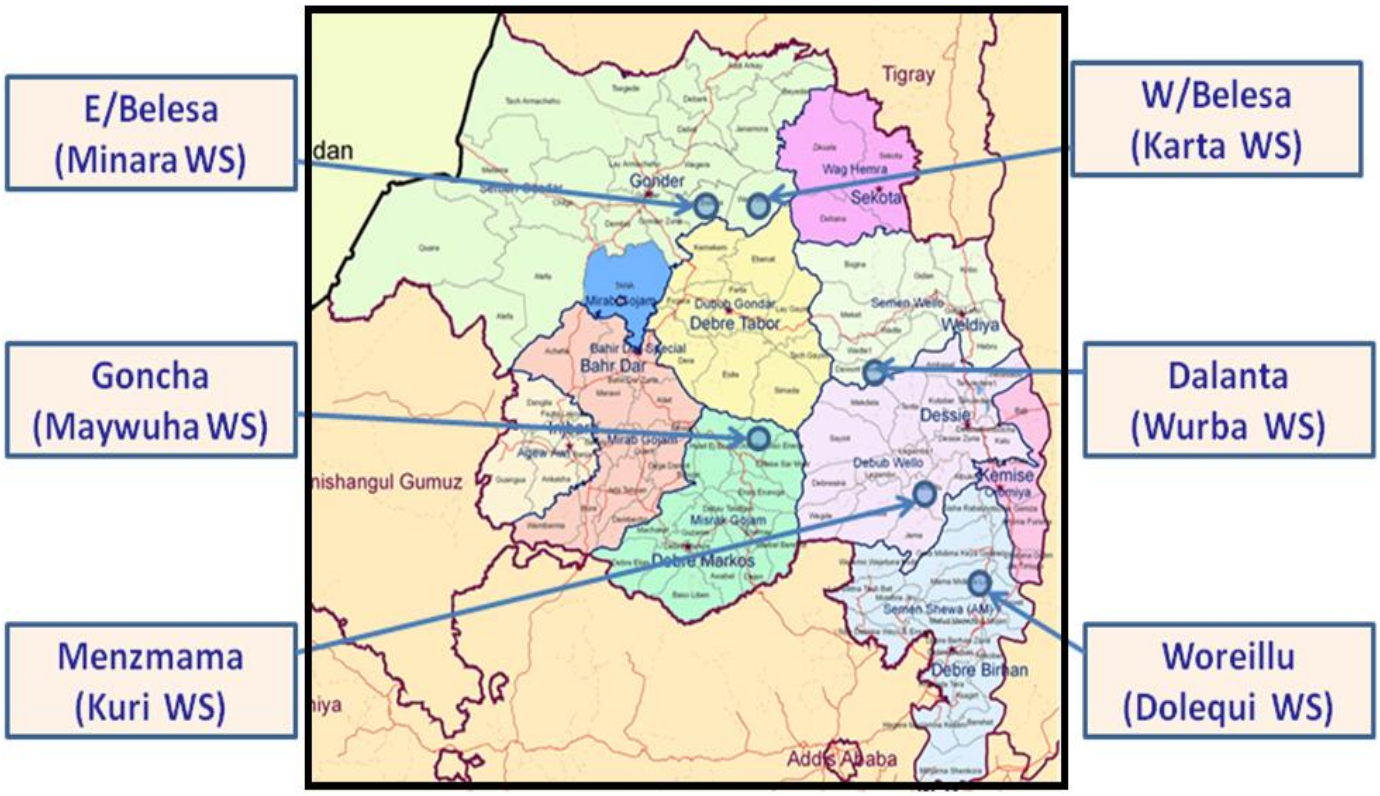

Figure 1: Study areas of the model watersheds

Table 1: Agro-climatic characteristics of the watersheds

Watershed	AltitudinalRange (m.a.s.l.)	Average Min. Temp (^{0}C)	Average Max. Temp (^{0}C)	Rainfall range (mm)	Traditional Agro-ecological classifications
Minara	1700-1900	17	32	780-850	dry woenadega
Karita	1700-1900	16	30	800 – 880	dry woenadega (dry mid-alltitude)
Maywuha	2600- 2700	12	22	1200-1500	Woinadega to Dega (humid highland)
Kuri	3160 - 3260	5.51	19.61	861-1000	Dega to Wurch
Dolequi	2750-2930	15.5	22.5	766 -1250	Dega
Wurba	3000-3545	4.5	16.53	880-1200	Dega to Wurch

Source: District Agricultural Offices, 2011

III. METHODS

Research methodology including detailed impact assessment tools and survey instruments were conducted in six micro watersheds located in six project districts namely; East Belessa, West Belessa, Delanta, Menz Mama, Goncha and Woreillu. Baseline and watershed development plan documents were used as a bench mark for the assessment Sets of indicators comprising both conventional signs of productivity and those relating to less tangible factors such as 'ability to accept initial slow progress were used as plan evaluation criteria in addition to project target indicators. The indicators were:

- Replication to non-project sites,
- Changes in the self-dependence of local groups and communities,
- Changes in gender relations,
- Overall projects plans and technologies acceptance
- Sustainability

A total sample of 40 households from each watershed was selected randomly. Generally, a total of 240 (40x6) sample households were considered. We selected 40 households for better comparison using statistical tests and to minimize the sampling error. By including questions that could describe the past and the present situation in the questionnaire and data sheets (Table 2), the study team could assess the "before and after" cases simultaneously to capture the changes due to the advent of watershed development projects in order to understand the impact of the program. The total sample household number is nearly quarter of the total number of households in the watershed.

Table 2: Category and level of evaluation/assessment

Impact level	Impact description
Implementation of Intervention plan	Comparison of SWHISA's plan before intervention and actual implementation in the project period
Farmers' Adoption level	Utilization of technologies disseminated by the project
Farmers' Evaluation of interventions	The acceptability of technologies disseminated by the project
Experts Evaluation of interventions	The change of the model watersheds farmers response to the level of acceptance and sustainability

The primary data collected using a structured questionnaire has been analyzed using SPSS computer software. The data collected from secondary data and using a reconnaissance survey has been narrated and supplement the quantitative analysis. The analytical statistical methods were descriptive statistics and statistical tests like t-test, chi-square and ANOVA. Moreover, institutional and stakeholder analyses related to the intervention evaluation, sustainability assessment and possible replication of project approach were made to draw policy and institutional recommendations.

IV. RESULTS AND DISCUSSIONS

SWHISA project tried to intervene and resulted in significant changes in many of the farmers' problems. To mention some, soil and water conservation works, such as area closure formation, nursery development, tree plantation, gully treatment, compost making, water harvesting, capacity building, experience sharing, farming tools supply, gender equality and awareness creation are among the major areas of interventions. Forage development, Irrigation developments and production of forage and horticultural crops showed some improvements. The overall intervention strategies which were tried to be implemented showed significant changes in the biophysical as well as socio economic status of the people in all watersheds as stated in Table 3.

Moreover, based on the discussion made with watershed committees, the WDP was so participatory, comprehensive, and attainable. Almost all of the plans were successfully implanted. Those plans were developed after identification of the problems of farmers by the mobilization of the SWHISA project.

The level of adoption of various soil and moisture conservation measures and their follow-up activities by farmers can also be considered as a combined effect of awareness, involvement in the program and contribution. The result indicates that there is a wide variation in the level of adoption. All of the project interventions were not immediately accepted by the local population. Some of the intervention areas were easily adopted and others were adopted after a continuous training and experience sharing programs of the project. The level of adoption in all the watersheds is summarized in Table 4.

Table 3: Evaluation of the project Intervention plan in the WDP

Intervention plan	Minara (E/Belesa)	Karita (W/Belesa	Maywuha (Gonchasiso)	Kuri (Menze	Doleqie (Woreillu)	Wurba (Dalanta
- SWC	✓	✓	✓	✓	✓	✓
- Nursery establishment & forestry development	✓	✓	✓	✓	✓	✓
- Livestock improvement, and forage development	✓	✓	✓	✓	✓	✓
- Agronomic development for improved crop production	✓	✓	✓	✓	✓	✓
- Horticultural crop production	✓	✓	✓	✓	✓	✓
- Preparation & production of energy saving stoves including solar energy and Biogas technology						
- Horticultural crop production	✓	✓	✓	✓	✓	✓
- Water harvesting & small-scale irrigation dev't	✓	✓	✓	✓	✓	✓
- Compost & other natural fertilizers preparation	✓	✓	✓	✓	✓	✓
- Project leadership & management with watershed committee establishment	✓	✓	✓	✓	✓	✓
- Family planning & hygiene improvement						
- Off-farm activities for generating additional incomes	✓	✓	✓	✓	✓	✓
- Home management and health care.	✓	✓	✓	✓	✓	✓
- Apiculture and poultry development	✓	✓	✓	✓	✓	✓
- Infrastructure development				✓		
- Credit Service						
- Capacity building	✓	✓	✓	✓	✓	✓
- Provision of quality farming hand tools	✓	✓	✓	✓	✓	✓

Accordingly, all SWC interventions had high level of adoption except nursery development. Number of respondent's participation and their evaluation on SWC works such as gully treatment, tree plantation, terrace and bundle construction and area closure adoption rate were found to be high. For nursery development management, 66% of respondents participated in SWC works and 60% of the participants had evaluated the SWC works as good and the level of adoption was medium.

Soil fertility management intervention had generally low to medium adoption except compost application (88% of respondents were involved in it and 80% of participants had evaluated it as good. Even though, the number of respondents who practiced green manuring reached 109 out of 240 and medium level adoption category accommodate 100-200 participants out of 240, the assessment team had observed that green manuring technology was not adopted very well and had low level of adoption. Relatively, green manuring had been better practiced in East Belesa. Respondent assessment result showed as 29 out of 40 participants had been involved in the work and 22 out of 40 had evaluated it as good.. In East Gojjam, Maywuha watershed, the adoption level was low only 9 participants out of 40 evaluated it as good. The reason is that the natural soil fertility condition is better and the awareness level of the people in the improvement of the soil condition was limited.

In the area of water harvesting and utilization activities, drinking water construction, irrigation utilization and rain water harvesting were the main activities of intervention SWHISA project has brought in to the model watersheds. Generally, water harvesting and utilization interventions had low level of adoption (Table 4). Specially, rain water harvesting and irrigation utilization interventions had low level of adoption in Maywuha and Doleqi watersheds, only 2 to 5 participants from the sample households were involved.

On the other hand, under the crop production intervention, improved seed utilization, horticulture production, herbicide/pesticide utilization and post harvest technology dissemination have been among the activities to boost crop production development intervention areas. The overall level of adoption of the crop production technologies(which are cultural based and conventional agricultural production system) in the target areas was low except utilization of improved seeds. The utilization of improved seed was moderately adopted in all intervention areas (110 out of 240 participated in this intervention and 93 out of 110 had evaluated the technology as good technology).

In the area of animal production intervention, production of fodder trees, offering training and experience sharing tours were the common activities for the development of animal productivity. Even though, different interventions of increasing agricultural production and productivity have been also practiced by government since many years ago, SWHISA also introduced the above specific interventions that have synergic results on increasing cattle fattening, small ruminant production, apiculture and livestock feed development.

Assessment findings indicated that animal production packages had medium level of adoption except apiculture. Apiculture intervention through the provision of training and facilitation of experience sharing tools, were not adopted very well (38 out of 240 participants and 32 out of 38 supported this idea). The low level of adoption was because of low number of participants, otherwise nearly, 96 % of the participants who were involved in apiculture, liked the technology and had good evaluation of the intervention.

Table 4. Households' participation in SWISHA Intervention

Description of interventions	Participants & evaluation	Minara	Karita	Maywuha	Kuri	Doleqie	Wurba	Total	Adoption Level **
▪ **SWC works**	Households Evaluated	40	40	40	40	40	40	240	High
- Area closure	Households Evaluated	39	38	29	40	39	38	239	
	Evaluation(Good)	39	38	29	40	39	38	223	
- Gully treatment	Households Evaluated	36	40	32	40	39	33	220	High
	Evaluation(Good)	27	34	31	40	37	32	201	
- Terrace, Trench & bundle construction	Households Evaluated	39	39	36	40	37	38	229	High
	Evaluation(Good)	30	34	35	40	36	39	214	
- Nursery dev't&mgt	Households Evaluated	23	23	29	36	18	29	158	Medium
	Evaluation(Good)	19	17	29	35	17	29	146	
- Tree plantation	Households Evaluated	25	29	36	40	37	36	203	High
	Evaluation(Good)	25	29	36	40	37	36	203	
▪ **Soil fertility mgt activities**	Households Evaluated	40	40	40	40	40	40	240	
- Compost application	Households Evaluated	32	38	37	31	36	36	210	High
	Evaluation(Good)	24	33	36	31	34	36	194	
- Manure application	Households Evaluated	35	25	34	24	31	23	172	Medium
	Evaluation(Good)	27	25	33	24	30	23	162	
- Green manuring	Households Evaluated	29	13	9	16	19	23	109	Low*
	Evaluation(Good)	22	13	9	16	19	23	102	
- Agronomic practices	Households Evaluated	30	35	29	33	34	32	193	Medium
	Evaluation(Good)	22	30	29	34	32	31	178	
▪ **Water harvesting and utilization**	Households Evaluated	40	31	37	39	40	40	227	
Drinking water construction	Households Evaluated	36	22	12	18	10	16	114	Low
	Evaluation(Good)	28	20	12	17	8	16	101	
- Irrigation utilization	Households Evaluated	4	7	19	2	6	19	57	Low
	Evaluation(Good)	4	7	19	2	6	19	57	
- Rain water harvesting	Households Evaluated	7	9	1	22	1	10	50	Low
	Evaluation(Good)	3	9	2	19	1	10	44	
▪ **Crop production**	Households Evaluated	40	40	40	39	40	40	239	
- Improved seed utilization	Evaluation(Good)	25	28	21	19	7	10	110	M*
	Households Evaluated	15	27	19	18	5	9	93	
- Horticulture production	Evaluation(Good)	15	15	14	8	6	23	81	Low
	Households Evaluated	8	14	12	8	6	21	69	
- Pesticide /herbicide utilization	Evaluation(Good)	18	23	26	13	2	4	86	Low
	Households Evaluated	13	23	23	12	2	4	77	
- Post harvest technology	Households Evaluated	22	15	14	7	8	13	79	Low
	Evaluation(Good)	13	15	10	7	6	12	63	
▪ **Animal production**	Households Evaluated	40	37	40	39	40	39	235	
- Cattle fattening	Evaluation(Good)	10	6	17	20	8	16	77	Medium *
	Evaluation(Good)	8	6	16	19	8	16	73	
- Small ruminant (Sheep and goat)	Households Evaluated	14	7	13	13	10	27	84	M*

Description of interventions	Participants & evaluation	Minara	Karita	Maywuha	Kuri	Doleqie	Wurba	Total	Adoption Level **
	Evaluation(Good)	10	7	11	14	9	27	78	
- Apiculture (Local/Improved)	Households Evaluated	4	3	9	8	6	8	38	Low
	Evaluation(Good)	2	3	9	6	4	8	32	
- Feed development	Households Evaluated	22	10	13	13	15	27	100	M*
	Evaluation(Good)	18	9	11	13	13	27	91	

Remark * Adoption level modified by physical evaluation
** Based on the physical evaluations and number of participants (High >200; Medium 100 - 200, Low < 100).

On the other hand, the sustainability issues of the watershed plans and technologies are stated as follows. About 80 % of the sample respondents have explained their willingness to continue practicing SWHISA project interventions even in the absence of the project. It was high in Minera (92.5 %) and very low in Maywuha (59 %) (Figure 2). The best performing and managed closed area of Minera and Wurba has also revealed this reality. The main reason for lower willingness to continue for Maywuha model watershed was the complain of the households in the watershed to have food aid by comparing the neighbouring WFP (World Food Program) watershed supported by food aid and the dissatisfaction on the selection of households for experience sharing from the watershed during this assessment.

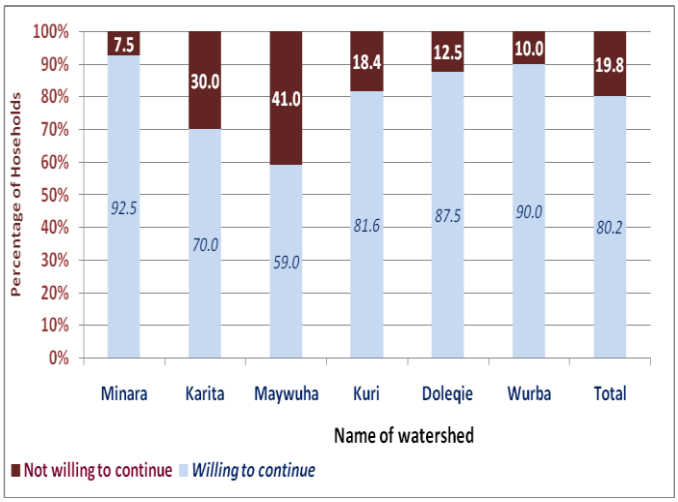

Figure 2: Percentage of households on willingness for interventions implementation in the future.

The general willingness was not consistent for each specific intervention during this assessment. Based on the qualitative evaluation of the sample households respond in individual and group discussions it was possible to classify the different interventions in to three levels based on their potential to be practiced even without support of SWHISA (High, Medium and Low) (Table 5).

Table 5. Future prospect of specific intervention to be practiced in the future

Intervention options	Level of continuity	Remark
- **SWC works**		
- Area closure	Low	Free grazing
- Gully treatment	Medium	
- Terrace & bundle construction	Medium	
- Nursery dev't&mgt	Medium	
- Tree plantation	High	
▪ **Soil fertility mgt activities**		
- Compost application	High	
- Manure application	High	
- Green manuring	Low	Less availability
- Agronomic practices	Medium	
▪ **Water harvesting and utilization**		
- Drinking water construction	Low	
- Irrigation utilization	High	
- Rain water harvesting	Low	High cost of construction
▪ **Crop production**		
- Improved seed utilization	Medium	Cost of seed
- Horticulture production	Medium	
- Pesticide /herbicide utilization	Medium	
▪ **Animal production**		
- Cattle fattening	Medium	
- Small ruminant (Sheep and goat)	Medium	
- Apiculture (Local/Improved)	Medium	
- Feed development	Low	

V. CONCLUSION

From the results of the assessment study it is possible to make the following conclusions. The Watershed Committees had been actively involved in the implementation of watershed programmes in all the watersheds. It was realized that participation of local community members are key to the success of the watershed projects' plan. Participation also enhances community empowerment. The participation of beneficiaries in planning and execution of the watershed was seen in rural households. The study team has tried to weight the achievement of SWHISA project objectives as indicated in the table 6. The project tried to intervene in most of the problems of farmers in all the model watersheds.

Table 6:Evaluation of SWHISA project objectives achievement

SWHISA Objectives	Evaluation
▪ To increase the productivity of land by rehabilitating the degraded land & improving the water potential.	✓
▪ Enhance the capacity of farmers, DAs, & district experts & related institutions in the proper planning & mgt of WSs	✓
▪ To establish sustainable model WS dev't for the area.	✓
▪ To bring up better land management, agronomic practices and introduction of high value crop	✓
▪ To increase the productivity of land through rehabilitating the degraded land	✓
▪ To increase the productivity of land by rehabilitating the degraded land & improving the water potential.	✓
▪ To bring about attitudinal change on integrated watershed management through full participation of the community and create sense of ownership of farmers on watershed development by empowering the community in their resources	✓
▪ To ensure a higher income level of the beneficiaries within the model watershed per unit land area.	Partially Yes
▪ Inclusion of value added activities were considered	Partially Yes

The adoption levels of those interventions were different. Some of the interventions were highly adopted, like SWC works and others took some time such as water harvesting and utilization. Crop and animal production were also medium to low adoption levels based on the respondents response. The study team recommends the following points :Identification of potential farming households for capital intensive technologies, strengthen monitoring and evaluation system, avoid partiality in capacity building management, reduce dependency syndrome, develop a guideline to evaluate the impacts on the hydrology, establish data base system, strengthen experience sharing, create market outlet and increase market success, complementarities with districts, stepwise introduction of technologies, set clear boundary of the watersheds and design staff retention system**.**

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