DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

INTEGRATED WATER SHED MANAGEMENT: CHALLENGES AND PRACTICES IN GORCHE WAREDA, SIDAMA ZONE, SOUTHERN ETHIOPIA.

M.SC THESIS

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This is to certify that the thesis entitled "Integrated Watershed Management: Challenges and Practices in Gorche Woreda, Sidama Zone, Southern Ethiopia" submitted to the school of graduate studies and Department of Geography and Environmental studies in partial fulfillment of the requirements for the degree of Master's in Sustainable Natural Resource Management (SNRM), has been carried out by Asiregid Deribe Teferi, under my supervision. Therefore, I recommend that the student has fulfilled the requirements and hence here can submit the thesis to the graduate school and department for the defense.

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We, the undersigned, members of the Board of Examiners of the final open defense by Asiregid Deribe Teferi have read and evaluated his thesis entitled "Integrated Watershed Management: Challenges and Practices in Gorche Woreda, Sidama Zone, Southern Ethiopia", and examined the candidate's oral presentation. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the degree.

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ACRONYM

CRGE----------Climate Resilient Green Economy

FAO---------- Food of Agricultural Organization

FDRE----------Federal Democratic Republic of Ethiopia

GEF----------Global Environmental Facility

GWARDOR--------Gorche Woreda Agricultural and Rural Development Office Report

HHs ----------House Holds

IWM---------- Integrated Watershed Management

LUP---------- Land Use Planning

MOARD---------- Ministry of Agricultural and Rural Development

MOFED---------- Ministry of Finance and Economic Development

NGOs----------Non-Governmental Organization

PASDEP----------Plan for Accelerated and Sustainable Development to End Poverty

SNRM---------- Sustainable Natural Resource Management

SPSS---------- Statistical Package for Social Science

SSA---------- Sub-Saharan Africa

SWC---------- Soil and Water Conservation

UOEWQP----------Universal Outreach and Extension Water Quality Program

WFP---------- World Food Program

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ABSTRACT

This study was conducted to examine the current status of integrated watershed management in relation to its structure and community participation on watershed development based activities, identify the major challenges, and evaluate its contribution to the livelihood of the rural households in Gorche woreda Sidama zone. The study employed descriptive survey design and followed cross sectional research method encompassing both qualitative and quantitative data. A total of **226** sample respondents were selected through systematic random sampling. The data were analyzed by using simple descriptive statistics such as percentages, frequency, tables and charts. Quantitative data were analyzed through interpretation and conceptual generalization. The findings of this study indicate that the study of watershed faced various social, economic, institutional and implementation problems that hinder the effective performances of watershed interventions and development program of which deforestation, overgrazing, continuous ploughs, less contact between agricultural experts and farmers are the major determinants. Furthermore, poor education status of the respondents and farmers lack awareness of carrying responsibilities is the other challenging factors for the implementation of IWM practices. For that reason, limited training and technical support of agricultural experts or DAs, poor planning and identification of problems, lack of proper follow-up, lack of organization, proper implementation problems, lack of coordination between farmers and DAs, lack of support from NGOs, limited use of proper management techniques for varying landscape, administrative problems and failure of the committee in mobilizing the community are the main institutional and implementation constraints in the study area. Therefore, the Woreda Agricultural and Rural Development Office and every concerned stakeholder should take into consideration the social, economic, institutional and implementation constraints affected the effective functioning of IWM program.

Key terms: Challenges, Practices, Institution, Integrated, Watershed and Management.

CHAPTER ONE: INTRODUCTION

1.1. Background and Justification

The origin of modern watershed management can be traced back to the 19th century. The concept of watershed management has internationally gained significance following the United Nations Conference on Environmental and Development in 1992 in Rio De Janeiro (also known as the Earth Summit) (Forch and Schutt, 2004). Thus, Watershed management implies the judicious use of natural resources such as land, water, biodiversity and biomass in a watershed to obtain optimum production with minimum disturbance to the environment (Binyam and Desale, 2014). It is a holistic approach to managing watershed resources that integrates hydrology, ecology, soils, physical climatology and other sciences (Pandit et al., 2007). However, the approach first achieved prominence in developing countries in the 1970s in programs designed to protect downstream resource and infrastructure through improvements in upland natural resource management (Darghouth et al., 2008).

At the present time, the magnitude of resource degradation and the inability of the fragmented approach to counter it remained two key challenges reinforcing each other. According to Global Environmental Facility (GEF, 2010), land degradation is one of the most severe global problems of our time, which affects 33% of the land surface; with consequences for more than 2.5 billion people. Degradation of resources is caused by the heavy pressure from the human and livestock populations, coupled with many other physical, socio-economic and political factors (Sonneveld, 2002). Thus, scarcity of water and degradation of land are among the most prominent issues of discussion worldwide, concerned with sustainable development (Subh, 2006). Therefore, the twenty-first century is a time by which the world is getting seriously confronted by issues of sustainable use of water and land resources.

In general, watershed degradation resulted in long-term reduction in the quantity and quality of water and land resources, which negatively impact on the livelihoods of rural poor who rely on these resources for their subsistence and livelihoods.

This worldwide depletion of land resources continues to be a serious hazard, particularly, in the least developing countries, where agriculture is the main pillar of their economy (Kertesz, 2009).

The combined effect of low productivity and ecosystem degradation therefore, has locked the poor in a vicious circle of poverty and environmental degradation (Holden et al., 2005). Hence, the conservation and management of land and water resources for sustainable intensification of agriculture and poverty reduction in developing regions has remained one of the most challenging policy issues for a long time (Bekele et al., 2007).

Ethiopia is one of the well-endowed countries in Sub-Saharan Africa (SSA) in terms of natural resources and valuable diversity in the production environment. However, the country has been affected by the interlinked and reinforcing problems of land degradation and extreme Ethiopia is susceptible to recurrent droughts and stagnation of agriculture (Gete, 2006). Generally, natural resource degradation is a major environmental, socio-economic and policy challenge in Ethiopia (Aklilu, 2001). In particular, land degradation in the form of soil erosion and nutrient depletion has been a major constraint for the provision of goods and services from rain fed agricultural watershed levels in Ethiopia.

Thus, Environmental protection movement in Ethiopia began during the monarchy and was intensified during Derg periods and continued since then (Temesgen, 2015). The food – For-Work incentives was provided by international, multilateral and bilateral organizations of which the European Economic Commission, United Nation Development Program (UNDP) and Food and Agricultural Organization (FAO) were the major one (Getachew, 2005). But it was mostly unsatisfactory due to lack of effective community participation, unmanageable planning units and lack of deep study about the watershed. On top of all these, the less emphasis given to the integrated watershed management (IWM) is said to be another responsible factor for the failure (Woldeamlak, 2oo3). This is due to poor integration and coordination, which is either fostered or hindered by a complex set of environmental and socio-economic and institutional factors at various spatial levels.

Recently, the government has designed and implemented a comprehensive sustainable Land Management Project that focuses on a compromise between top-down and bottom-up approaches to watershed management activities (MOFED, 2010). Corresponding to these, the strong nexus between severe land degradation, low agricultural productivity and rural poverty has been a major challenge of rural development. In order to break these inter wined problems, integrated

and sustainable resources management practices are required and planned into farming system development (FDRE, 2011).

In Ethiopia, since 1980s onwards now, watershed management was given attention and being implemented in different parts of the country (Gete, 2006; Tongul and Hobson, 2013).

The southern Nations, Nationalities and Peoples' Region (SNNPR) is one of the nine regional state of Ethiopia located in the south and south-western part of the country with a diverse agro-ecology. Though the region has an immense natural resource basis like forest, land, water, species biodiversity, the rapidly increasing of population and the dependency of community on agriculture for its livelihood has contributed to the fast and vast deterioration and destruction of the natural resource. In a watershed management program due to time and financial limitation, it is difficult to make rehabilitation and soil and water conservation work at one time in all places thus it is important to study the watersheds of the area and make ordering by their risk of erosion (Tripathi et al., 2003).

Therefore, the objective of this study is to present the implications on challenges and practices of integrated watershed management (IWM) activities in Wamole Watershed which is found in Gorche Woreda, Sidama Zone, and Southern Ethiopia.

1.2. Statement of the Problem

In Gorche Woreda continuous and intensive farming on lands above is endangering heavy soil loss, most of these rugged hills and mountains have been intensively cultivated for more than a century in unwise manner. In other words, deforestation, over grazing and poor watershed management has been commonly happenings in the area. Consequently, land resources (soil, grass and forest land) are heavily degraded in many parts of the district.

There is high demand for sustainable conservation of heavy loss of soil, grass and forest land from continuous and intensive farming, deforestation and overgrazing. This needs the introduction of integrated watershed management (IWSM) activities in to the study area. Integrated Watershed Management (IWM) is an approach that uses collective action by a group of people reliant on a watershed area to proactively manage the resources and natural community assets within the area (Farm Africa, 2015). This includes actions to carefully manage the surface

water (rivers, streams, lakes and ponds) and groundwater (shallow and deep wells) within the watershed, as well as mutual agreements on resource use, including the use of surrounding land for agriculture and livestock grazing.

Integrated Watershed management was introduced to Gorche Woreda through different Environmental Conservation projects with help of different government and non-government organization. Integrated watershed management activities were implemented by freely local community participation as well as Food for work participants as a part of their livelihood security, has been performing for more than a decade in parts of the study area. According to Kauri (2013), Watershed approach was implemented to address issues of poverty-and land resource degradation in different parts of the country.

Despite the above mentioned practices of watershed management activities at the study area, there is many challenges at the study area. For instance lack of awareness from the local community, reduced land size, poor planning, poor commitment, socio economic problems, climate change impacts and extreme weather events like drought, flooding etc. are the major challenges of integrated watershed management activities at the study area. Loss of vegetation cover, drought and climate change were recently prevailed environmental problem in south central highland including Sidama Zone. The population in the rural areas is increasing and more food is required to feed this population. On the other hand, the land sizes used by each of the farmers are reducing. These situations forced the farmers to use the land intensively throughout the year that has resulted in soil degradation. Soil degradation in turn encompasses mineral depletion, poor physical (low water retaining capacity) and biological conditions of soil (Tekalign, 2011).

Even though there is different practices and challenges of integrated watershed management activities at the study, there is no any study that was conducted on the challenges and practices of integrated watershed management at Gorche Woreda, Sidama Zone, and Southern Ethiopia. Motivated by the above gap, this study is intended to assess the challenges and practices of integrated watershed management at Gorche Woreda, Sidama Zone Southern Ethiopia.

1.3 OBJECTIVES OF THE STUDY

1.3.1 GENERAL OBJECTIVES

- The general objective of this study is to assess the major challenges and practices of integrated watershed management at Gorche Woreda, Sidama Zone, Southern Ethiopia.

1.3.2. SPECIFIC OBJECTIVES

Specifically the study intends:-

1. To evaluate the practices of integrated watershed management in Wamole watershed at the study area
2. To assess the contributions of integrated watershed management to the livelihood of the rural households at the study area;
3. To Identify the determinant challenges for Integrated Watershed Management practices in the study area

1.4. RESEARCH QUESTION

Based on the stated objective above, the study tried to answer the following research questions:-

1. What is the practicing level of integrated watershed management in Wamole watershed?
2. What are the contributions of integrated watershed management for the livelihood of the rural households?
3. What are the determinant challenges for integrated watershed management practice in the area?

1.5 SIGNIFICANCE OF THE STUDY

The study was carried out for academic purpose and focused on assessing the major challenges and practicing of IWM in Gorche Woreda at Wamole Watershed. The Result of the study hopefully contributes to the identification of major problems and potentials for sustainable IWM by the farmers in the watershed areas under study. It helps developing community based

participatory IWM and to create awareness among the people to use their resources in a sustainable manner.

Therefore, the finding of this study provides possible suggestions on integrated watershed management system at the study area. Moreover, academic community, Woreda's agricultural and rural development officer and stakeholders who are concerned with environmentalist and agricultural experts can use the surveys finding in order to improve the practices of integrate watershed management. In addition it can also serve as a reference for future researches on the subject of integrated watershed management practice.

1.6 DELIMITATION OF THE STUDY

This has considered the challenges and practices of IWM program and its impacts on the intervention practices in case of Wamole Watershed in Gorche Woreda of the Southern Nations, Nationalities and People's Regional states (SNNPRs). It also Examines the extent of community participation in IWM program and its contributions for the livelihood of the rural households; challenges and practices associated with it. Hence, the study has have-spatial specificity and therefore, it is difficult to generalize to other watershed areas. Due to lack of available data, the study did not go further to study the temporal variation of IWM of the study area. It is only delimited in the current or existing situations of challenges and practices of IWM in Wamole watershed.

1.7 LIMITATION OF THE STUDY

The study has attempts to investigating the main challenges and practices of IWM at Wamole watershed level. Focusing on some of the extent of participating the status of integrated watershed management, socio-economic, institutional and implementation constraints pertinent to the whole process of implementation of local fitting IWM arrangement and efforts were made to identify some important factors that the success of IWM. However, the researcher has encountered a number of shortcomings during the course of the study. As the matter of this fact, the selected sample household members may not absolutely represent the characteristics of all farmers in the study area, problem of up-dated address occur during collection of data from the respondents, problem of to get all required information and data due to Coronavirus (COVID-

19), fixing the appointed and meeting the outside Agricultural and rural development staff or officials from previous position and lack of suitable transport access has contributed to the limitation of the study. Even though, all the effort made to alleviate the problems.

1.8 ORGANIZATION OF THE THESIS

This thesis constitutes five chapters. In the first and introductory chapter subtopics that are discussed include; background, statement of the problem, objectives of the study, research question, significance of the study, delimitation of the study and limitation of the study.

The second chapter elaborates the conceptual and empirical literature review related to integrated watershed management.

Chapter three introduces background information about the study area and verifies research design, sources of data, sampling techniques and sample size, methods of data collection tools and methods of data analysis, Followed by chapter four that presents the socio demographic characteristics of the sample household respondent, the result and the major findings of the study presented. Finally chapter five offers conclusion and recommendations

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 THEORETICAL LITERATURE

2.1.1 Watershed management: An overview and history.

Watershed management is dedicated to solving watershed problem on a sustainable basis. Thus, the approach is generally preventive, progressive, corrective and curative. However, watershed restoration and protection management are often a complex web of technical, Legal and economic issues involving numerous stakeholders. For successful implementation of solutions to the physical and economic issues, a broad, representative array of stockholders should be involved (Said et al., 2006). Thus, the ability to address these issues depends on the attributes intrinsic to the watershed and whether they provide sufficient, basis for this innovative approach to watershed management (Chess and Gibson, 2001).

In Ethiopia, watershed management programs commenced in a formal way in the 1970s.From that time up to the late 1990s, implementation was typically a government-led, top-down, incentive based (Food-For-Work) approach that prioritized engineering measures.

During this phase, the programs focused primarily on reducing soil erosion. The purpose was mostly for implementing natural resource conservation and development programs. However, large-scale efforts remained mostly unsatisfactory due to lack of effective community participation, limited sense of responsibility over assets created, and unmanageable planning units (Lakew et al., 2005). As a result the minimum planning at the initial stage involved shifting from larger watersheds to smaller sub- watersheds and these were tested at the plot stage through FAO technical assistance under Ministry of Agricultural and Rural Development (MOARD) during 1988-1991.

Recently, the government has designed and implemented a comprehensive sustainable Land Management Project that focuses on a compromise between top-down and bottom-up approaches to watershed management activities (MOFED, 2010).

There is now a supportive policy and legal framework in the form of policies that facilitate decentralized and participatory development, institutional arrangements that allow and encourage

public agencies at all levels to work together, and an approach to natural resources that reflects local legislations and tuner practices (Gebrehawarya et al., 2016). Several NGOs and bilateral organizations also adopted participatory land use-planning approach in the last decades in their respective areas of intervention and in close collaboration with government partners. For instance, both the German Development Cooperation (GTZ) and SOS Sahel have followed a participatory Land Use-Planning (LUP) approach.

The collective experience comprising different approaches, combined with the need to have a common and standardized more effective approach to the country as a whole, gave birth to the current community-based participatory watershed development was introduced to promote watershed management as a means to achieve broader integrated natural resource management and livelihood improvement objectives with in prevailing agro-ecological and socio-economic environments. In line with its policy objective, the Government of Ethiopia has implemented watershed management activities in different regions and districts.

2.1.2 Approaches of Watershed Management

A. Collaborative Watershed Management

Ideally, collaborative watershed management refers to shared decision-making and implementation by public and private sector partners who share the common goal of conserving or enhancing hydrologic resources (Michaels, 2001). With such a wide variety of land-use patterns across watersheds, it is important that collaborative approaches to water resource management are tailored to local land use planning efforts (Scott et al., 2010).

Out of bio-physical necessity, managing a watershed involves coordinated stewardship of the water body and the land area that the water body drains.

Moreover, collaborative management efforts in each setting can be impacted by different sets of variables, from the level of human capital (e.g. income, education) and social capital (e.g; trust, networks, norms of reciprocity) in watershed communities, to the financial, technical, and human resources made available by government agencies, NGOs, academic units, and local citizens (Scott et al., 2010).

Successful collaborative watershed management programs emphasize active stockholders engagement, employ integrated solutions, recognize the authority of multiple agencies and jurisdictions, and build on expertise and resources across sectors.

B. Holistic Watershed Management

Embraces the idea that all aspects of the watershed: human resources, economic development, environmental quality, infrastructure development and public safety must be considered in a holistic watershed management decision- making process (UOEWQP, 2004). Holistic watershed management is fundamental approach in a facilitated process designed for the integration of organizations and individuals having environmental knowledge, skills and resources in the water quality and comprehensive community planning (UOEWQP, 2004).

C. Integrated watershed management approach

An ‘’Integrated Watershed Management’’ approach should strive to create setting for collaboration and innovation by facilitating dialogue among local stockholders. Overriding charge under the piloting of this approach is fostering a framework for dialogue among stockholders for problem solving examining interdisciplinary solutions that are inherently multi-objective. In order to succeed, IWM must be participatory, adaptive and experimental, integrating all the relevant scientific knowledge/data and user-supplied information regarding the social, economic and environmental processes affecting natural resources at the watershed level (Steiguer et al., 2003). Therefore, IWM program proposes a framework for fostering interdisciplinary on ground implementation activities. Interdisciplinary takes on a meaning of multiple dimensions and scales.

D. Organizational approaches in Watershed Management

With the increase in population water has become a key resource. The result of the development efforts of the countries, demand on the water has been become on maximum level. This situation thread clear water resources and watersheds areas were under the pressure of human activities. So that, many of the international organizations have considered on this problem. In addition to this, they have produced many protection projects to solve water issues such as the World Bank, IFAD, FAO, and IWMI.

2.1.3 Integrated Watershed Management practices in Ethiopia

In Ethiopia watershed management was merely considered as a practice of soil and water conservation. The early 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 village leaders.

The Ethiopian government has for a long time recognized the serious implication of continuing soil erosion to environmental degradation (MOARD, 2005).In response, governments and development agencies have invested substantial resources in promoting soil and water conservation practices as part of efforts to improve environmental conditions and ensure sustainable and increased agricultural production since the 1970s.

While many land use can occur on watersheds, natural resources production and environmental protection are equally important managerial objectives. However, those projects failed due to their centralized structure, rigid technology and lack of attention to institutional arrangement (MOARD, 2005; Berhnu et al., 2009). Regardless of all those efforts, the natural resource base is deteriorating from time to time and becomes major causes for food insecurity and vulnerability (Lakew et al., 2005). Therefore, the institutional strengthening watershed project in Ethiopia was implemented by FAO, and was principally aimed at capacity building of Ministry of Natural Resource's technicians and experts and development agents in the highland regions of the country. This approach was tested at the pilot stage through FAO technical assistance under Ministry of Agriculture (MOA) during 1988-1991 (MOARD, 2005). Several NGOs and bilateral organizations also adopted watershed development in the last decade in their perspectives intervention areas with collaboration of government partners.

For instance the land rehabilitation project, with World Food Program (WFP) Food-For-Work assistance aimed at addressing the problems of food insecurity through the construction of soil conservation structures, community forestry, and rural infrastructure works. The project focused on selected food deficit Watersheds in the country where the incidence of chronic food insecurity is most severe. Following this, studies conducted in different parts of the country came up with different factors that explain the low level of success of conservation activities ranging from the poor performance of the technologies themselves to policy and institutional deficiencies at different levels (Lakew et al., 2005; Berhanu et al., 2009).

The interventions were primarily technology oriented and top-down with limited participation of the beneficiaries in decision making (Berhanu et al., 2009). Such command and control type of policies that have not been linked to the indigenous land conservation knowledge of the farmers as well as their local institutions which have limited the sense of responsibility.

This in turn obliged the technologies to focus narrowly on structural measures to arrest soil erosion only, without fully considering the underlying causes of low soil productivity, socio-economic factors, and the need for tangible benefits to be attractive to poor farmers (Berhanu et al., 2009).

To avoid these problems, the Ethiopian government has been promoted a more holistic and land-escape wide approaches that go beyond resource conservation towards improved land husbandry and water management using a national guideline known as community-based participatory watershed development, where is impact is yet to be seen.

2.2. EMPIRICAL LITERATURE

2.2.1. Challenges of Integrated Watershed Management in Ethiopia

Managing natural resources and controlling the environmental impacts associated with land use change requires an understanding of the underlying cause, which arise out of complex interplay between bio-physical and socio-economic factors (Rasul et al., 2004). The way these interact with each other and the level and extent of participation in management of natural resources in the watershed have an implication on the success/failure of a watershed management program.

Factors such as political environment, property rights, livelihood activities, priorities and needs of beneficiaries, participation of different stockholders in watershed intervention, natural factors, and level of awareness of beneficiaries, indigenous practices in resource management, traditional institutions, and established management arrangement play key role in the success/failure of a certain watershed management program. The challenge for a watershed governance program is, therefore, to get this portfolio of actors work together more effectively (Genskow and Born, 2006).

Generally, the success/failure of a particular watershed management program in Ethiopia depends on several factors, which could be bio-physical, socio-economic and institutional. Putting the major reasons behind failure of most of the watershed management programs in Africa, Achouri, (2005) argued as follows:

‘’Many watershed management programs have failed to achieve their objectives mainly owing to the following reasons: focused too much on natural resource conservation; they were designed in little attention to human activities and priorities and needs of people; they neglected the beneficiaries’ involvement and contribution to the planning and implementation of watershed management intervention; they were frequently limited in span and scope and lacked the long-term commitment needed to address underlying causes and long-term management issues in satisfactory ways’’. Therefore, several challenges were also identified that threaten the success of watershed management in south central zone of Ethiopia. These include the lack of technical advice and information to support the selection of interventions suitable for the local context; uncoordinated interventions, institutions and actors within a watershed; and, importantly, the uneven distribution of the water management costs and benefits (Gebrehawaryat et al., 2016).

As Genen et al., (2015) confirmed some of other important challenges faced in conceptualizing and operationalized IWM are less work on degraded steep lands, farmers are inclined to short-term benefits, negative impacts of incentives, open livestock grazing, limited financial support and low attention to maintenance, inappropriately customized resource use and management, incapable training and mass mobilizations for only 30 consecutive days campaign work were carried out in all intervention areas may influence effectiveness and sustainability of IWM activities as a whole.

2.2.2. Watershed Development and Sustainable livelihood Nexus

Involvement of local people is the core of micro-watershed based resources conservation as (Sharm et al., 1997 as cited in Woldeamlak, 2003) defines IWM as: ‘utilization and conservation of land, water and vegetation resource at farm households and micro-watershed level for continuous improved livelihood and human development.’ The ultimate objectives are thus development at the local level through appropriate use and management of natural resources made by local people at the local level. In other words, IWM acknowledges that individual

farmers or communities as a group are the best manager of the resources because they realize that their dependence on the resources for livelihood is nearly absolute.

Recent evidence are emerging from experience of many countries of the world that IWM generally leads to effective resources conservation and improved rural livelihoods (Woldeamlak, 2003). Until the 1990s, watershed management was viewed as an engineering problem as well as technical solutions for controlling erosion, and reducing runoff and flooding. More recently, watershed management programs sought to embed the local participatory planning processes initiated as part of the participatory watershed initiatives with in broader social and political processes more explicitly. The focus shifted from working directly with local groups on land and water issues to supporting multi-stakeholders negotiation platforms to address a range of issues including but not limited to natural resource management but focused on livelihood sustainability (FAO, 2007).

2.2.3. Livelihood Strategy and Livelihood outcomes

Livelihood strategy is organized sets of lifestyle choice, goals, and values, and activities influenced by biophysical, political/legal, economic, social, cultural and psychological components. Livelihood strategies are strategies, which communities of the watershed households have experienced to lead the life using either farming or non-farming activities (Lakew et al., 2005). It is vital to note that the livelihood strategies of the households influenced by different factors such as social, natural, physical, environmental and economic conditions. This implies that the livelihoods strategies of the households are strongly influence by vulnerability context, the mediating institutions and livelihood assets or capitals too.

The concepts of livelihoods basically looks at peoples' means of gaining a living as a process of accessing various livelihood assets or capitals such as financial, human, social, physical and natural assets through various livelihood strategies (e.g. farming, micro- and small enterprise, etc.) for the purpose of achieving certain livelihood outcomes (e.g. food security, income generation, etc.) (Yeraswork, 2000). Livelihood outcomes are the results of combination of different assets using livelihood strategies. It could be (positive) due to opportunity and undesirable (negative) outcomes due to challenges according to different situations and factors respectively.

2.2.4. Policies and strategies towards natural resources management in Ethiopia

The national economic policies play a great role in fashioning the institutional framework for any given social context. Ethiopia is a signatory to a number of international conventions that have positive implications on the sustainable development efforts of the country through combating desertification and climate change (Cesar and Ekbom, 2013).

The Environmental Policy of Ethiopia was issued in 1997 and this document was the first key document that captured environmental sustainable development principles. Ethiopia has also developed a framework and national strategy towards a green economy, ‘’Climate Resilient Green Economy’’ (Cesar and Ebkom 2013). According to Federal Democratic Republic of Ethiopia, (FDRE, 2011) Ethiopia’s climate-resilient Green Economy (CRGE) strategy is also benefitting from the improvement in the natural environment brought about through IWM. The issue of land degradation is highlighted in Ethiopia’s recently completed Poverty Reduction Strategy known as the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) 2005/2006-2009/2010. The government’s strategy to reverse land degradation and to promote sustainable land management, outlined in the PASDEP, is to address the root causes of degradation by: a) strengthening land tenure security; b) building local capacity in community-based approaches to watershed management; c) scaling-up of successful models for watershed management; and d) strengthening natural resource information management.

Appropriate policy environment is the pre-requisite for being able to implement watershed management processes that satisfy the objectives specified by the interested parties (Brooks et al., 2003). Watershed governance is unlikely to succeed if a supportive policy environment is lacked (FAO, 2007). Based on several years of experience with pilot watershed management projects in Ethiopia, the MOARD published in 2005 the widely accepted community based participatory Watershed Development: A Guideline. These guidelines were supposed to ensure the community based problem identification, planning, implementation and governance of the SWC activities (Tefera and Sterk, 2010). IWM requires an enabling environment (policy, legal and institutional framework) at the national level. Existence of an enabling environment facilitated the IWM piloting process in Ethiopia as the process was owned by government and other stakeholders. Several strategies and policies refer and support the need for development of natural resources, community participation and diversified agriculture. These also includes:

Rural Development Policy and Strategies, Food Security Strategy (2002), New Coalition for Food Security Program, Natural Resources and Environment Policy and Land Administration and Use, Forest Conservation and Development Policies.

2.2.5. Institutional Alternatives for Integrated Watershed Management

Institutions are defined in many different ways. The most widely quoted one is by Douglas North (1990) which, defines institutions as humanly devised constraints, made up of formal constraints(i.e. rules, laws, and constitutions),informal constraints(i.e. norms of behavior, convention, and self-imposed codes conduct) that structure human interactions, and their informant characteristics(Bekele et al., 2007). Putting it in similar way, several scholars, noted that institutions can be either formal (written rules, constitutions, laws and contracts),or informal(customs, sanctions, taboos, traditions and unwritten codes of conduct) rules that regulate access to resources (Heikkila, 2004). They set the ground rules for resource use and establish the incentives, information and compulsions that guide economic outcomes.

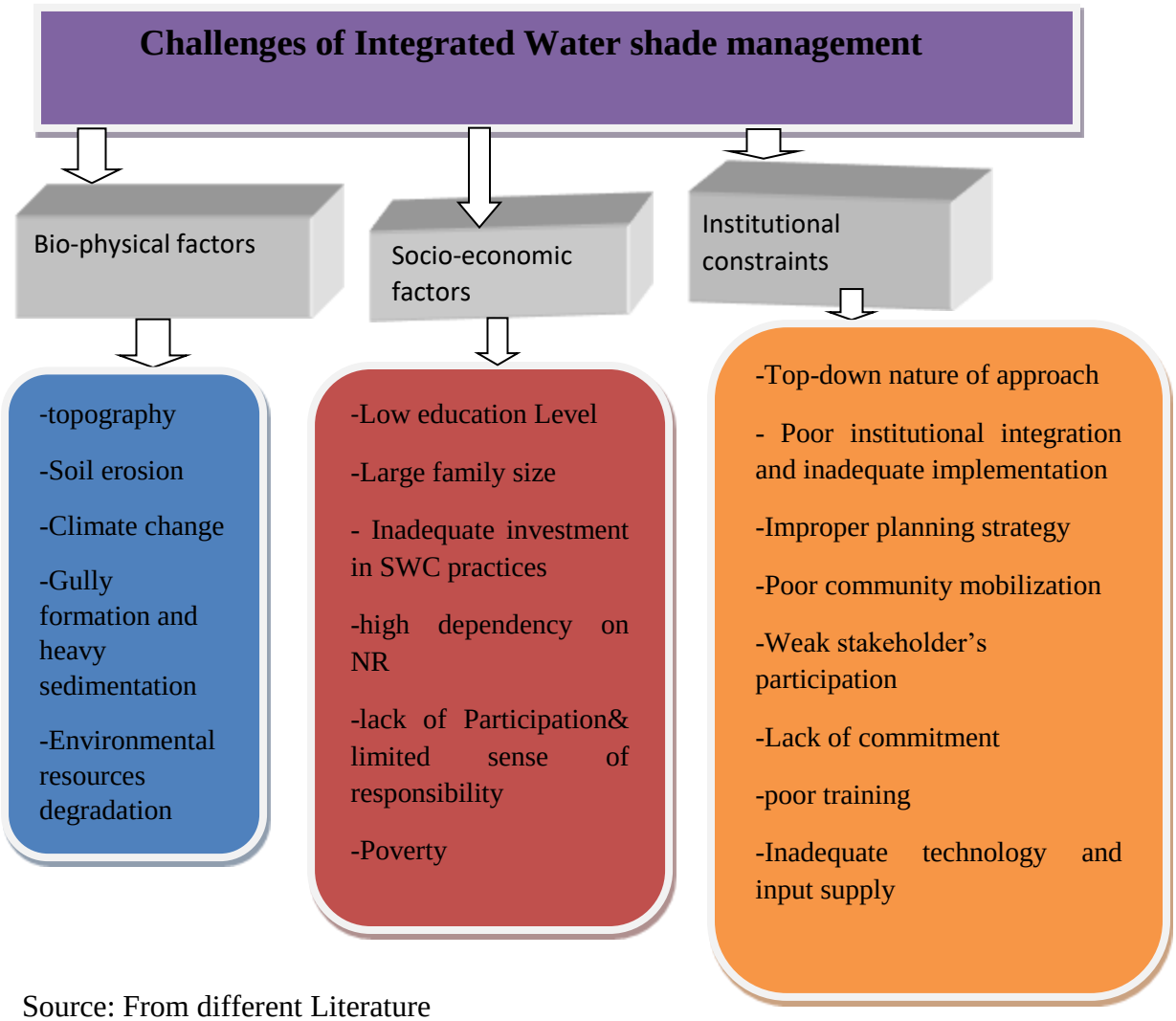
The institutional environment is dynamic and changing: and institutions operate at all levels for the house hold to the international arena and in all spheres from the most private to the most public. Therefore, addressing the challenges of sustainable resource management through water shed based planning and implementation requires innovative institutional alternatives that will help internalize the externalist and deal with the unique co-operation and incentive problems of policy and market failure for private and collective action.

2.2.6. The Role of Traditional Institutions on Integrated Watershed Management in Ethiopia

Recently there has been a strong revival of traditional and indigenous institutions to assume a self-help and development role in rural Ethiopia. Realizing the potential of these community based organizations/institutions such as IDIR, these days, several NGOs have used these organizations for various development activities including agricultural input supply, saving and credit, natural resource conservation, and health care(Bekalu, 1997 as cited by Alemneh, 2003).Further , Alemneh,(2003) recommended that government should make a concerted efforts to support and strengthening indigenous community organizations as they have the potential to be an important vehicle for facilitating community based approach in natural resource management and self-help development activities.

2.3. CONCEPTUAL FRAMEWORK

The main concern of this study is to explore the challenges IWM in relation to bio-physical, socio-economic and institutional factors. In turn how each of them is influencing the implementations of watershed activities or program. The conceptual framework also developed and presented is attempts to illustrate how the implementation of IWM could be interrelated with various factors like (i.e. bio-physical, socio-economic and institutional constraints) and which in turn each are influenced by other factors. To understand the challenges of IWM situation in the study area, the following model marks an attempt to examine the role of bio-physical, socio-economic and institutional factors that affecting the effectiveness and sustainable implementation of IWM activities.

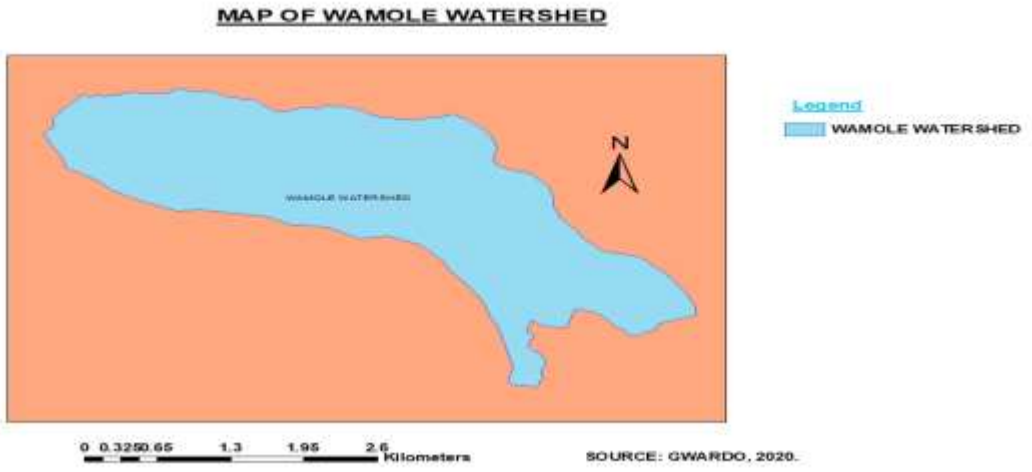


Source: From different Literature

CHAPTER THREE: MATERIALS AND METHODS

3.1. DESCRIPTION OF THE STUDY AREA

Sidama Zone is one of 18 Zones found under south nation, nationalities and people's regional (SNNPRs) state of Ethiopia. Gorche Woreda is one of the woreda founds in Sidama Zone. It is located at a distance of around 46 k.m from the capital city of SNNPRs, Hawassa. According to Gorche Woreda Agriculture and Rural Development office report (GWARDOR) (2019) the total area of the woreda is 193958 hectares and it is bordered in the South by Arbegona Woreda, in the West by Wonsho Woreda, in the North by Shebedino Woreda, in the East by MelgaWoredas. There were around 25861 households (relatively 129305) people in the Woreda who live being clustered in 21Kebeles including urban parts(kebele 01 and 02), Around 120795(93.4%) of the people are living in rural areas depending on crop production and animal rearing and the rest 6.58% (8510) are dwellers in the urban part of the Woreda.



Wamole watershed, found in this Woreda,-has a total land area of 3120 hectares of land. The watershed is bounded by main road in the East, Tishishe River in the West, Kenera kebele in the South and Gamaso Woricho kebele in the North. The watershed consists of three kebeles namely; Murancho Galadela from upper section (catchment), Muracho Gorche from middle section and Gamaso Shenewa from lower section (GWARDOR, 2016). Population in the watershed are 520household heads, among which 193 (37.1 %) are female headed and the remaining 327 (62.8 %) are male headed households. Within the watershed, a total of 2600-

people are living of which 1108or 42.6% are females and 1492 or 57.38% are males. The average family size of HHs was found to be 5 (five) people (See Table 1 below).

Table 1: Population of the watersheds

Household heads				**Total population**			**Average family size**
No	Male	Female	Total	Male	Female	Total	
	327	193	520	1492	1108	2600	5
%	62.8	37.1%	100%	57.38%	42.6%		

Source: Gorche Woreda Agricultural and Rural development office (2019)

Economic activities

Economic activities in the watershed are, like other parts of Zones and Woredas, based on mixed farming (crop/vegetable and livestock).Crops like barley, bean, and wheat. Other cash crops like chat and also vegetables like Inset, cabbage, garlic and onion are the-leading crops grown by the majority of the farmers. Crops and livestock mixed farming systems are the predominant agriculture in Wamole watershed areas. In the watershed area livestock is next to crop production for the livelihood of the farming community.

Topography

The Topography of Gorche Woreda ranges an average of 1500-3200 meter above mean sea level. The Woreda generally characterized high mountain chain from western side of the Woreda bordered with Arbegona Woreda. The chain of this Mountain named as Garamba Mountain which is the highest mountain in Sidama Zone. It is bordered with Arbegona Woreda (Shafamo Kebele), Soka Sonicho, and Asarado Dama kebeles. The height of this mountain reaches up to 3200 meter above mean sea level. The major relief features includes 55%, 25% and 20% of the Woreda is a chained mountain, escarpment, plain land respectively (GWARDO, 2016).

Climate and rainfall distribution

The area has bimodal rainfall pattern that is from March to May and from July to December. With interruption of 3-4 dry months and the later one is the main rainy season, however the truly dry month is only January and February. The mean annual rainfall is 900-1500 mm at a

temperature of 12-21 ^{0}C. Which has an average altitude of 1800-2400 meters above sea level, more than the total area of the study site is covered by mountain and gentle slope area (Gorche Woreda Agriculture and Natural Resource Office Report, 2016).

Soil type

One of the factors that accelerate soil or land degradation is the type of soil, its character, structure and texture**.** In the study area the major dominant type of soil is sandy loam found in most parts of kebeles of the Woreda. It has well drained texture and fertile, because of this it is suitable for agricultural crop production and tree plantation of the area.

Drainage

Most of the rivers found in Gorche Woreda are small rivers. Generally, several rivers in this Woreda are used for irrigation purposes. Most of the rivers are drained from West to Eastern directions because the altitude that are increased from East to Western. All rivers namely, Wamole, Tishishe, Boga, Galasho, Tercha, Garena, and Boa are rivers which drained into different parts with in the boundary of the Woreda. From them, Wamole is the biggest one. The remaining rivers tributes into it and Wamole itself tributes in to Gidawo river (GWARDO, 2016)

3.2 RESEARCH METHODOLOGY

3.2.1 Research Design

The study is basically a descriptive research design which was employing both quantitative and qualitative techniques. Moreover, qualitative method is designed to help researchers understand people, social and cultural contexts with in which they live. Whereas, quantitative methods measure variables on a sample of subjects and express the relationships between variables using effective statistics such as coo- relations, relative frequencies, or percentages. Such a combination of approaches is particularly appropriate for a study of this nature where no particular source of information has the complete picture of what is going on and an understanding of the situation can only be established by putting the information pieces together, similar to completing a Jigsaw puzzle. Therefore, in this study, mixed approach is selected to be appropriate.

3.2.2 Data Sources and Types

To ensure the research reliability and validity, different data sources and types were used. In this case both primary and secondary sources were used to collect data for this study. To achieve the purpose of this study, primary data were collected from the Gorche Woreda Agricultural and Rural development Office (GWARDO) natural resource management experts, sample household respondents, Kebele administrator, DAs and non-participant field observations. While the secondary data were collected from published and unpublished documents, official reports, Books and internet sources for acquiring the necessary sources to supplement primary data.

3.2.3 SAMPLING TECHNIQUES AND SAMPLE SIZE DETERMINATION

SAMPLING TECHNIQUES

Multistage sampling techniques were used for this study. At the first stage, Gorche Woreda was purposively selected from the whole woredas of the Sidama Zone because; the watershed intervention is not strengthened and practiced in this woreda. The researcher used probability and non-probability sampling techniques. In addition, there is no any study conducted concerning integrated watershed management in the woreda.

Moreover, the researcher has been listening local people anger for their productivity becoming decline through a time. The reason behind selecting the study area is also familiarity with the area that the researcher aware of the culture of the people which in turn help -get cooperation from people during data collection. In order to get rich information, the researcher met with GWARDO natural resource protection experts and discussed the issue related to the level of degradation and prevailing land use pressures beyond the actual intervention practices of IWM. After the discussion, among 19 kebeles the researcher was able to get the eagerness of experts purposefully selected to undertake the study at the Wamole watershed in the Woreda level due to more affected than others.

In the second stage, based on the survey field visit that is already been conducted as well as the discussion carried with some of the stakeholders around the study watershed: the study area was stratified into three different strata in order to cover varying topography. The three stratified and selected catchment or section areas includes: - areas belong to Upper, Middle and Lower sections

or catchments. Thirdly, the sample household has been taking proportionally from each stratum catchment areas from the total households in the watershed.

SAMPLE SIZE DETERMINATION

The Woreda in which the study was conducted has 19Kebeles excluding urban kebeles. In these kebeles there are five main watersheds which they used in cluster. These are Tarcha, Kedo, Wamole, Gidabo and Boga watersheds. Each watershed comprises many micro-watersheds. The researcher selected Wamole watershed by using simple random sampling. In the Wamole watershed there were 520 households.

i.e. Upper section (catchment) with a population of 171household head (Male 107 and Female 64), Middle section with a population of 190 household head (Male 119 and Female 71) and Lower section with a population of 159 household head (Male 101 and Female 58).

The sample size was determined to be 226 Households based on Yamane's formula (1967) cited in Robert (2012).

n = N/1+N (e) 2

Where, **n** = sample size

N = Total number of households

e = margin of error set at 5%

Therefore, $n = N/1+ N (e)^2$

$n = 520/1 + 520 (0.05)^2$

$n = 520/1 + 520 (0.0025)$

$n = 520/2.3$

$n = 226$

These 226 participant farmers were selected from the three section of the watershed. I.e. upper, middle and lower section by using probability of proportional to size method (Kothri, 2004)

nh = (Nh/N)n

Where, **nh**= sample size of the stratum

Nh= total household head in each stratum

N= total population (total head of the household in the study area)

n= total sample size of the study

Upper section nh= (171/520)226 = 74

Middle section nh= (190/520)226 = 83

Lower section nh= (159/520)226 = 69

The total sample size was collected to three areas using probability proportional to the size. Finally samples from each respective areas of the watershed were selected using simple random sampling (lottery) methods.

TABLE 2: Sampling frame used to identify sample households and IWM participants

No	Sections	Total number of households			Sampled households			Sampled HHs in %
		M	F	T	M	F	T	
1	Upper section	107	64	171	46	28	74	43.27%
2	Middle section	119	71	190	52	31	83	43.68%
3	Lower section	101	58	159	44	25	69	43.39%
	Total	**327**	**193**	**520**	**142**	**84**	**226**	**100%**

Source: Gorche Woreda agricultural and Rural development office: 2020.

3.2.4 DATA COLLECTION TOOLS

For the sake of accomplishing the desired outcomes, the required data was collected from primary and secondary sources. Thus, the primary sources of data were collected through the following tools;

QUESTIONNAIRE

The household survey using the structured and semi structured questionnaire was the major data collection instrument of the study. The questionnaire involves both open and close- ended questions, for the sake of obtaining and inviting accurate and free responses from the respondents towards the subject of inquiry. The questionnaire was translated into the local language and it was administered by three research assistants.

KEY INFORMANT INTERVIEW (KII)

Both structured and semi structured interview were prepared to collect data from 10 (Ten) key informants at kebele and district level. At the kebele level 6 (Six) watershed committee and 2 (two) kebele leaders were selected through purposive or judgment sampling. Further, at the district level 2 (Two) natural resource conservation experts from Agricultural and rural development Office have been participated in the interview.

FIELD OBSERVATION

Direct observations on the activities and physical environment in the watershed were conducted by the researcher. The purpose is to understand the general environmental conditions of the watershed such as topography, the cropland conditions, pattern of grazing land with its status, as well as how forest status and patterns are set at current times. Moreover, settlement patterns, the main natural resources conservation mechanisms or methods that have been implemented by the local communities and its status with in the watershed also addressed.

FOCUS GROUP DISCUSSION

To make the data more reliable and valid the researcher used focus group discussion (FGD). The main objective of this study is to investigate additional facts that might not be addressed by the survey method. Randomly eight group members conducted association In consultation with Kebeles' Agriculture Developmental officers, FGD participants were selected based on their level of participation, watershed committee leader and modeled experience. Accordingly, a total of three FGDs having 6-8 members were made in the three segments of the watershed.. During the survey the group discussion took 60 to 90 minutes. The open ended questions provide for

discussions between the researcher and the respondents on specific issues where detailed information is needed while the structure questions provide definite answer.

Photo Gallery 1: Investigator interaction with FGD participants, 2020.

DOCUMENT REVIEW

The secondary data was collected from Documents, and reports of Woreda Agricultural and Rural Development office. Other important sources of secondary data such as Books, journals and internet sources were used for acquire the necessary information and to supplement the opinion of the respondents and observation make during field visits.

3.2.5 METHODS OF DATA ANALYSIS

In this research, mixed research methods were used to analyze the data. Various techniques of descriptive statistics were used to address the stated objectives of the study. After data was collected, each questionnaire was tallied, categorized and organized by using a summary sheet. Next to this process, the data was coded, entered and analyzed by using statistical package for social science (SPSS) version 23. Descriptive analytical statistic such as mean, frequency, and percentages were used for quantitative data analysis. Qualitative data was analyzed through interpretation and conceptual generalization. Both quantitative and qualitative data were integrated as necessary and findings of the study were presented through description measure using tables, figures and diagrams. Besides, Maps and photograph were used to supplement qualitative data of the area.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1 DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

The demographic characteristic of the watershed in the study area was analyzed to reveal about social and psychological households under study. As stated earlier the total of 226 sample size households participated in this study. According to the survey result, the demographic feature of the HHs (age, sex, education status, marital status, and family size of the respondent) were shown here under table 3

Table3: Sex, Age, Educational status, and family size, of the HH head respondents

Item	Demographic Description	Category	Frequency	Percent
1	Gender	Male	142	62.8%
		Female	84	37.2%
		Total	**226**	**100%**
2	Age	20 – 34	52	23%
		35 – 49	83	36.7%
		50 – 64	72	31.8%
		65 and above	19	8.4%
		Total	**226**	**100%**
3	Educational Status	Illiterate	105	46.4%
		Elementary (Grade 1-8)	82	36.3%
		High school (Grade 9-12)	29	12.8%
		Collage and above	10	4.4%
		Total	**226**	**100%**
4	Household Family size	1 to 3	29	12.8%
		4 to 6	45	19.9%
		7 to 9	56	24.7%
		10 to 12	34	15%
		13 to 15	62	27.4%
		Total	**226**	**100%**

Source: Field survey by investigator, 2020.

4.1.1 Gender composition of the respondents

Out of the total respondents in the area of selected watershed, the sex composition constitutes **68.8%** and **37.2%** for male and female respondents respectively (see Table 3). This indicates that the majority of HHs in the study area are male and the participants of female headed on watershed management activities. Eleni (2008) also reported that female headed HHs participated in soil and water conservation measures were low due to lack of support from local government body. In addition to this, according to DAs and KIIs during FGD, the participation of female households in IWM activities was low due to most of the time they are busy on home course, lack of awareness about the program, lack of support from the concerned body, culture (trend: they do not raise their idea freely; plus they do not participate different meetings in the Kebele).

4.1.2 Age distribution of the survey respondents

The age composition of sample respondents were classified into four categories based on sociological classification (Table 3). Accordingly, the respondent's age found between 20 - 34, 35- 49, 50 -64 and 65 and above years of ages constitutes **23%, 36.7%, 31.8%** and **8.4%** respectively. Lowest ratio is also observed in the age group above 65 years. The maximum age observed was 75 and the minimum was 20 years old. According to Workneh (2000), labor is an important determinant in peasant food production as most agricultural operation in small farming systems are labor intensive. Thus, it is clear from Table 3 that the majority of the respondents fall in the mid –adult age groups ranging from 20-64. These age groups are relatively productive age having motivation to participate and broader vision the change to the performance of IWM activities. This indicates the more sample households are economically active in the area.

4.1.3 Educational status of the survey respondents

Education enables farmers to tackle watershed problems using various ways of IWM practices, traditional, and introduced soil conservation technologies. Education level also has strong relation to socio-economic status (Catter et al, 2009). According to the data from Table 3 above, the majority of the sample HH heads, (**46.4%)** were illiterate, the rest **36.3%, 12.8%** and **4.4%** were literates in the level of educational hierarchy. Such as elementary (Grade 1-8), high school (Grade 9-12) and Collage and above, respectively. In line with this, CSA, (2011/2012) reported

in Ethiopia 58% of women and 44% of men are illiterate. A similar study has also confirmed that in developing countries like Ethiopia low level of education and high level of illiteracy rate is common (Mathyalu, M, 2013).

Therefore, the KII and survey result indicates that the low level educational backgrounds are found to hold back HHs from implementing IWM practices. For instance, when we compare literate HHs with that of illiterate one, a farmer who is literate one can have better understanding and even can employ modern farm inputs and other newly emerged farm innovations in order to be more productive and ever to be food secured. Generally, the literacy level in the study area is low and this study found that most of the farmers were practicing low techniques of land resource management activities.

4.1.4 Marital status and HHs family size of the respondents

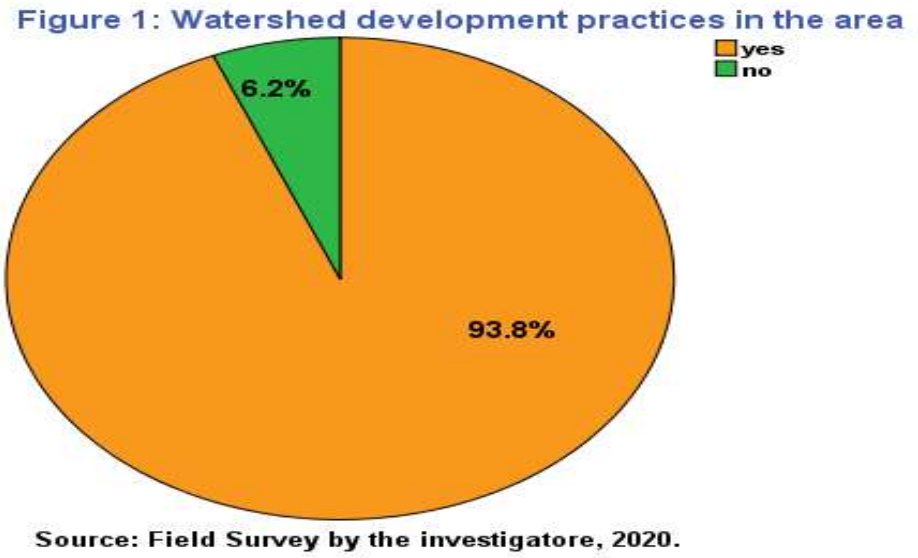
All of household heads in the study area are married. With the respect of HHs family size interviewed in the survey **27.4%** HH heads have had family size of 13 to 15, **15.15%** respondents have had 10 to 12 people and, **24.7%** and **19.9%** of respondents have had 7 to 9 and 4 to 6 people respectively. However, the remaining **12.8%** of the household respondents have only 1 to 3 family sizes (Table 3).The household size also indicates the level of overcrowding, and thus coping capacity in a community. The national average of rural household size is about 4-9 persons (CSA, 2011). Conversely, the result shows that majority of HHs (**67.9%)** out of the total have family size greater than 7 people who have heavy burden to the economic capability of household heads in the area it is possible to say that large household family size means high demand for food and getting farm land. This indicates that the watershed intervention project did not integrated family planning program in the study area.

4.2 STATUS OF INTEGRATED WATERSHED MANAGEMENT (IWM)

Watershed ecology is primarily a human ecology. Still, Ethiopia is one of the sub-Saharan African countries where deforestation, soil degradation and impoverishment of both ground and surface water largely imped socio-economic development (Anteneh, 2010). Thus, participatory watershed development is employed to improve the livelihoods of community in rural areas. So, understanding of watershed stakeholders' views, logic and knowledge is necessary (FAO, 2006).

4.2.1 Farmers response on the IWM practices

The majority (**93.8%)** of survey participants confirmed the realization of watershed development activities in the study area, whereas, the remaining, **6.2%** of the respondents have knowledge gap about the current practices of watershed development in the area (See Figure 1 below). The FGD participants also confirmed this fact. Based on this result, it is possible to say that most farmers have been participating in various activities of watershed development programs in Wamole watershed, Sidama Zone, Southern Ethiopia. Even though, most of the respondents practiced IW, assessing and understanding its sustainability is very important. Amsalu (2006) pointed out that such a comprehensive assessment would be useful to better understand the interrelationships between people and their management of land resources, and for the development of more appropriate and sustainable land use systems.



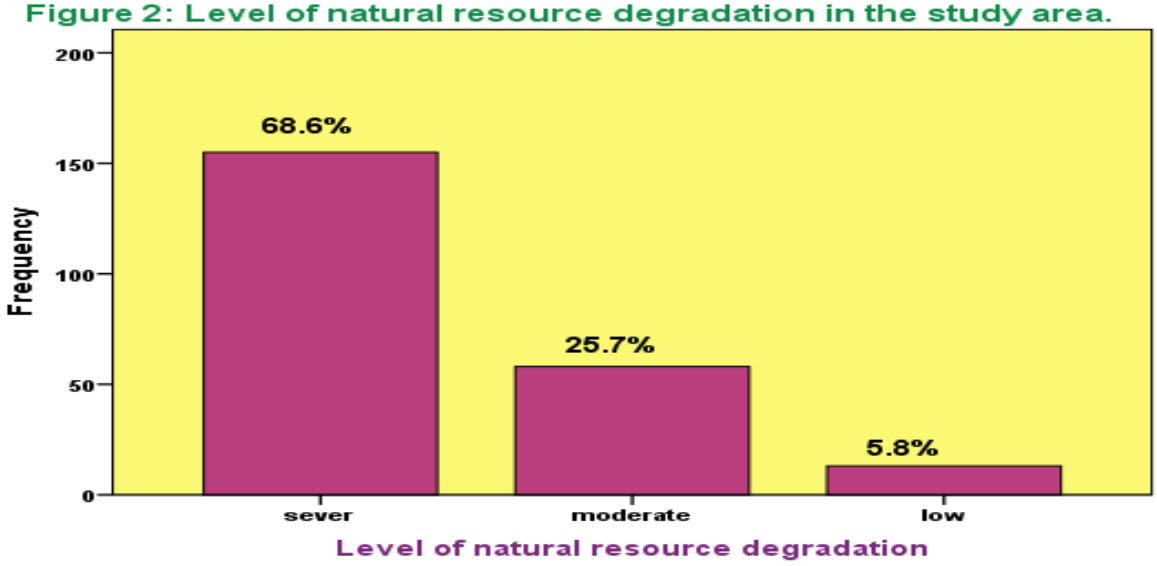
Source: Field Survey by the investigatore, 2020.

4.2.2 Level of natural resources degradation problems in the study area.

The sample respondents were also asked about the level of natural resources (i.e. land, water, forest, etc.) degradation problems. Accordingly, **68.5%, 25.6%** and **5.7%** of respondents said that there is sever, moderate and low level of natural resource degradation problems in Wamole watershed respectively (see Figure 2 below). Evidences collected from the KII, FGD and field observation confirms that unsustainable use of natural resources is also counter affecting the livelihood of rural households. For instance, as deforestation is severally affecting the forest

cover of an area, it resulted in the decline of the water storage of the watershed. Mostly the level of land degradation becomes sever in hill sides of the study areas. Similar study in Ethiopia has also proved that human induced mismanagement of natural resources together with concomitant climate changes is a root cause of soil degradation (Nyssen and Dramis, 2003). Therefore, the finding of this study indicates that the watershed has faced resource degradation problems particularly deforestation, land degradation and soil erosion.

Figure 2: Level of natural resource degradation in the study area.

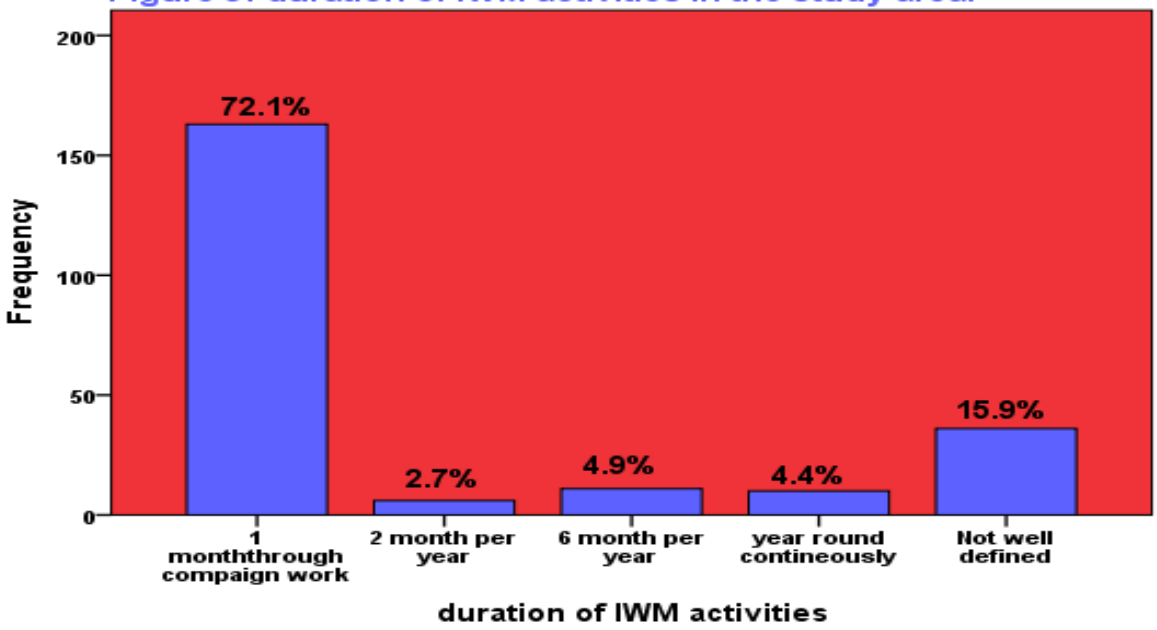


Source: Own Survey, 2020.

4.2.3 Duration of Integrated Watershed Management Activities in the study area.

With regard to IWM activities which are done in the watershed, the majority **(71.6 %)** of HH respondents confirmed that the activities were done for a month in a year through campaign work, whereas, **2.6%, 4.8%** and **4.4%** of the respondents reported two months per year, six months per year, and all the year round, respectively. The rest **16.4%** of respondents were unable to define about the duration of IWM activities in their locality (See Figure 3 Below). According to FGD participants, watershed management activities have been done for one month annually. That was conducted when the local government mobilizes people for campaign work as per the plan or program. Woldeamlak (2003) stated that the less emphasis given to the IWM is said to be another responsible factor for the failure. Therefore, this indicates that limited effort is made for and is impossible to achieve absolute watershed development practices in the area unless the intervention is done continuously and sustainably as long as the problems existing on the ground.

Figure 3: duration of IWM activities in the study area.



Source: Own Survey, 2020.

4.2.4 The role of Farmers participation on the IWM activities and techniques of SWC.

Table 4: The role of Farmers participation on the IWM activities and techniques of SWC;

Item	Watershed issues	Description of response	Frequency	Percent (%)
1	Farmers role in IWM Activities	Planning and problem identification	33	14.6
		Technology selection	42	18.5
		Construction of SWC measures	106	47
		Monitoring and Supervision	25	11
		Evaluating the outcomes of watershed activities	20	8.8
		Total	**226**	**100%**
2	The role of Women in IWM as compared with Men	Very good	21	9.3
		Good	45	20
		No difference	40	17.7
		Limited	120	53
		Total	**226**	**100%**
	Techniques of SWC measures effective for	Traditional	20	8.8
		Modern	60	26.5

3	the area	Both Traditional and Modern	146	64.6
		Total	**226**	**100%**

Source: Field survey by the investigator, 2020.

Table 4 above reveals the role of farmers in watershed activities. About **47%** and **18.5%** of the household respondents said that they participate in construction of SWC measures and technology selection, respectively. Whereas, the rest **14.6%** and **11%** of respondents participated on planning and problem identification, and monitoring and supervision respectively, while only **8.8%** of HH respondents said they evaluated the outcome of IWM activities in the watershed. Similarly, FGD participants during discussion confirms that they were participating in the construction of SWC measures across gullies and hillside of the watershed areas, but not in planning, problem identification, monitoring and evaluating the outcomes of watershed management activities in their localities. The KIIs also stated that watershed intervention areas and activities were selected and planned by the Woreda's agricultural experts and development task force. The result is similar with Zenebe (2005), who stated that farmers' involvement in problem identification, priority setting, planning and implementation of the programs has been minimal. Hence, the result indicates that community participation during area selection and beneficiary interest did not come out through the process of IWM activities.

Women have high sense of protection, saving and market-oriented attitudes that should be encouraged. As it illustrated in Table 4 above, about **9.3%, 20%** and **17.7%** of the respondents, said that the role of women was very good, good and there is no difference between the participation of women and men respectively. But, majority (**53%**) of the respondents believed women's participation was limited more than men during watershed management activities in the study area. KIIs and FGD participants indicates that female-headed HHs often face more labor constraints than male-headed households. In line with this, MOARD (2005) said that women should be given support to increase their participation in watershed development and NRM including productivity intensification measures at homestead level. This indicates that the community participation based on the sex differentiation affected the performances of IWM activities in the area.

Thus, one understands from this finding is that the participation of women in IWM activities like planning, implementation, monitoring and evaluation, training, experiences sharing and so on were low.

From the fact that soil conservation measures have been applied, it is clear that the HHs have sound perception of soil erosion problems and insight into how the problem can be alleviated. In line with effective techniques of SWC measures in the study area, **8.8%** and **26.5%** of HHs respondents said that traditional techniques and modern techniques respectively were effective measures to the watershed areas. However, the majority (**64.6%**) of the respondents said that both traditional and modern techniques of SWC measures were effective in the study area (See Table 4 above). In support of the above statement, Aklilu (2001) stated that farmers' decision to conserve natural resources in general and SWC in particular is largely determined by their knowledge of the problems and perceived benefit of conservation.

According to the data obtained from FGD and field observation, some farmers perceived the effectiveness of traditional SWC techniques as preferred methods controlling erosion. While others also signify traditional SWC practices are more effective when used in combination with modern techniques.

4.2.5 Soil and Water Conservation Techniques applied on private (Farmer's) land

Watershed management projects aims to achieve productivity and sustainable development by using SWC techniques (through construction of bunds, gabion, terracing, cut-off drainage and gully control, etc). Land to increased rain fed crop yield and greater ground recharge. As well as for environmental conservation, this also focused on reducing the degradation of natural resources (FAO, 2006).

Table 5: Natural Resource Conservation Techniques.

No	Types of conservation techniques	Frequency	Percent	Valid Percent	Cumulative Percent
1	Tree plantation	20	8.8	8.8	8.8
2	Contour plowing	117	51.8	51.8	60.6
3	Terracing	36	15.9	15.9	76.5

4	Gully control	15	6.6	6.6	83.2
5	Gabion construction	12	5.3	5.3	88.5
6	Cut-off drainage	20	8.8	8.8	97.3
7	Grass strip	6	2.7	2.7	100.0
	Total	226	100.0	100.0	

Source: Field survey by the investigator, 2020.

As can be seen in Table 5 above, **51.8%** and **15.9%** of the farm respondents replied that the conservation techniques applied on their land for controlling soil degradation were contour plowing, Terracing and gully control methods, respectively. In line with this, Eleni (2008) stated that big gullies associated with the establishment of the conservation structures, especially between the boundaries farms plot, were commonly observed in different parts of Ethiopia. The result showed the contribution of these conservation techniques in the study area is medium. The contribution of other techniques, For instance, tree plantation, gabion construction, cut-off drainage and grass strip practices of the households on their land is still very low.

In order to overcome the problem, different gully stabilization measures are currently taking place in the study area. Participants in the KIIs and FGD suggested that reforestation and afforestation were applied through the provision of informal training by DAs and agricultural experts. However, the HHs were frequently cutting down trees rather than planting of trees in the study area that leads to soil degradation. Besides, the field observation witnessed construction of gabion and tracing works by community is going on for controlling soil degradation problem in Wamole watershed. This enables to reduce soil degradation even if the problem could not be completely resolved.

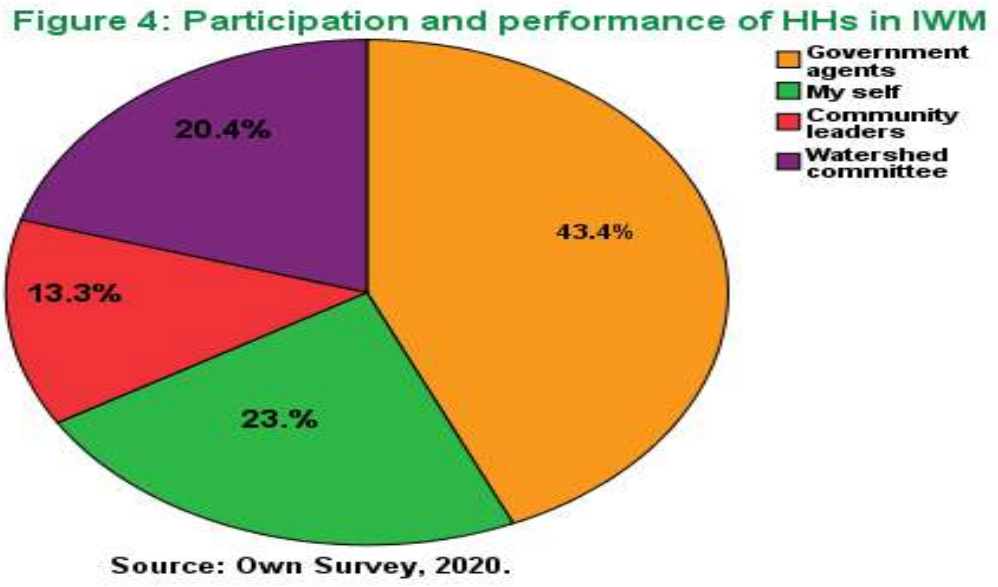
Photo Gallery 3: WSC techniques in the study area.

As it was observed during transect walks, most gullies were formed along the border and outside farm plots. According to the response of DAs (KIIs), improved cut-off drains are similar to the traditional cut-off drains in terms of function but they differ in ways of construction and maintenance. Grass strip are the least coast and least labor-demanding SWC structures. To sum up, all the stated controlling mechanism were on going but they were not properly employed and maintained by the households in the study area. Few HHs contribute their effort to control soil degradation problem, yet the problem still exists despite slight reduction. Hence, it is concludes that there is high rate of soil erosion, which require more IWM practices in Wamole watershed in Gorche Woreda, Southern Ethiopia.

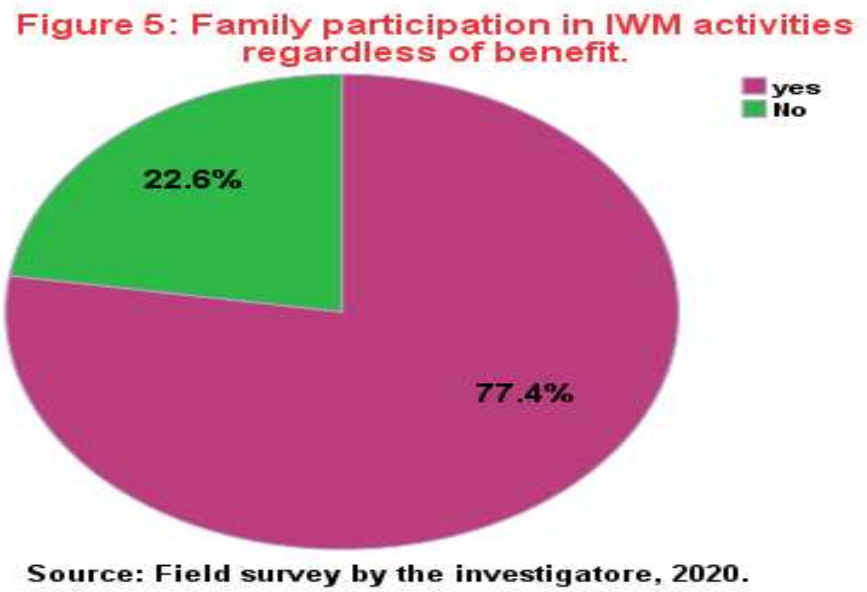
4.2.6 Participation and Performance of Households in IWM

Photo Gallery 2: Participation of HHs in Integrated watershed

As can be seen from figure 4bellow, **23%** of respondents replied that the decision on the participation of watershed activities was made by them while **20.3%** and **13.3%** said it was made by watershed committee in meeting and community leaders respectively. The remaining, **43.4%** of HHs respondents stated individual's participation on watershed management was decided by the government management. Participants in FGD and KIIs also confirmed that individual's participation in watershed management activities is decided by the district developmental force, which was a common phenomenon each year when the local governments mobilized peoples for campaign work according to the pre-planned program. In line with this, Alemneh (2003) reported that one of the problem with SWC program was they were designed in little attention to human activities and priorities and needs of people. Thus, the study result indicates a decision made by government agents is a top-down watershed approach which puts its sustainability in question.



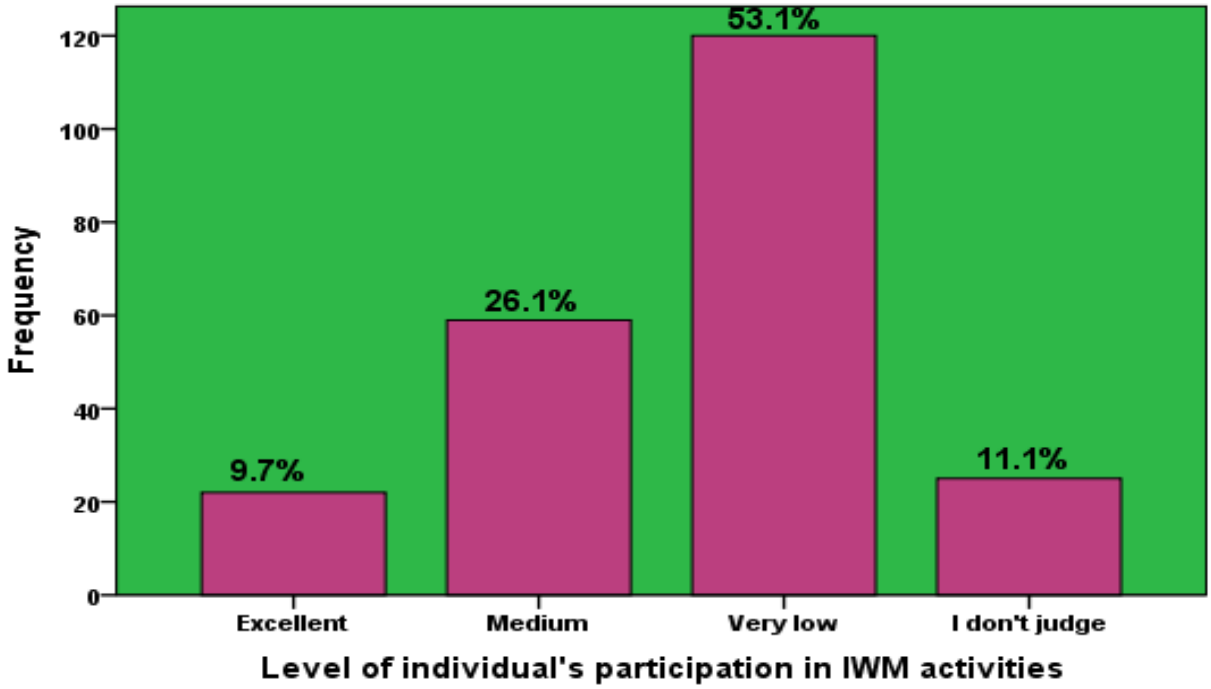
The extent of success/failure of watershed management is determined by the extent of people's participation with in the watershed boundaries. Accordingly, as it is seen in figure 5 bellow, about **77.4%** of the respondents indicated that they participated in activities of IWM without taking any aid of food or cash, while the remaining **22.6%** of the household participants did not participate. Information gathered from KII and FGD also confirms this fact.



Source: Field survey by the investigatore, 2020.

According to Johnson (2011), participation implies that stakeholders work together to set criteria for sustainable integrated watershed managements, identify priorities, constraints, evaluate possible solutions, recommend technologies and policies and monitor and evaluate impacts. Regarding the level of participation in IWM activities, **9.7%, 26.1%** and **53.1%** of the farm respondents judged that their participation was excellent, medium and very low respectively. The remaining **11.1%** of them indicated that they could not judge their level of participation in the IWM activities (Figure 6 below).

Figure 6: Level of individual's participation in IWM activities in the study area.

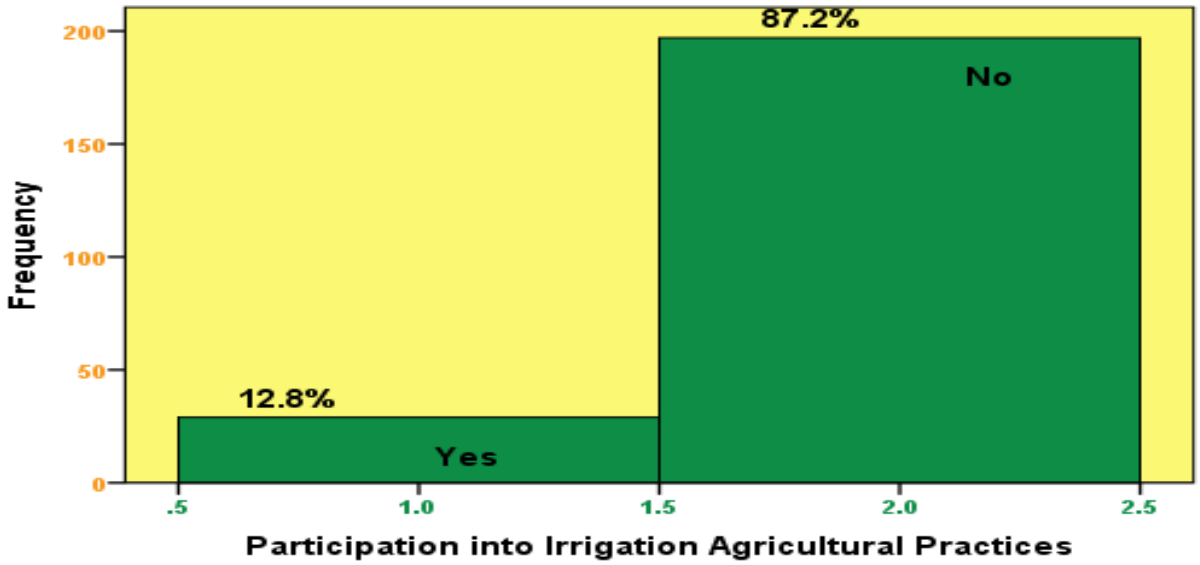


Source: Own Survey, 2020.

Generally, in crop production, irrigation is the pillar particularly in drought prone areas as a result of the intervention of integrated watershed development program. When we see figure: 7 below, out of **226** only **12.8%** of the household respondents were able to practice irrigation agriculture to supplement their livelihood income. Whereas, the majority, **87.2%** of respondents were not practicing in irrigation agriculture in the watershed due to some reasons. According to Teketel (2009), the big challenge to the implementers during very first steps of planning was to get farmer's acceptance of the whole ideas of intervention.

The result indicates that the watershed intervention project does not realize equal share of available water resources among beneficiaries of the watershed in habitants.

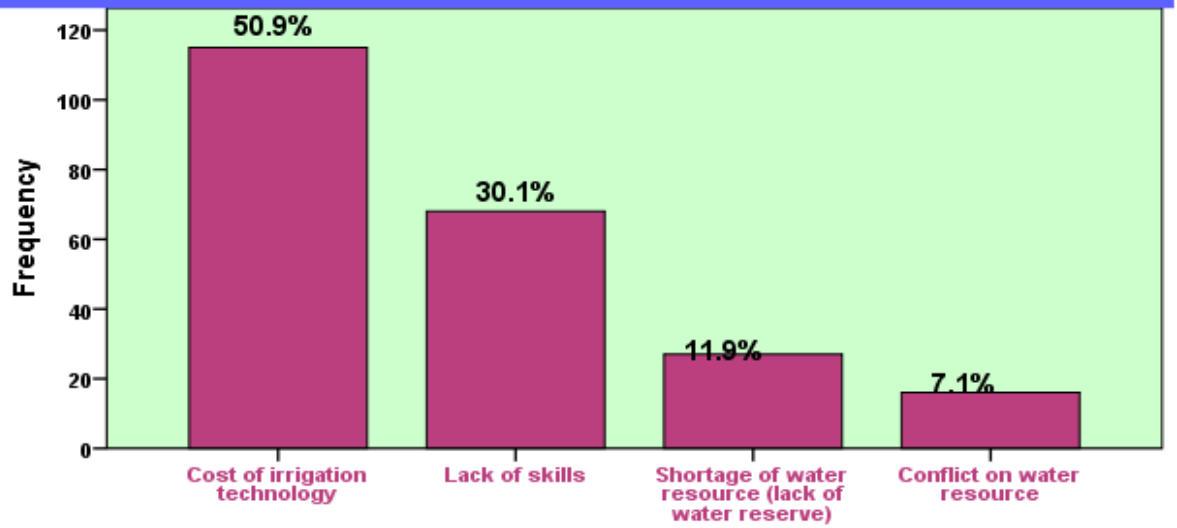
Figure 7: Participation into irrigation agricultural practices in the study area.



Source: Own Survey, 2020.

Different reasons were given by sample respondents who do not use irrigation agriculture. In this case, **50.9%** of respondents mentioned the cost of irrigation technologies, **30.1%** stated lack of skills and efficient training, **11, 9%** of them reason out shortage of access to water resources and the rest 7**.1%** said the occurrence of conflict in water resource among the inhabitants. Accordingly, Guerin (2001), stated that to achieve sustainable development, sustainable technologies need to be developed, transferred and adopted. Participation of the FGD and KII also indicated that the costs of irrigation technologies (like water pump, construction of water channels, etc.), poor training and low skill development of irrigation scheme together with fluctuation in river water volume hinder farmers from the use of irrigation agriculture in the study area. In addition, poor irrigation system, less access to input and land shortages were mentioned as additional problems contributing for less irrigation agricultural practices and productivity in the area. Therefore, the finding showed that the intervention does not bring expected changes in improving crop production and productivity as well as change in the household's livelihood income source due to poor irrigation practices in the area.

Figure 8: Reasons were by the sample respondents who do not use irrigation agriculture at the study area.

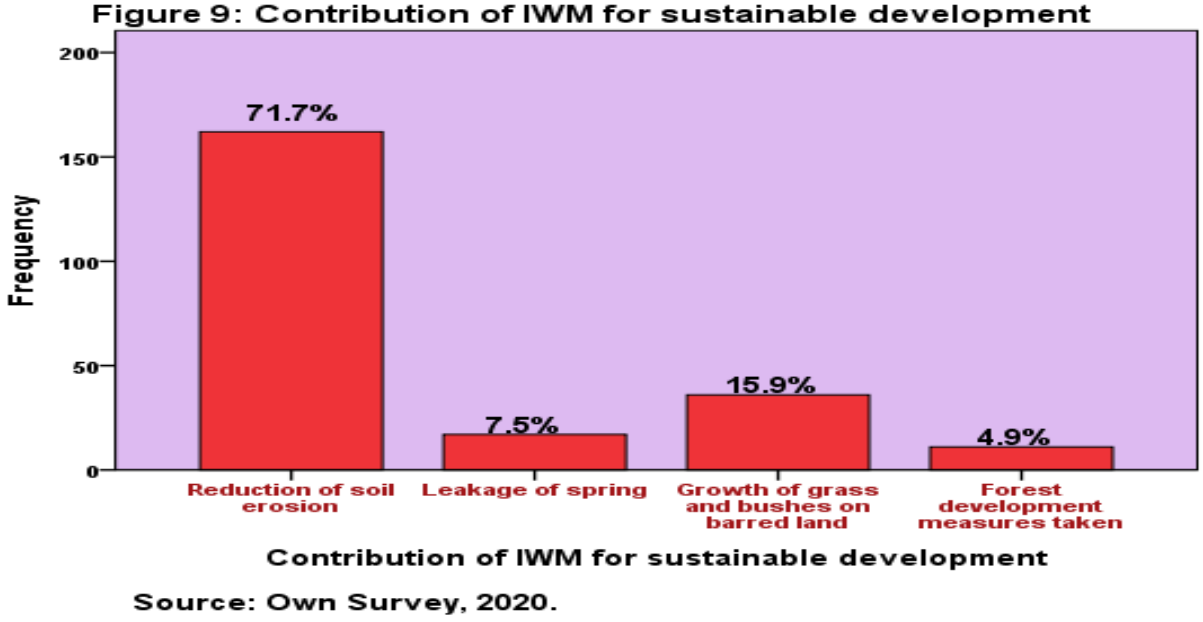


Source: Own Survey, 2020.

4.3 Contribution of IWM for the Livelihood.

A farming system is a natural resource management unit operated by a farm HHs includes the entire ranges of economic activities of the family members (on-farm, off-farm agricultural as well as off-farm non-agricultural activities) to ensure their physical survival as well as their social and economic wellbeing (Conway,2010). Improving the livelihood of the watershed inhabitants is one of activities that the watershed project addresses through their implementation program. Owning to the pivotal role of human population in watershed health and balance, local livelihoods are major issues in sustainable watershed management (FAO, 2007).

Figure 9: Contribution of IWM for sustainable development



Source: Own Survey, 2020.

Figure: 9 above, from **226** total respondents, the majority (**71.7%)** said that IWM program could contributes to reduce soil erosion. In the same, **15.9%** of the respondents confirmed that it was useful for the growth of grass and increase of bushes on bare land, where as **7.5%** and **4.9%** of the respondents said the implementation of IWM activities were good for the development of spring and forest development respectively. In addition to this, the information which was obtained from FGD shows that some farmers play their own role on IWM activities which provides little improvement in agricultural productivity and environmental protection, but the problem was still not adequately alleviated from the area. The study result is similar with Bekele et al. (2004) who stated that unlike short duration agricultural technologies (e.g. new varieties); resource improving IWM interventions required a relatively longer planning horizon.

Table 6: Contribution of IWM to change witnessed on the livelihood in the study area.

No	Reasons	Frequency	Percent	Valid Percent	Cumulative Percent
1	Improvement of family food supply	61	27.0	27.0	27.0
2	Increase productivity	67	29.6	29.6	56.6
3	Use of modern agricultural technologies	30	13.3	13.3	69.9
4	Involvement in irrigation agriculture	22	9.7	9.7	79.6
5	Enhancing of drought resisting capacity	46	20.4	20.4	100.0
	Total	226	100.0	100.0	

Source: Own Survey, 2020.

Table 6: above shows the result of the study about changes observed on the livelihood of watershed communities due to the intervention of IWM practices. Accordingly**, 27%** and **29.6%** of respondents said that watershed intervention provide a great contribution for the improvement of family food supply and increase productivity respectively, while **20.4%** and **13.3%** said for enhancing of drought resisting capacity and use of modern agricultural technologies respectively. The remaining, **9.7%** of the total sample respondents said that they involved in irrigation agriculture. However, the participants of FGD and KIIs said that the poor also faced financial and socio-economic constraints. Therefore, these factors also seriously hindered improved land management practices, use of modern agricultural technologies and involvement in agriculture, which lower the productivity and income of the poor.

According to Reta (2010), non-agricultural activities have significant importance in rural setting and particular option for agricultural landless farmers. As far as, information obtained through KII and field observation is concerned some youth people in the area have not yet participated in any of agro-economic activities, which help them to generate their own income in watershed area. As a result, this indicates that the involvement of landless farming communities in exercising non-agricultural income generating activities was very low. The participants of FGD also confirmed this fact.

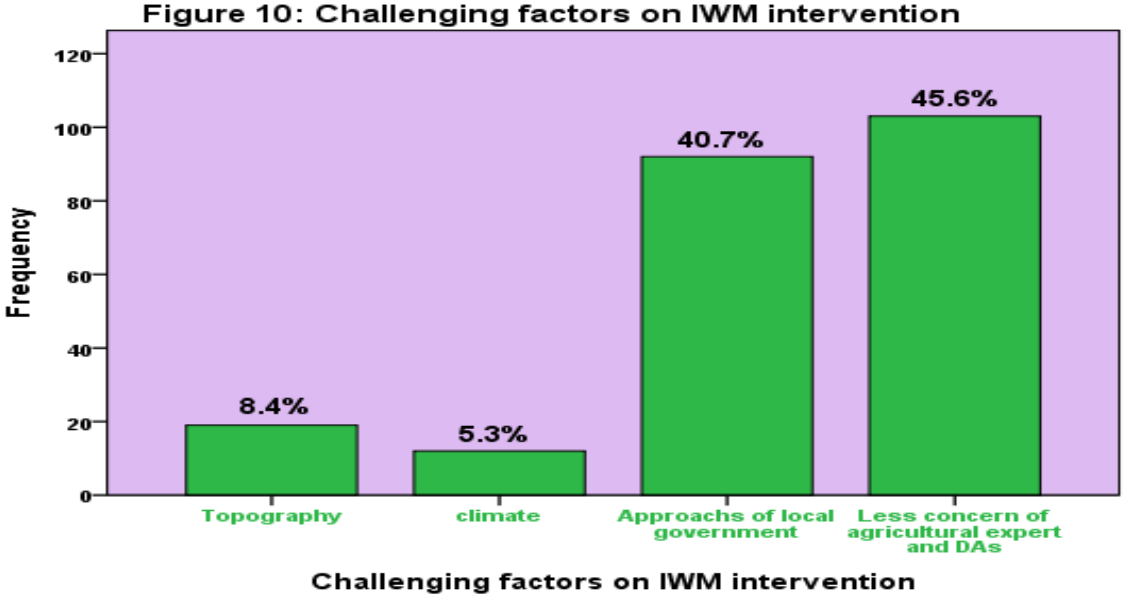
4.4 CHALLENGES OF INTEGRATED WATERSHED MANAGEMENT

The main prerequisite for attaining sustainable watershed management is the formulation of appropriate resource management policies, which are supported by the farming communities, and to which they are willing and able to respond. However, poor IWM practices seem to be responsible for land degradation and complicated implementation problems. The integrated process of land degradation and increased poverty has been referred to be the ‘’downhill of spiral of unsustainability’’ leading to the ‘’poverty trap’’ (Greenland et al. 2009).

4.4.1 Challenging Factors on IWM intervention

Regarding factors influencing IWM in the watershed areas, about **8.4%** of HHs respondents said that topography 9of the study area is influencing watershed activities, which about **5.3%** of them indicated that the effect of climate was taken as a challenging factor on implementing integrated watershed activities. However, about **46.9%** and **40.7%** of HHs said that the approach of local government and less concerns of agricultural experts DAs, respectively, have been major challenge for the implementation of IWM in the area (Figure 10 below). According to Achouri (2005), one of the major reasons behind failure of most watershed management in Africa is ignorance of the beneficiaries’ involvement and contribution to the planning and implementation intervention. The information obtained from the FGD supports this finding. That is, evidence of FGD indicated that, beyond the topography and climatic problem in the area, the approach of local government and less concern of agricultural experts as well as DAs was a key challenging factors for IWM program.

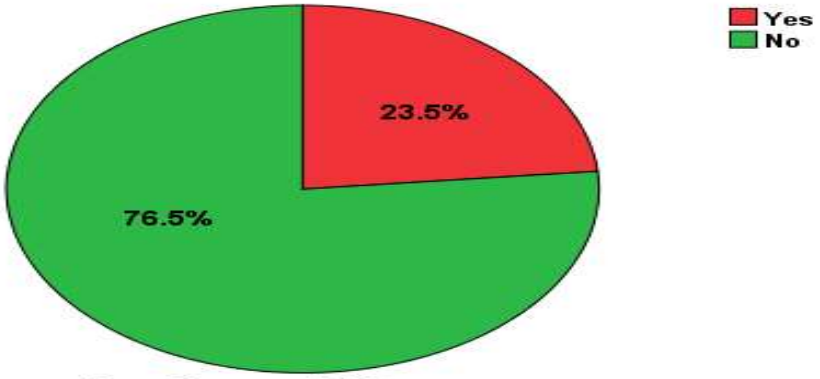
Figure 10: Challenging factors on IWM intervention



Source: Own Survye, 2020.

Households were asked whether or not they had continuously and sustainably used the constructed physical structures in the area. As shown in figure11 bellow, **23.5%** of the respondents indicated that they used the measures continuously and sustainably in the area, while the majority, **76.5 %** of respondent HHs failed to recognize or confirm the use of constructed physical structures in a continuous and sustainable way. According to Berhanu (2000), the most important reasons that contribute to the low level of use of conservation technologies and to the failure of the introduced structures by individual farmers are lack of participation of farmers in the planning process (top-down approach), inappropriateness of the technologies, limited availabilities of resources to the farmers, institutional and organizational problems, neglect of the indigenous knowledge of the community and other economic and technical viability problems. Informant in the FGD replied that the construction of physical structure was intermittent and non-sustainable because farmers occasionally destruct SWC structures for their own purposes. This is similar to the data obtained during field observation by investigator in the study area. Therefore, such non-sustainability of constructed physical structure do have a potential impact on the effectiveness of the watershed intervention measures in the area.

Figure 11: Farmers continuous and sustainable use of constructed physical structres



Source: Own Survey, 2020.

Table: 7 Bellow summarizes the response of the total **226** sampled HHs on the factors affecting the sustainability of constructed physical structure. Accordingly, **9.7%** of the respondents replied that the structures were destroyed naturally, **29.2%** said it was due to poor construction, and **39.8%** of the respondents said the structure were destroyed because of poor trends of maintenance. While the remaining **21.2%** complained overgrazing (uncontrolled grazing) in the study area, and so was said proved by the participants of FGD.

In line with this, Tefera and Sterk (2010) indicated that reasons for not adopting IWM technologies include high labor demands, difficult technical structures, and land tenure in security and loss of land to IWM measures. Therefore, poor construction, poor maintenance and uncontrolled grazing are common challenging phenomena, which affect the sustainable implementation of IWM activities in the watershed.

Table 7: Farmers reason for non-sustainability of structures

No	Reasons	Frequency	Percent	Valid Percent	Cumulative Percent
1	Structures get destroyed naturally	22	9.7	9.7	9.7
2	Structures get destroyed due to poor construction	66	29.2	29.2	38.9
3	Structures get destroyed due to poor maintenance	90	39.8	39.8	78.8
4	Structures get destroyed by uncontrolled grazing	48	21.2	21.2	100.0
	Total	226	100.0	100.0	

Source: Field survey by the investigator, 2020.

Accordingly, different factors are listed below in Table 8 and the respondents rated these factors as high, medium, and low in order to show the extent of influence of the factors in challenging the implementation of IWM in the study area.`

Table 8: Factors challenging the success/failure of IWM in the study area

Item	Factors	Extent					
		High		Medium		Low	
		Frequency	%	Frequency	%	Frequency	%
1	Natural resource degradation	173	76.5	53	23.4	-	-
2	Low access to new agricultural inputs	100	44.2	112	49.5	14	6.2
3	Low agricultural harvest	119	52.6	68	30	39	17.2
4	Hanger and food crises	164	72.5	52	23	10	4.4
5	Shortage of land	112	49.5	96	42.4	18	7.9
6	Unemployment and absence of off-farm activities	119	52.6	77	34	30	13.2
7	Dependence on natural resources	165	73	61	27	-	-
8	Inadequacy of conservation effort	172	76.1	54	23.8	-	-

Source: Field survey by the investigator, 2020.

Sample HHs were asked about whether natural resource degradation is currently challenging the watershed development program (See Table 8 above). Regarding this, about **76.5%** of the respondents indicated that the rate of natural resources degradation in the study area was getting higher and higher, but the remaining **23.4%** said it was medium, and information obtained from KII participants during FGD also confirms there is high level of natural degradation in the area. In this regard, Bekele et al, (2006) stated if local agro-ecosystems are not managed properly, there by threatening current and future livelihood. This shows that there is high rate of natural resource degradation becoming a key challenge for effective and efficient implementation of IWM.

One of the issues in rural areas where land cultivation dominates livelihood activities is access to new agricultural inputs (i.e. specialized seeds, fertilizer, modern agricultural technologies, tools and equipment etc.) which are significant to investment in agricultural production. As it is seen in Table 8 item 2 above, **44.2%, 49.5%** and **6.2%** of the HHs reported that the challenges of low access to agricultural inputs in the area can be seen as high, medium and low, respectively. The FGD participants were also reported that the provision of new agricultural inputs in the area is very limited and thus they have not widely used to maximize their productivity due to its cost.

Therefore, the result indicated that limited access to new agricultural inputs are challenging IWM activities for farmers who needs to cover the costs of agricultural inputs which is another negative effects on their livelihood income. Similarly, FAO (2017) reported that reducing rural poverty requires increasing productivity and profitability, linking farmers to markets and providing them with efficient extension and agricultural advisory services.

With respect to Table 8, the majority, (**52.6%**) of HH respondents mentioned the extent of challenge of low agricultural harvest in the study area is high, and **30%** of them mentioned it as medium in the area. The remaining **17.2%** respondents said the impact of low agricultural harvest on watershed management is low. The response of the HHs to the low agricultural productivity is supported by studies by Yirga (2007), who stated that over the last decades, agricultural production and income growth in Ethiopia have lagged behind. The information's obtained from the KII and FGD confirms low harvest of agricultural product is a key challenging factors for their livelihood as well as it enforces farmers to cultivate marginal land to increase their production. This is also in turn affecting the sustainable implementation of IWM practices in the study area.

Generally, low productivity characterizes Ethiopian agriculture which has made it difficult to attain food self-sufficient at a national level (Eleni, 2008). Therefore, the result indicates that low agricultural harvest has tremendous impacts on farmers' livelihood and the watershed development program in the study area.

As shown in Table 8, the HH respondents were asked about whether hanger and food crises may have an impact on watershed activities. Accordingly, **72.5%, 23%** and **4.4%** of respondents respectively, mentioned that hanger and food crises have high, medium and low level of impact on the watershed management activities. According to GWARD (2019), one of the primary objectives of IWM practices is to boost agricultural production and productivity. Participants of FGD stated that the occurrences of hanger and food crises among the watershed inhabitants were vital challenges on their livelihood which resulted from the low production and little conservation efforts on soil degradation in the study area. So, most of the HHs conceptualized that the watershed intervention are not guarantee for resilience HHs food security for their livelihood. The livelihoods of the HHs in study area mainly depend on land cultivation.

As can see in Table 8 above, **75%** and **25%** of the respondents reported that the problem of shortage of land is high and medium in the area respectively. According to the KII during FGD, the consequences of land degradation, fragmentation and redistribution among HH family members that were resulted in the significance reduction in land holding size. Therefore, shortage of land is the major determinant of the livelihoods of the HH farm with in the area, which determines the quantity of implementation of IWM activities.

Human capital is an important asset of individuals and for the support of effective implementation of IWM activities. The majority (**56.1%)** of HH respondents mentioned that high level of unemployment and absence of off-farm activities are found to be the challenge on the development of IWM activities in the study area. About **43.9%** of HHs also reported that there is medium level of unemployment and absence of off-farm activities in the area, which affect watershed program. In line with this, FAO (2017) reported that high level of youth unemployment and under employment in rural areas prevent HHs from diversifying livelihoods and escaping poverty for food. The data obtained from KII during FGD, confirmed the existence of unemployment and absence of off-farm activities in the area contributed to rural poverty and rural out migration which influences the effectiveness of watershed projects. Therefore, the result shows that there is high level unemployment and absence of off-farm activities which in turn, hindered the immediate economic return of watershed interventions for landless young people, putting economic sustainability to be under question.

As it is illustrated in Table 8 above, about **66.5%** and **33.5%** of the HH respondents stated that inadequacy of conservation effort in the area is high and medium respectively. Participants of FGD said that deforestation and soil erosion is very critical problem due to poor conservation effort of the communities in the study area. In addition, unsustainable use of natural resources, the poor performance of water harvesting particularly irrigation scheme, agro-forestry and forge development as well as low utilization of input technologies together have become key challenges of IWM for its economic returns. Thus, the result indicates the actions that have been taken to combat the problems of natural resources degradation like soil erosion, deforestation, e t c. are inadequate and the level of natural resource degradation is very critical in the study area. In line with this, FAO (2017) stated that the adoption of sustainable production systems ad practices, including integrated conservation agriculture, agro-forestry and sustainable forest

management and other form of climate smart agriculture will help farmer's eco-system and communities to adapt to, mitigate and build resilience to climate change and address country specific needs and gender specific context.

4.5 Integration of Service Giving Institutions with Watershed Development Program.

Watershed development requires multiple interventions that jointly enhance the resource base and livelihoods of the rural people. This requires capacity building of all the stakeholders from farmers to policy makers. In terms of capacity building, managing watershed externalities within and outside the watershed requires cooperation among various stakeholders to build and strengthen institutions, social norms and regulations and to develop systems of sharing responsibilities and benefits. According to survey of HHs response, the integration of different service giving institutions in the watershed can be mentioned in different degree of agreements (See Table 9 below).

Table 9: Integration between services giving institutions on watershed program

No	Services giving Institutions	Level of agreement									
		S. agree		Agree		Uncertain		Disagree		S. disagree	
		Fre	%	Fre.	%	F	%	F	%	F	%
1	Integration of Education service	132	58.4	59	26.1	-	-	35	15.5	-	-
2	Integration of health and family planning program	21	9.3	14	6.1	-	-	146	64.6	45	19.9
3	Integration of veterinary service	-	-	36	15.9	89	39.3	111	49.1	-	-
4	Agricultural extensions service	-	-	103	45.5	18	7.9	98	43.3	-	-

Source: Field survey by the investigator, 2020.

As it illustrated in Table 9 above, HHs who "strongly agree" and "agree" on the integration of education service with watershed management is experienced in the watershed accounted (**84.5%**) of the total respondents. Harris (2012) stated that as our knowledge of the environment increases, we become more aware of the potential risks faced by society. From this result one can understand that, it is simple to rate the degree of integrity of education service is not a problem of IWM in wamole watershed, Gorche Woreda, Southern Ethiopia.

As can be stated in Table 9, about **9.3%** of the HH were "strongly agree", **6.1%** of them "agree" on health and family planning program integration with watershed projects in the area respectively. On the other hand, for the opinion "health family planning program integration about **70%** of the farm HHs replied "disagree" (**64.6%**) and "strongly disagree" (**19.9%**). This indicates that integration of health and family planning to watershed programs was very less. Inadequate integration of health and family planning program associated with rapid population and expansion of human disease affects watershed intervention program in the study area.

Similarly, about **15.6%, 39.6%** and **44.8%** of respondents were agreed, uncertain and "disagreed" on the integration of veterinary services with watershed management program in their locality. All collective efforts are resigned through institution, and without institutional changes we will not move purposefully towards sustainability (Dovers, 2001). Therefore, the result indicates that poor integration of veterinary service is found to have an effect on the success of IWM programs. This fact is also confirmed by the FGD participants.

On the other hand, the survey result in Table 9 above, indicates that those who "agreed" on the integration of agricultural extension service with watershed development program accounts about 39.2% while those who were uncertain, disagreed and strongly disagreed accounts 0.5%, 42% and 18.2% respectively. Thus, this shows that there is a gap in providing better agricultural extension service in the area. Respondents of the KIIs and FGD stated that the watershed program did not adequately serving the communities in providing better agricultural extension service and it limits the opportunities farmers to increase their level of awareness on agricultural production and the need to reduce potential challenges of their productivity. Therefore, the survey result is in line with Fikiru, (2009) which explained the lack of integration from the different disciplines; sector and limited level of participation of stakeholders are among the limiting factors contributed to low level of success.

4.5.1 Institutional and Implementation Capability in Watershed Management.

The institutional environment is dynamic and changing and institutions operate at all levels from the most private to the most public. The way different stakeholders interact with each other and their level of participation has implications on the success or failure of IWM program.

Table 10: Responses on the Role of Watershed Committee and Elders.

No	Items	Description of responses	Frequency	Percent
1	Existence of IWM Committee	Yes	62	27.4
		No	164	72.5
		Total	226	100%
2	Function of committee	Issuing and enforcing by law	11	17.7
		Successfully mobilize members for action	9	14.5
		They are not functioning well	14	22.6
		Difficult to judge	28	45.1
		Total	62	100%
3	The role of elders	Support the committee in mobilizing community for successful participation	132	58.4
		Resolving any conflicts among the watershed communities	53	23.4
		Monitoring the works of both committee and people	41	18.1
		Total	226	100%

Source: Field survey by the investigator, 2020.

As indicated in the Table 10 above, only **27.4%** of the HHs assured the existence of watershed management committee in the watershed area while the majority **(72.5%)** of them assured the absence of watershed committee established in the area. Hence, one of the challenges for watershed governance is also to get a portfolio of relevant actors working together more effectively (Genskow and Born, 2006). Therefore, the absence of watershed committee affects the implementation of integrated watershed activities in the study area.

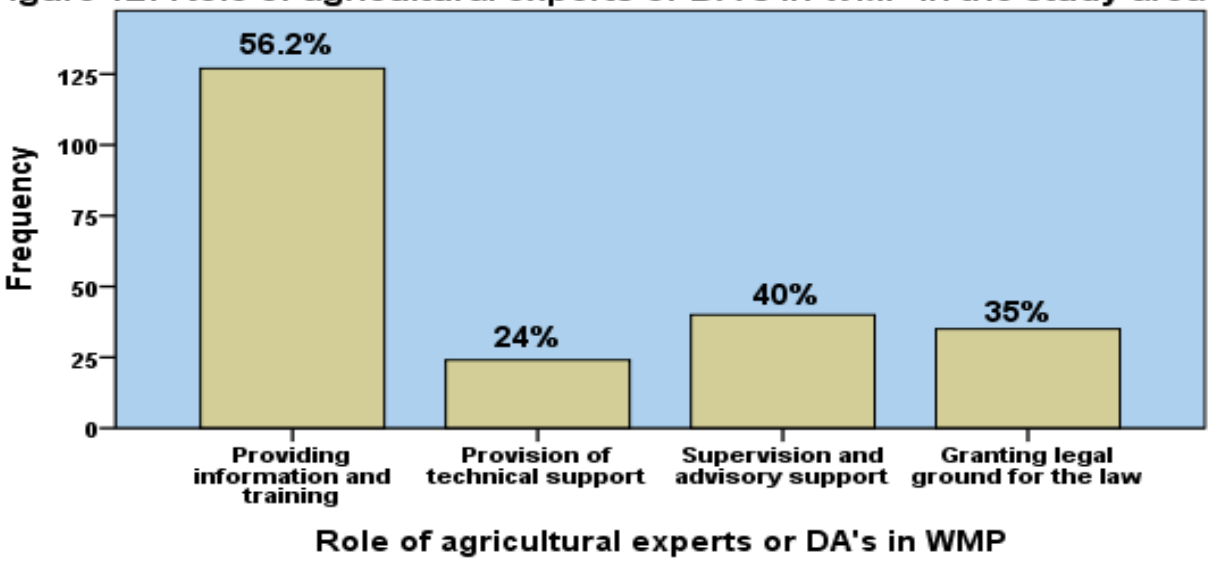
Regarding the function of committee in the study are, **17.7%** of the HHs said that the committee are issuing and enforcing by law, **22.6%** said they are not functioning well and **45.1%** said it is difficult to judge, only the remaining **14.5%** respondents showed their successful mobilization of members for watershed activities (Table 10 above). It was noted from the discussions held with KII and FGD that there was a weakness in establishing permanent watershed committee in the watershed due to unwillingness of farmers to be a members of watershed committee. Furthermore, the FGD participants added that mostly the committee has been established

temporarily during the starting time of 30 days watershed campaign work. This fact also shows that the permanent participation of farmers as a committee membership and decision making is very low and limited in the study area. Therefore, the existences of institutions without the participation of the direct beneficiaries and stakeholders do not bring the expected results.

Regarding the role of elders and influential leaders in watershed management program, **58.4%** of the HHs said that they support the committee in mobilizing the community for successful participation, **23.4%** said these bodies involve in resolving conflicts among the watershed communities and **18.1%** said they were monitoring the works of both the watershed committee and peoples (Table 10 above). Information from FGD and KIIs said that elders and influential leaders have played important role in mediating and resolving the conflict and ensuring the rule of law in the study area.

Photo Gallery 3: Local elders blessing people during the campaign work

Figure 12: Role of agricultural experts or DA's in WMP in the study area



Source: Own Survey, 2020.

As it is seen in Figure: 12 above, **56.2%** of respondents indicates that they get information and training from agricultural experts and DAs about resource management, **24%** respondents indicates provision of technical support, **35%** Granting legal ground for the law and **40%** Supervision and advisory support were the services given about IWM activities by agricultural experts and DAs. Interviewed farmers during FGD noted that DAs lacked the necessary practical experiences and experts to teach IWM skills. In addition, DAs also lack training in other key areas, such as intensifying or diversifying farming systems, agricultural marketing and other communication and skills, such as how to organize producer groups. Thus, the survey result indicates that farmers were demanding specific skills from DAs, the need for training and technical assistance as they rapidly move into the production of high value yield and better IWM is not well answered.

Table 11:Institutional and implementation constraints

No	Institutional and Implementation Constraints	Frequency	Percent
1	Poor planning and identification problem	101	44.7%
2	Lack of proper follow up and sustainability	43	19.0%
3	Lack of organization and proper implementation problems	28	12.4%

4	Lack of coordination between farmers and DA's in the area	19	8.4%
5	Lack of support from NGO's	17	7.5%
6	Limited use of proper IWM techniques for varying landscape	18	8.0%
	Total	226	100.0

Source: Field survey by the investigator, 2020

As it shown in Table 11 above, the respondents were further asked about the types of institutional and implementation constraints in the watershed. Accordingly, from the total respondents, **44.7%** of the HHs clearly recognized poor planning and identification of problems of watershed management activities and **19%** indicated lack of proper follow up and sustainability challenge. The remaining informants **12.4%** showed lack of organization and proper implementation, **8.4%** said lack of coordination between farmers and development agents **7.5%** pointed out lack of support from NGO's and **8%** repaid limited use of proper IWM techniques for varying landscape were the major institutional as well as implementation constraints which observed in the watershed areas (Table 11 above). The information obtained from FGD and KIIs confirmed this fact. It is also mentioned that those problems are associated with the problem of structure development, poor management, lack of the proper assessment and identification of watershed problem, less concern for key activities and lack of appropriate technologies are found to be the contributing factors which challenging the watershed management activities.

Table12: Reasons behind limited participation of community.

No	Reasons behind limited participation of community	Frequency	Percent
1	Administrative problems	92	40.7
2	Poor support of DA's	48	21.2
3	Low level of awareness about the consequence of resource degradation	33	14.6
4	Failure of the committee of watershed to mobilize the people	53	23.5
	Total	226	100.0

Source: Field survey by the investigator, 2020.

As it is illustrated in Table 12 above, administrative problems (**40.7%),** poor supports of DAs (**21.2%**), low level of awareness about the consequences of resource degradation (**14.6%**) and failure of watershed committee in mobilizing peoples (**23.5%**) were recognized by community as main challenges that attributed to limited participation of communities in IWM practice. FGD participants in watershed also witnessed that administrative problems, low level of awareness of the communities about impact of resource degradation and poor support of DA's have contributed to people's limited participation in watershed management practiced. In addition, the households applied rehabilitation practice on degraded land without their own motivation through the forces of external bodies brought deprecations on watershed management in the study area.

4.5.2 Efforts of Institutions on Integrated Watershed Management.

The current sustainable approach of IWM is somewhere in between. Because, of the proper mix would include factors such as bio-physical, social, cultural, financial, and political considerations for all concerned stakeholder. Therefore, addressing the challenges of sustainable resource management through watershed based planning and implementation require innovative institutions alternative that will help internalize the externalities and deal with the unique cooperation and incentive problems of policy and market failures for private and collective action.

Table 13: Efforts of Institutions on Integrated Watershed Management.

No	Institutional Efforts	Extent of their efforts					
		High		Medium		Low	
		Fre	%	Fre.	%	Fre.	%
1	Efforts of formal institution (i.e. Government sectors)	23	10.1%	61	26.9%	122	53.9%
2	Efforts of informal institutions (e.g. Idir, religious organization etc.)	66	29.2%	140	61.9%	20	8.8%
3	Technical support and training by government	53	23.4%	72	31.8%	101	44.7%
4	Skill development due to intervention	27	11.9%	60	26.5%	139	61.5%

Source: Field survey by the investigator, 2020.

Out of the total **226** respondents, about **10.1%** and **26.9%** of them reported that the effort of formal institutions in watershed intervention was high and medium respectively. Whereas, majority (**53.9%**) of the respondents indicates that the efforts made by formal institutions in watershed management activities has remained at low level (See Table 13 above). The justification behind the low level of efforts made by formal institutions is the limited concern and commitments of local government, agricultural experts, DA's, health centers, NGO's, etc. which were mentioned during FGD. The finding of this study is similar with Woldeamlak 2003 who reported the less emphasis given to IWM is one factor responsible for the failure. A similar study by Teketel, (2009) reported the way different stakeholders interact with each other and their level of participation has a big implication on the success/failure of watershed management program.

Regarding the environment of informal or traditional institutions, **29.2%, 61.9%** and **8.8%** of the HH represents respectively, believed that there was high, medium and low level participation of local institutions observed in IWM activities in the area (Table 13 above). As testified by most key informants from the community, FGD and the survey data the successful intervention in the watershed activities has a lot to do with the active involvement of indigenous institutions (Like Idir and religious organization etc). They were especially in mobilizing communities, enforcing the by-laws and effecting penalties as the provision of the by-laws. This finding is also similar with Alemneh, (2003) who recommended that government should make a consented effort to support and strengthen indigenous community organizations/traditional institutions as they have potential to be an important vehicle for facilitating community based approaches in natural resources management and self-help development activities.

As stated in table 13 above, about **23.4%** and **31.8%** of respondents mentioned that the level of the technical support and training received from the government was high and medium respectively. However, the majority of **44.7%** respondents were also reported that level technical support and training delivered by the government in the study area was too low. To this regard the FGD and KII participants reviewed that mostly the government officials were focused on political issues rather than they are giving any technical and training support on IWM activities.

Based on Table 13 above, about **11.9%** and **26.**5**%** of respondents mentioned that the level of skill development due to watershed intervention in the area was promising (High and medium) respectively. Whereas, the majority of **61.5%** respondents were reported the skill developments

in the area is still low. In line with this, Alemneh, (2003) stated one of the big challenges to conservation programs of the 1970's and 1980's was that the technical requirements were not in the scope of farmer's skills and abilities. Accordingly, the survey result shows lack of commitments of DA's and agricultural office experts, and poor extensions approach and lack of trust regarding to the services delivering in skill development that affects the watershed intervention activities.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

This research was conducted with the aim of investigating challenges and practices of IWM in Wamole watershed Gorche Woreda, Southern Ethiopia.

Accordingly, the study employed descriptive survey design and follow a mixed research approach which aimed at examining the overall challenges and practices of IWM in the study area. A mix of qualitative and quantitative methods was employed side by side in cross-sectional way to address the stated objectives. Questionnaire, KII, FGD and Field observation were used to collect data of this study. 226 households were randomly selected from the total households and participated in the study area. In the process of data analysis the quantitative data which were obtained through questionnaire were analyzed quantitatively by using descriptive statistics to compute frequency and percentages and co-relational analysis present in table for the easy interpretation of the data. Based on the findings of the study, the researcher has drowned the following conclusion:-

The finding of this study shows that the low level of educational backgrounds causes for low awareness and little transfer of information which in turn made the level of their participation in watershed management minimal. About the majority in habitants belongs to the productive age groups between 20-64 years of age which is an education of sufficient labor force in the study area. Hence, the average dependency ratio was lower than the national average, but also the family size of the HH head is relatively greater than the national average of rural HH size which can be heavy burden to the economic capability of the rural HH heads in the study area.

The empirical evidences of this study indicated that the realization of watershed development activities followed the IWM programs in the area. The descriptive survey result showed that: From the total sample respondent (93.8%) was confirmed the realization of IWM practices in the study area. However, (68.5%) sample respondents said that there is sever natural resource degradation problems due to inadequacy of conservation practices in the study area. With regard to IWM activities which are done in the watershed, the majority (71.6%) respondents confirmed that the activities were done for a month in a year through campaign work. Participatory watershed development program is practical in some context but needs to be tailored to local condition. According to the role of farmer's participation in IWM activities (47%) of the respondents said that they participate in construction of SWC measures. Mostly the role of farming communities are limited to only execute SWC activities through campaign work when they are ordered by the project development task forces in the top-down approaches more willingly than they participate in pre-planning, problem identification, technology selection, monitoring and supervision, evaluating the outcome of watershed activities and etc. in the study area. Furthermore, the participation of women in IWM activities and decision making in the watershed is still low. With regard to women participation, the majority (53%) of the respondents believed women's participation was limited more than men during IWM activities. Similarly, the result shows nearly half of sample respondents are not enthusiasm to participate on watershed activities unless either food/cash provided for their labors and it is sometimes held them for dependency. Due to poor irrigation agricultural practices, it is difficult for the farming communities in the area to increase productivity and satisfying their family's consumptions let alone to obtain higher production and supply for market.

The IWM intervention faces significant challenges in the watershed areas about 46.9% and 40.7% were said that approach of local government and less concerns of agricultural experts or DAs respectively have been major challenge for the implementation of IWM in the area. Thus, the watershed management development process is not given adequate attention from different stakeholders including local government, agricultural office experts, DAs and watershed committees in the area. The most important challenges which hamper the implementation of IWM in the study area includes: poor construction of SWC measures, farmer's unsustainable use of constructed physical structures, poor maintenances, uncontrolled grazing, existence of less interested and non-participant household heads in the watershed activities, sever natural resource

degradation, low access to new agricultural inputs (eg. Crop varieties, technology etc.), low harvest, shortage of land, large number of unemployment and absence of off-farm activities, dependency on natural resources, inadequate conservation efforts and etc together with the approach of local government, less concerns of agricultural experts and DA's are highly affecting the success of watershed intervention in the area.

Regarding to the current IWM practices in the area have great contribution for sustainable development. According to the findings, among sample respondent the majority (71.7%) said that IWM program could contributed to reduce soil erosion, while 15.9%, 7.5% and 4.9% of the respondents said that it was useful for the growth of grass and increase of bushes on bare land, good for development of spring and forest development respectively. Similarly, the sample HHs replied on the contribution of IWM to change witnessed on the livelihood, the majority 29.6% and 27% said that watershed intervention provide a great contribution for the improvement of productivity and family food supply respectively, while 20.4%, 13.3% and 9.7% said that for enhancing of drought resisting capacity, use of modern agricultural technologies and used irrigation agriculture respectively. The dominant livelihood activities of HHs in the watershed are agriculture, with the absence of non-farm/off farm income generating activities change observed in economic return become low on which the extent of improvement in crop productivities and production is not in the way expected and these IWM practices are new phenomena for our farmers and its resultant effect on their livelihood may not be immediate. Its effect is gradual and especially protecting and reducing frequent occurrence of drought and conservation of biodiversity may not be observed in a short time.

Moreover, some important activities which make the watershed integrated are not done well and as a result they do not give immediate economic return for the rural poor. For this reason, today one cannot be sure about the implementation of IWM program guarantee for their livelihood of the communities in the area. Limited training and technical support of agricultural experts or DA's, poor planning and identification of problems, lack of proper follow up, lack of organization, proper implementation problems, lack of coordination between farmers and DA's, lack of support from NGO's , limited use of proper management techniques for varying landscape, administrative problems and failure of the committee in mobilizing the community are the main institutional and implementation constraints in the study area.

The IWM participation implies that stakeholders work together to set criteria for sustainable management, identify priorities, constraints, evaluate possible solutions, recommend technologies and policies. However, institutionalizing and socializing the watershed in the community are not done well in terms of establishing the watershed committee activities as district and kebele teams, which is managed by Gorche agricultural and rural development office (GWARDO). Besides, low level of institutional integration with watershed program and inadequate efforts of various institutions encountered as the complexity to coordinate and mobilize the communities as well as hindering from successfully implementing IWM activities in the area. As a result, the sustainability issue of the watershed has become under question and has exacerbated due to the low economic return of the natural assets.

5.2 RECOMMENDATION

Based on the finding of the study, the following practical points are recommended to overcome some of the constraints of IWM practices and maximize the benefit of the intervention.

1. Enhancing the use of knowledge and adult education should be essential to build a culture of safety and resilience at all level. In addition, health and health related family planning methods need to be integrated with integrated watershed program. Therefore, the ministry of education should work in collaboration with the ministry of health on awareness creation and IWM programs.
2. Households' participation in decision making is low. So, the local government, agricultural office experts and DA's should be better to consider HHs decision while making decisions, participating in planning, problem identifications, technology selection, monitoring, supervision and evaluating the outcome of watershed activities, since they have indigenous knowledge and experiences of the area. Moreover, while watershed intervention implemented attention should be given to female and marginal farmers.
3. The watershed management development program should be given due attention from different stakeholders including local government, agricultural office experts, DA's, watershed committees and even by inhabitant communities in the area. Hence, the response, commitments and responsibilities required for the success of such policies still depends on knowledge and perception of the problem by smallholder farmers.

4. To solve the problems associated with increasing trends of land shortage, non-agricultural or off-farm income generating activities local government and agricultural office should be give due attention and promoted by means of socializing the watershed. Develop collaboration between sectors, harmonization of approaches like ownership, integration of multi-disciplinary activities, participatory, demand driven, and income generating should be developed so that it help in sustaining different developmental activities carried for watershed management.
5. Moreover, watershed development should focus not only SWC activities but also on ownership of rehabilitated communal lands, income generating to improve HH assets, preparation of watershed base line with the community, establishment of community watershed institution, empowerment of the watershed inhabitant for planning, decision making, selection of technologies and follow up of day to day activities and integration of activities should be implemented with continuous impact assessment and research by the government or NGO's.
6. Therefore, to achieve the anticipated goals of the watershed program and improve the livelihood of HH, training on documentation and proper management of data particularly on institutionalizing, socializing and on income generating activities should be necessary to give to the community members by the agricultural and rural development organizations.

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QUESTIONNAIRES

Appendix 1

DILLA UNIVERSITY

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES MA, DEGREE PROGRAM SPECIALIZATION IN SUSTAINABLE NATURAL RESOURCE MANAGEMENT

Region SNNPRS Zone Sidama Woreda Gorche

Name of Watershed----------

HOUSEHOLD LEVEL QUESTIONNAIRES

Dear Sir:

You have been selected to participate in the study designed to collect information on Integrated Watershed Management (IWM): Challenges and practices in reference to the selected Wamole watershed area of Gorche Woreda, Sidama Zone, SNNPR.

Accordingly, I kindly ask you to share me your opinion and experiences taking few minutes from your schedule of time. Your genuine cooperation is very important, because you represent many other farmers who have similar experiences. The genuine response you provide is highly valuable and determines the effectiveness of this investigation. Please, be assured that I will treat your response confidently and will not be used for any purpose other than research.

You are not expected to write your name on the questionnaire.

Thank you in advance for your cooperation!

October, 2019 E.C

Gorche Woreda

INSTRUCTION: Dear enumerator, please circle the letter representing respondent's answer from the given alternatives for each part of the questions.

PART I. Personal background information

1. Age- A. 16-30 B. 31-45 C. 46-60 D. 61-75 E. 76 and above
2. Sex- A. Male B. Female
3. Educational status; A. illiterate B. Elementary (1-8) C. High school (9-12) D. College & above
4. Marital status: A. Unmarried B. Married C. Widowed D. Separated
5. Family household size: A. 1-3 B. 4-6 C. 7-9 D. 10-12 E. above 12

PART II The level of integrated watershed management practices.

6. Is there any integrated watershed management practiced in the area? A. Yes B. No

7. If your answer to question item 6 is yes, what are the major practices?

A. Soil and water conservation

B. Reforestation

C. Contour plowing

D. Growth of grass and bushes on barred land

E. If others, please specify----------

8. How these watershed management activities began in your area?

A. By enforcing the government body

B. Informing by the watershed committee

C. By ourselves, according to its duration

D. Agricultural and rural development experts and DAs gives awareness about IWM.

9. Did you acquire adequate technical knowledge necessary to continue on your own with activities introduced by watershed development program? A. Yes B. No

10. Which techniques of IWM are efficient for your area?

A. Traditional B. Modern C. Both Traditional and Modern

11. What type of natural resource conservation techniques are currently applied in this watershed?

A. Tree plantation B. Contour plowing C. Terracing D. Gully control

E. cut-off drainage F. other, please specify----------

12. Do farmers use the constructed physical structures continuously and sustainably?

A. Yes B. No

13. If your response to question No. 10 is "No" what would happen to the constructed physical Structures?

A. The structures get destroyed naturally
B. The structures get destroyed due to poor construction
C. The structures get destroyed due to poor maintenance
D. The structures get destroyed due to uncontrolled grazing in area
E. The structures get destroyed purposively by farmers.

14. Did you access to new agricultural technologies? A. Yes B. No

15. Do you practice irrigation agriculture? A. Yes B. No

16. If your response to question No. 13 is "No" why you do not use irrigation?

A. shortage of access of water resource (lack of water reserve)

B. coasts of irrigation technologies C. lack of skills and efficient training

D. conflict on water resource among communities

17. Have you or any member of your family participated in the conservation measures and Management of existing structures of the watershed, if food or cash was not provided for your Labor? A. Yes B. No

18. Who decided your participation in Soil Water Conservation and watershed development activities? A. Myself B. watershed committee in meeting C. community leaders D. Gov't agents E. NGOs

19. How do you evaluate your level of participation in watershed management activities, if food

Or cash was not provided for your labor?

20. How many times does the watershed development activities were done in your watershed?

A. One month through campaign work B. Two month per year C. Six month per year

D. Monitoring and Supervision E. evaluating the outcomes of IWM activities

F. If other, please specify----------

21. How do you evaluate the role of women in IWM project compared with government program? A. Best B. Better C. No difference D. Limited

PART III Contribution of Integrated Watershed Management for the livelihood of the rural households

22. What is the main contribution of IWM related with sustainable development of natural resources? A. Reduction of soil erosion B. existence of spring C. growth of grass & bushes on barred land D. forest development measure taken place E. if other, please specify--------

23. After the time of watershed intervention, how do you perceive the general living condition of the community?

A. Improved B. show little improvement C. remained the same D. I don't know

22. Could you please rate as strongly agree, agree, uncertainly, disagree, strongly disagree the following contribution related to in your local area?

	Contribution	**Extent**				
		Strongly Agree	**agree**	**Uncertainly**	**disagree**	**Strongly Disagree**
A	Creates income generating activities					

B	Create employment					
C	Enables better water harvest & use of irrigation					
D	Enable planting trees for land & soil protection					
E	Enables households food secure					

24. What change is witnessed on the livelihood of watershed community?

A. Improvement of family food supply B. Increased productivity

C. uses of modern agricultural technologies D. involvement in irrigation agriculture

E. development army was created F. enhancement of drought resisting capacity

G. if other, please specify----------

25. What is the major contribution of IWM activities for the livelihood of the rural households?

A. Involved in small scale micro-enterprises in the area B. They employed in bee farming

C. They are employed in cattle ranching D. Participating in alternative income generating activities in rehabilitated areas E. Nothing is happened F. If other, please specify----------

PART IV Determinant challenges that influences in Integrated Watershed Management (IWM) in the area

26. What are the challenges that influence IWM activities in the area?

A. Topography B. Approaches of the district government C. climate

D. less concern of the agricultural office experts and DAs E. the behavior of the community.

27. Is the existing community size appropriate to achieve the watershed development practices?

A. it is manageable B. the size is increasing and unmanageable

C. the size is small and has less resource.

28. What is the attitude of farmers towards community participation in SWC and watershed development activities?

A. they are highly interested B they have less interested C have no interest.

29. Are there natural resource conservation techniques effective in conserving the quality of watershed resource sustainability? A. Yes B. No

30. If your response to question No. 28 is "No" why they could not be effective?

A. unwillingness of the community of use natural resources conservation measures properly

B. lack of follow up of concerned bodies and less support

C. lack of clear understanding about impotence of natural resources conservation

D. the ways of use of conservation measurements

31. Could you please rate the following challenges as high, medium, low?

	Observed challenges	**Extent**		
		High	**Medium**	**Low**
A	Natural resource degradation			
B	Low harvest			
C	Hanger/ food crises			
D	Unemployment			
E	Shortage of land			
F	Drought			
G	Less access to new agricultural inputs			
H	Dependency on natural resources			
I	Poor irrigation practices			
J	Livestock disease			

DILLA UNIVERSITY

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES MA, DEGREE PROGRAM SPECIALIZATION IN SUSTAINABLE NATURAL RESOURCE MANAGEMENT

Region----------Zone----------Woreda----------

Name of Watershed----------

Respondent's name----------

Date of the interview----------

Enumerator (Name and Signature) ----------

AIM OF THE QUESTIONNAIRE

This questionnaire is prepared to collect data about Integrated Watershed Management: Challenges and Practices in Gorche Woreda, Sidama Zone, SNNPR. It is expected to generate and provide helpful information for development practitioners about the determinant challenges of integrated watershed management and the magnitude of its impact on the process of watershed. Therefore, your input as a stakeholder to fill this questionnaire is highly appreciated and information provided will stay confidential your right to involve or not is also respected.

October, 2012 E.C

Gorche Woreda

PART I. KEY INFORMANT INTERVIEW (KIIs) AND FOCUS GROUP DISCUSION (FGD) CHECK LIST

1. **Personal background information**

   Name---------- **Sex**-------- **Age**--------

   Education status----------

   Occupation----------

   Responsibility----------

2. What was/is the current situation and status of watershed in relation to the practices of integrated watershed management?
3. What were the levels of land degradation observed on agricultural production and the environment in general?
4. What were the local farmer's role and their responses to integrated watershed management activities?
5. How is the level of awareness and participation of farmers in the management of the watershed? Why?
6. What are the major interventions undertaken by integrated watershed management in the watershed on farmer's land?
7. How did the whole idea of the watershed development practices go forward?
8. What institutions were established to support the watershed intervention?
9. Is there any watershed management committee? If so what is its role? How was it established? Are there any by-laws? How do you establish the by-laws? What reward/punishment mechanisms does the committee employ?
10. What were the specific direct/indirect contribution the community gained from the integrated watershed management program?
11. What were the specific measures taken to restore to health of watershed? And what were the direct effects of these measures?
12. What is your role in the management of the watershed? And how do you integrate your action with that of other stakeholders?

13. What are the major formal institutions involved in the management of the watershed? What is the role of each towards the success of integrated watershed management developmental activities?
14. Have you ever faced any challenging factors during the implementation of integrated watershed management in the watershed community?
15. Do you observe livelihood change in your community from the outcomes of integrated watershed management implementation program?

PART II PERSONAL OBSERVATION CHECKLIST (BASED ON TRANSECT ALK)

1. Major land use types
2. Level of soil erosion
3. Situation of natural resources (soil, water and vegetation)
4. Conservation structures (physical and biological)
5. Status of land management

PART III SECONDARY DATA CHECKLIST

1. Demographic data (Total population, Male Female, Fertility rate, Age group).
2. Geography (Location, altitude, area map) and climate (Rainfall, Temperature).
3. Agro-Ecology, farming system and land use types.
4. Major economic activities, market and infrastructure.
5. Effects of informal institutions and watershed committee.
6. Major crops produced and livestock reared