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Integrated Watershed Development from Sustainable Livelihood Perspective; the case of Terri Watershed in Delanta Woreda, Ethiopia

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DEVELOPMENT STUDIES

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ACRONYMS

CBIWRM: Community based integrated water resource management

DA: Development Agent/Assistant

DFID: Department for International Development

DTIG: Delanta Woreda trade and investment guide

MERET project Managing of Environmental Resources to Enable Transitions to more Sustainable Livelihoods

ENTRO: Eastern Nile Technical Regional Office

FAO: Food and Agricultural Organization of United Nation

FDRE_CSOP: Federal Democratic Republic of Ethiopia-Country Strategic Opportunity Program

FGDs: Focused Group Discussions

FHHs: Female Headed Households

GDP: Growth Domestic Product

HHs: Households

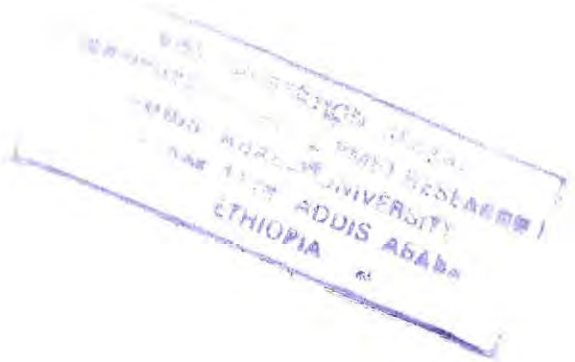
HYVs: High yielding varieties

IDS: Institute of Development Studies

IWD: Integrated Watershed Development

IWM: Integrated watershed management

KA:	Kebele Administration
KII:	Key Informant Interview
MHHs:	Male Headed Households
NGOs:	Nongovernmental originations
NRM:	Natural Resource Management
PA:	Peasant Association
SLA:	Sustainable Livelihood Approach/Analysis
SLF:	Sustainable Livelihood Framework
SPSS:	Statistical Package for Social Sciences
SWC:	Soil and Water Conservation
UNDP:	United Nation Development Program



ABSTRACT

Watersheds, especially in the developing world, are increasingly being managed for poverty alleviation as well as for environmental conservation objectives for rain fed agricultural system. The major challenges of rural development in Ethiopia including Delanta Woreda are land degradation, low agricultural productivity and rural poverty, which are interconnected. In order to break these intertwined problems, community based integrated watershed development is practiced. Of course, this practice brought opportunities for livelihood improvement of rural poor but its sustainability is a challenging one. Past watershed studies failed to consider key success factors of watershed development [Such as environmental, economic, technological, technical, social, institutional and physical]. Therefore, the overall objective of this study is to investigate the main challenges and opportunities of integrated watershed development with the eye of sustainable rural livelihood perspective. Both qualitative and quantitative research methods were employed to gather and analyze data. Specifically, questionnaire survey, focus group discussion, key informant interview, field observation and review of pertinent secondary data sources were utilized to generate the data. The key findings of the study reveal that the majority of natural resources have been improved in the watershed because of the physical SWC and its technologies practiced in the area. Economically, the household benefited from food- for- work; however, there were also challenges. Because of the investments on activities of income generating were low and not concurrently performed with SWC, the investment on physical SWC structures had not immediate economic return. Institutionalization of watershed development and social network were not given adequate attention in practice and challenging the sustainability of the community-based watershed development. On the other hand, agricultural activities became an opportunities for viable option of the households, if there were adequate access to irrigation, agricultural inputs & technologies. Therefore, access of the communities to capacity building and input technologies with socializing and institutionalizing the watershed development should be done not an option, but imperative for sustainable livelihoods.

Key words: watershed, sustainable development, asset, livelihood

CHAPTER ONE
INTRODUCTION

1.1. Background of the study

Watershed, especially in the developing world has increasingly been managed and developed for poverty alleviation and environmental conservation. Agricultural production particularly rain-fed agriculture production objectives focused to alleviate poverty. As well as for environmental conservation, this also focuses on reducing the degradation of natural resources objectives (FAO, 2006). Generally, degradation of natural resources was considered as the greatest constraint to sustainable agricultural development in most of the developing countries including Ethiopia, which depend on subsistence agriculture.

In Ethiopia, "agriculture is the mainstay of the economy" (Teshome, 2006), which has been the primary source of income for more than 85 per cent of the country's population, estimated at 80 million people. Nearly, 55 per cent of all smallholder farmers operate on one hectare or less. Out of the cultivated land, 4.3 million hectare has irrigation potential, of which 5.8 % is currently being utilized. Nevertheless, the productivity is still low due to its subsistence rain-fed agriculture (FDRE, 2009).

Low productivity of land in rain-fed areas, which has been aggravated by water scarcity; land degradation; poor infrastructure; marginalizes agriculture; and poor livelihoods in the rain-fed areas is becoming the major problem. Additionally, demographic pressures in developing countries, including Ethiopia increased vulnerability due to climate change and further threatened the livelihoods in rain-fed areas (Joshi et al, 2009).

Therefore, effective management through the development of appropriate approaches of integrated watershed development and adequate policies became the pillar. The approach of Watershed development that included participation of relevant stakeholders in land resources management is widely accepted as the approach best suited to address the sustainable use and management of resources. In fact, watershed development aspects such as forestry, agriculture, hydrology, ecology, soils, and other sciences to provide guidelines for choosing acceptable management alternatives within social and economic aspects have been practiced in an integrated approach (Achouri, 2002). It has been used as useful for

planning and implementing natural resource and agricultural development for many centuries.

Different scholars argued that watershed development approaches used for forestry, and soil and water conservation. Currently, watershed development approach is further developed and used as a business model, through which public–private partnership of market-led diversification in both high value crops and value-chains. Additionally, it has become as a livelihood approach rather than only a soil and water conservation approach (Shiferaw, Okello, and Reddy, 2009). In line with this, Kollmair and Gamper (2002) indicated that livelihood approach stressed on the importance of understanding various livelihood components and factors including the soil and water conservation with special emphasis on people centered.

In Ethiopia, planning watershed development traced back in the 1980s constituting 30-40 thousand hectares of large watershed as planning unit. The purpose was to implement natural resource conservation development programs. However, the large-scale ones remained mostly unsatisfactory due to lack of participation, limited sense of responsibility over asset created, and unmanageable planning units (Lakew et al, 2005). In addition, expanding human population and their increasing demands for natural resources led to exploitation and degradation of land and water resources. Expanding human demands for resources intensified watershed degradation (Brooks and Eckman, 2000). Due to these problems, community based integrated watershed development, which has implemented at Terri Watershed in Delanta Woreda (the study area) by MERET project was needed to be in place. Therefore, the research intended to investigate challenges and opportunities of integrated watershed development at the grass root via the lens of sustainable rural livelihoods perspective, focused on case of Terry watershed development.

1.2 Statement of Problem

Development of watersheds was managed and developed eco-friendly to rainwater and other natural resources, which are capable of addressing many natural, social and environmental intricacies (Samra, 1998; Wani *et al.*, 2002, 2003b, c; Rockström *et al.*, 2007; cited in Joshi *et al*, 2009).

However, in most watersheds the farmers and most of stakeholders were not aware of the major constraints for increasing productivity/ potential of the watershed specifically in terms of economic, social, technological, technical, physical, natural and environmental aspects. In rain- fed areas, low productivity aggravated by water scarcity, degraded and poorly managed land, poor infrastructure, and lack of market, marginalizes agriculture and poor livelihoods (Joshi et al, 2009).

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 intertwined problems, integrated and sustainable resources management practice is required and planned into farming system development (FDRE, 2009). In line with this, community based integrated watershed development has been practiced in Amhara National Region State, Delanta Woreda.

Even though, integrated watershed development call for the attention of researchers, they focused on single issue. The issues, which researchers focus include the followings: Implications for Policy and Practice on sustainable livelihood (Nicol, 2000); participation for watershed management (Johnson et al, 2001); watershed management problem and effect (Mintesnot, 2007); livelihood impact of CBIWRM (Jebessa, 2009); socioeconomic and institutional dynamic of IWM (Teketel, 2009); and mainstreaming gender in watershed management (UNDP, 2006). All these were substantial studies and show a roadmap, but not became radical grass root solutions for two rationalities. In one hand, the researches failed to incorporate the key determinant factors jointly (like biophysical, socioeconomic, institution and technology) as the issues mentioned above. In the other hand, Woldeamlak (2003), argued that watershed is site specific, which needs site-specific conservation planning and investigation due to diverse environmental conditions. Hence, there were gaps in one hand the researchers failed to address jointly key elements of integrated watershed development, and in the other hand, the previous researches have gaps in identifying and assessing challenges and opportunities in their study area and there is no research in a specific site as well as. These gaps need further study and empirical evidence to point out at the grass root level challenges and opportunities of integrated watershed development. In line with this, the research attempt to fill the gaps by investigating the challenges and opportunities of the Terri Watershed Development in Delanta Woreda.

In order to assess these, the following research questions are set for investigation:

What is the status of integrated watershed development? What are the challenges of integrated watershed development? What are the opportunities for integrated watershed development?

1.4 Objectives

1.4.1 General objective

The general objective of the study is to investigate the main challenges and opportunities of community-based integrated watershed development for sustainable rural livelihoods.

1.4.2 Specific objectives

1. To assess the current status of integrated watershed development in the study area
2. To assess opportunities and challenges of integrated watershed development
3. To draw implications for sustainable rural livelihoods

1.5 Significance of the Study

The finding of the study has significant contribution for development practitioners, policy makers, NGOs and government organizations to learn and think more about how to improve the design and implementation of the watershed programs in line with local contexts. In addition, it is not limit to the area understudy but also used in other areas which would have similar socioeconomic, institutional and natural resources backgrounds. Moreover, it would become as guideline how to incorporate jointly key issues of integrated watershed development, and sustainable livelihoods.

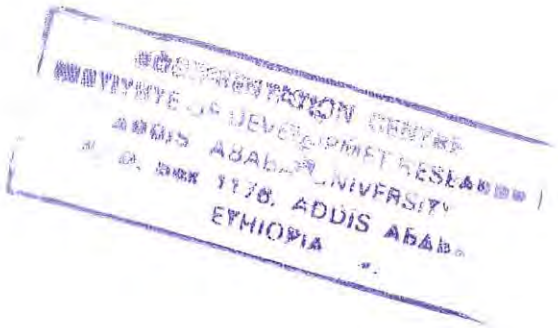
1.6 Scope and limitation of the Study

The study was carried out in small portion of the area, where the case exists and limited to case study on biophysical, socioeconomic, institutional, technical and technological issues. These was not addressed the practical investigation of soil physical and chemical analysis of different factors that influence production and productivity in the watershed.

1.7 Organization of the Thesis

This paper has structured into six chapters. The first chapter provided the background of the problem and justification for the need to research. While the second chapter discussed theoretical and conceptual issues related to the study and reviewed empirical studies about

the thematic areas. The third Chapter provided and described the methodology employed; the fourth chapter provided descriptions of the study area. The fifth chapter presented the key findings and discussed the results of the study. The final chapter provided conclusions and recommendations in promoting the opportunities of livelihood strategies due to the watershed and minimizing the challenges that had adverse effects on livelihood sustainability.



CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Concepts and definitions

2.1.1 Watershed

A watershed can simply be defined as any surface area from which run off from rainfall collected and drained to a common point/out let. It is synonymous with a drainage basin or catchment area. At socioeconomic level a watershed includes people, their farming system and interactions with their land resources, coping strategies, social, economic and cultural aspects (Lakew et.al ,2005).In line with this, Achouri (2002) also defined as an area that water at surface or subsurface flow to a given drainage system or common outlet. It is the basic building block for land and water planning.

2.1.2 Watershed development

Watershed development is the integration of appropriate technologies and strategies within the natural boundaries of a watershed or drainage basin for optimum development through conservation, regeneration and judicious utilization of all resources: land, water, animals and human (Lobo, *et al*, 1992 as cited in Li Qianxiang *et al*, 2005). In another way, watershed development can also be defined as an interactive process of integrated decision-making regarding uses and modifications of land and water within a watershed (Li Qianxiang *et al*, 2005).

2.1.3 Integrated Watershed Development

Watershed has been the most favored program to resolve the dilemma of environment and development. Growing concern of poverty, population growth and environmental degradation has led to increasing public investment towards integrating resources through watershed development. These kinds of public investment have increased the area under irrigation, assured water supply and ensured optimum production techniques, subsequently increased the yield in agricultural output. This ensured employment opportunities, reduced immigration of labor force and improved the capacity of people and crops to withstand extreme droughts (Saravanan, 2003). Integrated watershed development and management is a two side of cent. Importantly, FAO (1986) define integrated watershed development/ management as:

The process of formulating and carrying out a course of action involving manipulation of natural, agricultural and human resources on a watershed to provide resources that are desired by and suitable to society, but under the condition that soil and water resources are not adversely affected. Watershed management must consider the social, economic and institutional factors operating inside and outside the watershed. Integrated watershed management is a holistic area-based planning process that extends the government's policy on sustainable natural resources management and development activities.

In fact, watershed management integrates various aspects of forestry, agriculture, hydrology, ecology, soils, physical climatology and other sciences to provide guidelines for choosing acceptable management alternatives within social and economic aspects (Anchouri, 2002).

2.1.4 Community based watershed development

Community based watershed development defined as the rationally and socially acceptable utilization of all the natural resources for optimum production to fulfill the present needs with minimum degradation of natural resources such as land, water and environment. It should be underlined that people's need and aspirations drive the planning process here. Local farmers, other land users, and the wider community who depend on the land must be involved in all stages starting from the very beginning of the planning process to implementation, monitoring and evaluation since they were the ones that lived with the result. Consequently, it emphasized that the adequacy of planning depends on the human element and not only on the physical or technical aspects but social, economic, environmental, technological and local institutional aspect. Therefore planning must start from the people living on the land (Lakew *et al*, 2005). From the same source, it also noted that the key for the success of community based watershed development in creating a self-supporting system, which was essential for sustainability, lies on people's participation and integration.

i. Principles of community based integrated watershed development

As pointed out in Lakew *et.al* (2005), the main principles of community based integrated watershed development practices included: First, Participation, Watershed communities involved in all stages of planning, implementation and management of activities undertaken. Different participatory techniques had used based upon existing and innovative experience. Second, gender sensitive, Women, as parts of social group involved in watershed development planning, implementation, and management indispensable to ensure that they equally benefited from the various activities. Third, building upon local experience, strength and works, this local knowledge was an essential to improve existing technologies adapted new ones and managed natural resources. Fourth, Realistic, integrated, productive and manageable, watershed development planning should base upon local capacity, locally available resources and other forms of government and partners support. Fifth, watershed logic and potential points that had been given considera s manageable size, interactions between land use and their capability, biophysical and al requirements, production enhancement activities, optimize productivity per unit a er unit time, per unit of water, emphasis on quality physical structures, vegetative co nd biological measures, reclamation and rehabilitation of degraded and marginal land th, the need for flexibility at different levels, flexibility had been a key criteria requi ne participatory watershed development to fit in to local conditions. Seventh, cost g and empowering that was building ownership required by stakeholders. Eighth, co ites to sustainability of projects for establishing and Strengthen responsibility of various stakeholders in the management of assets created. Ninth, complementary to food security and rural development mainstreamed.

ii. The need for community based integrated watershed development

Early soil and water conservation programs in the United States, Eastern Africa and South Asia promoted a very narrow range of technical solutions to control soil erosion. Two key assumptions appear to underlie the design of such programs. The first is that soil conservation practices were universally applicable, that what works in one place will work in another. The second assumption is that local farmers are unaware of erosion and ignorant

of its causes and consequences (Pretty and Shah, 1999 as cited in Nancy et al, 2001). More often than not, both assumptions found out not working. According to the review by Nancy et al (2001), program technologies were both ecologically and economically incompatible with local farming system. Moreover, being impose on people as the way to prevent erosion, they came to replace rather than supplement local methods of soil and water management in places where these had practiced. They also added that either result of these centrally controlled soil and water conservation programs has been more erosion rather than less or because the new structures none maintained or because they were simply technically inferior to existing practices. Disappointingly, these assumptions are still evident in the design of many current watershed development projects, successors of the earlier large-scale soil and water conservation programs. ENTRO (2006) report verifies that in Indian and East African context, where a great deal of emphasis has been placed on watershed development, most of watershed development projects are still based on conventional approaches emphasizing physical planning without attention to local economic, and social aspects. Over all in response to the technical, social and economic failures of many past efforts in soil and water conservation, recent years have witnessed the growth of more communities based approaches to watershed development.

2.1.5 Participatory watershed Management and its linkages to Institution and overall development

Participatory watershed management considered a management strategy aiming to reduce poverty, conserve natural resources and promote good institutions, social linkage and economic returns. The development strategies which linked via institution particularly communities based has been used to access and control over resources. Community-based institutions were established with to empower the community and thereby helped to became master of own destiny by mobilizing and using own resources (knowledge, material, money, social capital, etc.) as well as by demanding-on the behalf of the poor and the marginalized groups whose voice were not fully respected the community human, social and economic rights. A community-based institution normally helped to ensure the sustainability of the development activities by developing in the community a sense of ownership with regard to the activities. A more positive empowering of individuals and

communities resulted in an ability to control their community resources and made decisions pertaining to their lives.

The institutionalization of community based integrated watershed development bonded the community together and gave them extra trust to regenerate the economic and social background and by and large, broaden their vision so as to protect and manage the environment for sustainable rural livelihoods (Kerr, 2004).

2.1.6 Definition of livelihoods

Livelihood is the most important concept used in this study. The study shares the definition given by Chambers and Conway (1992):

> *A livelihood comprises the capabilities, assets (stores, resources, claims and access), and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base and provide sustainable livelihood opportunities for the next generation: and which contributes net benefits to other livelihoods at the local and global levels in the long and short term (pp.7-8).*

In line with the above definition, the components of sustainable livelihood (vulnerability context, assets, mediating institutions, livelihood strategies, and livelihood outcomes) are concepts of sustainable livelihood approach for community based integrated watershed development. The livelihood asset or capital includes human capital, social capital, financial capital, natural capital and physical capital. The details of each asset are discussed below.

i. Livelihood Vulnerability Context

Livelihood Vulnerability Context forms the external environment in which people exist and gain importance through direct impacts upon people's asset status in the watershed. In this study, it comprises Trends (i.e. resource trends), Shocks (i.e. human, livestock or crop health shocks; natural hazards) and Seasonality (i.e. seasonality of prices, products or employment opportunities) and represents the part of the framework that lies furthest

outside stakeholder's control. Not all trends and seasonality considered as negative; they can move in favorable directions, too. Trends in new technologies or seasonality of prices had used as opportunities to secure livelihoods.

ii. Livelihood Assets

Livelihood assets, the livelihoods approach concerned first with people. Therefore, an accurate and realistic understanding of people's strengths (here called "assets" or "capital") is crucial to analyze how they endeavor to convert their assets into positive livelihood outcomes in the watershed.

a. *Human Capital*: it represents the skills, knowledge, ability to labor and good health that together enable people to pursue different livelihood strategies in which the technical aspect focused and achieve their livelihood objectives.

b. *Social Capital*: it comprises networks and connectedness that increase people's trust and ability to cooperate or membership in more formalized groups and their systems of rules, norms and sanctions.

c. *Natural Capital*: It represents the natural resource stocks from which resource flows and services (such as land, water, forests, erosion protection, biodiversity degree and rate of change)

d. *Physical Capital*: it comprises the basic infrastructure, equipments, tools, technology and producer goods needed to support livelihoods.

e. *Financial Capital:* it comprises economic activities (income, credit) those were the important availability of cash or equivalent that enables people to adopt different livelihood strategies.

Among the five categories of assets, financial capital probably the most versatile as it converted into other types of capital or it used for direct achievement of livelihood outcomes (e.g. purchasing of food to reduce food insecurity).

iii. Mediating Processes

Mediating Processes are institutions, participations, processes, policies, and that determining access to livelihood assets to pursue livelihood strategies. These developed through formal and informal institutions. In the context of this study, formal mediating institutions include the different administrative structure, laws, and NGOs. While informal once include Kre /Idir/ (financial and social association used for collaboration in the death of members), Mahber (mostly practiced in Christian religious followers and has social and economic function), Senbete (the same with Mahber but based on some saint days), Wonfel (kind of collaborative working practiced for agricultural activities, wedding, harvesting and land preparation).

iv. Livelihood Strategies

Livelihood Strategies are organized sets of lifestyle choices, goals and values, and activities influenced by biophysical, political/legal, economic, social, cultural, and psychological components. In the context of the study, livelihood strategies are strategies, which communities of the watershed households have experienced to lead the life using either farming or non-framing activities. 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.

v. Livelihood Outcomes

Livelihood Outcomes are the results of combination of different assets using livelihood strategies. It could be desirable (positive) due to opportunity and undesirable (negative) outcomes due to challenges according to different situations and factors respectively.

vi. Sustainable Rural Livelihoods

Sustainable Rural Livelihoods, the concept 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, natural assets through various livelihood strategies (e.g. farming, micro- and small enterprises, etc.) for the purpose of achieving

certain livelihood outcomes (e.g. food security, income generation, etc.). This conceptualization of livelihoods further expanded through the Sustainable Livelihoods Framework (SLF) (Scoones, 1998; Bebbington, 1999). In order to improve the livelihoods, interventions should improve peoples' access to livelihood assets. The interventions should then improve their capabilities to select appropriate livelihoods strategy to achieve their livelihood outcomes. To start with, the interventions, proponents of this framework recommend reforming the existing rules (including the rules of making these rules) that people created which determine how people access the necessary livelihood assets. These existing rules and systems of making rules are also commonly referred to as institutions (Regmi et al, NY).

The term "Sustainable Livelihood" is used here to refer to a livelihood that can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Hussein and Nelson.J, NY). Sustainable Livelihood Analysis (SLA) was an established mechanism in this context. Mainly five stages of analysis: vulnerability context, livelihood assets, policies and institutional processes, livelihood strategies and finally livelihood outcomes were applied. Livelihood assets were contextualized mainly human capital, natural capital, financial capital, physical capital and social capital (Kollmair and Gamper, 2002).

2.1.7 Integrated watershed development and sustainability linkage

Watersheds are the most appropriate spatial units on the terrestrial landscape for managing natural resources. They contain and define the geophysical and ecological processes related to surface water and its movement to a common point. Human modification of these units, their soils and vegetation has a direct impact upon the delivery of water, sediments, and nutrients into these river drainage systems. Watersheds therefore integrate the interrelations between key natural resources and human activity within a natural geographical and biophysical unit. It is because of these attributes that water and land resources can be best managed on the watershed scale and that the concept of watershed development has emerged (FAO, 2006). The core focus of watershed development is to maintain the ecological health within a watershed by controlling the quantity and quality of water. It is the process of guiding and organizing the use of a watershed's forests, land and other

resources to sustainable provided people with desired goods and services and without adversely affecting ecology. This recognized the interrelationships among land use, soil and water, the linkages between upland and downstream areas, and the numerous types of stakeholders. Thus, stakeholder participation and collaboration was crucial for successful and integrated watershed development for sustainable resource management (Siligato, Feldkotter, and Tuyll, NY).

2.1.8 Watershed Development and sustainable Livelihood nexus

Involvement of local people is the core of micro watershed based -resources conservation as (Sharma et al 1997 as sited in Woldeamelak, 2003) define 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 objective is thus development at the local level through appropriate use and management of natural resources made by local people at the local level .It is about local people taking a coordinate local level action for proper management of resources to control their own destiny in the development process. In the 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 Integrated watershed management (IWM) generally leads to effective resources conservation and improved rural livelihoods (Woldeamelak, 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. Additionally, enhancing groundwater recharge is often designed and implemented with little regard for their impact on the livelihoods of people, farm profitability, or social equity (Pretty and Shah, 1999; Johnson and Knox, 2002 as cited in Azemeraw, 2010). More recently, watershed management programs sought to embed the local participatory planning processes initiated as part of the participatory watershed initiatives within broader social and political processes more explicitly (FAO, 2006). The focus shifted from working directly with local groups on land and water issues to supporting multi-stakeholder

negotiation platforms to address a range of issues including but not limited to natural resource management but focused on livelihood sustainability (FAO, 2006).

2.2 Review of Empirical Studies

Different studies are conducted on watershed development. As a result, different views based on their empirical findings have been reflected on the issues related to watershed development and sustainable livelihoods. In the following sub-sections, review of empirical studies by different authors is discussed.

2.2.1 Empirical Lessons learned from watershed experiences

i. World Experience

According to Kumar (2007), watershed management is most likely to fail in areas where there is less resource dependence and there is not a homogeneous social group involved in the work. Besides, the study found out that, community participation fails more frequently when there are no other formal or informal organizations involved in the intervention. Another study conducted in Kenya by Isaac in 2009 using survey design indicates that integrated watershed management is fostered by participatory efforts exerted in the critical biophysical, socioeconomic conditions and suitable institutional structures that are being established. According to the study, participatory/integrated watershed management has been widely accepted and considered as an effective way of managing watershed resources in Kenya although implementation of this approach in practice remains a challenge.

These findings also seriously question the optimistic approach in popular and policy-level discussions that treat watershed based development as the new panacea.

Finally, the authors of this study contend that the Watershed management needs to be restructured significantly, if the watershed development approach has to deliver what it promises. Such a restructuring must clearly embrace a normative framework that treats livelihoods, productivity, sustainability, equity and decentralized governance as its central concerns, and must be based on strategies that respond to the varying socio-ecological contexts and experiences with implementation. In line with this, Achouri (2005) noted that

the reasons why many watershed management programmes in Africa failed to achieve their objectives. First, too much focus on natural resource conservation, they designed in little attention to human activities, priorities and needs of people. Second, they neglect the beneficiaries' involvement and contribution to planning and implementation of the watershed management interventions.

ii. Ethiopian Experience

Aklilu (2006), in Beressa watershed verified, the majority of farmers believe that erosion halted, and they used a range of practices for erosion control and fertility improvement though most farmers have developed negative attitudes towards externally recommended measures. As pointed out in the study, participation and consideration of farmers' conservation knowledge and practices identified as a key to the success of conservation practices in the study watershed. An assessment report by GTZ (2005), the watershed development intervention of South Gonder verifies that lack of strong local institutions, failure in community consultation and participation were the most important factors those contributed to the failure or obstacle for better achievement of the intended objectives in some watersheds.

Another study conducted by Woldeamlak in 2003 in East Gojjam zone, Amhara Regional State on the extent of farmers' participation in soil and water conservation activities revealed that majority of the farmers participated in the soil and water conservation activities against their will. According to this study majority of the farmers considered soil and water conservation activities that were underway in their communities to be a mandatory development work in which the village administration and development agents of the area forced them to participate. As pointed out in the study, the most important factor discouraging them from participating freely was the perceived ineffectiveness of soil and water conservation structures under construction.

2.2.2 Livelihood assets and its empirical studies

Access to formal and informal credits, farm inputs, and membership to different local institutions are important livelihood assets that derive the communities to take part in non-agricultural activities. These assets also widen options and open up opportunities for

increasing agricultural production through access to draught power, purchasing of farm inputs and implements (Adugna and Wagayehu, 2007; Barrett, et al, 2001). Agricultural technologies (such as hybrid varieties and other yield-enhancing technologies) improve the efficiency of the system, increase its productivity, and therefore, play a key role in poverty reduction. With the same token, Workneh (2006) revealed that increasing farm production via improve technologies is less debated option for agricultural households under the existing growth rate and have limited non-agricultural employment opportunities in the countries. However, Manyong et al (2007) reflected that most households considered that these coping strategies were not effective as they lack access. Thus, the higher the farm inputs, fertilizers, and HYVs, herbicides and pesticides utilizations, the higher the production and income earning could be (Arega, 2003; Dessalegn, 2009).

Likewise, memberships to different local institution of different kind mediate the household to gain livelihood assets, which could motivate livelihood diversification to both agriculture and non-agriculture (Adugna and Wagayehu, 2007 as cited in Reta, 2010).

The non-agricultural sources of income are equally important to agricultural and it reduces poverty. A 10% increase in the share of off-farm income in total income would reduce the household's probability of being poor by about 34% (Manyong et al, 2007). This implies that poverty reduction strategies must consider income-earning opportunities for rural households beyond farming (Reta, 2010).

2.2.3. Integrated watershed development and its livelihood strategies out come

There are two possible outcomes of alternative livelihood strategies. These are tradeoff between desirable, often inclined to be sustainable and undesirable inclined to unsustainable (Scoones, 1998). These outcomes were not the result of a single category of livelihood strategies but the mix of them. This strategy has several advantages, especially for poorer households because agricultural resources are often too limited to allow efficient use of all household labour, and non-farm activities in the watershed. In addition, off-farm employments of a household member provided an ongoing income subsidy to rural residents, which are especially useful for highly populated villages and resource scarcities. These provide opportunities for short-term casual and long-term employment of smallholders. The former often provides temporary financial relief for village residents

during peak cash demands such as payment of school fees, bride prices or other customary obligations (Koczberski, 2001 cited in Reta, 2010).

The access to credit service facilitates are essential for economic development with the possibility of creating micro-firms, the development of skill-based/craftsmen entrepreneurship beyond locality and local businesses which create employment. As this economic sector grows, non-agricultural economic activities could expand, which reduce the increasing rural unemployment due to population growth and limited agricultural land, and minimize the pressure on the fragile land resource and enhance its management. It is often the case that the poor do not have financial capital to pursue and widen livelihood options. Neither they are being able to save considerable amounts of money as no surplus in the household economy (Dyner, Alvarez, and Cherni, 2005).

2.3 Operational concept and Analytical frame work

2.4.1 Concepts

Integrated watershed development is a complex and somewhat abstract concept to comprehend. It has been complex processes because it involved many actions at different level of natural and human systems. It is embedded in wide ranges of environmental, economic, technological, technical, social, physical and institutional intervention that able to contextualize in to natural, financial, physical, social and human capital when these considered being investigated and practiced from sustainable livelihoods perspectives.

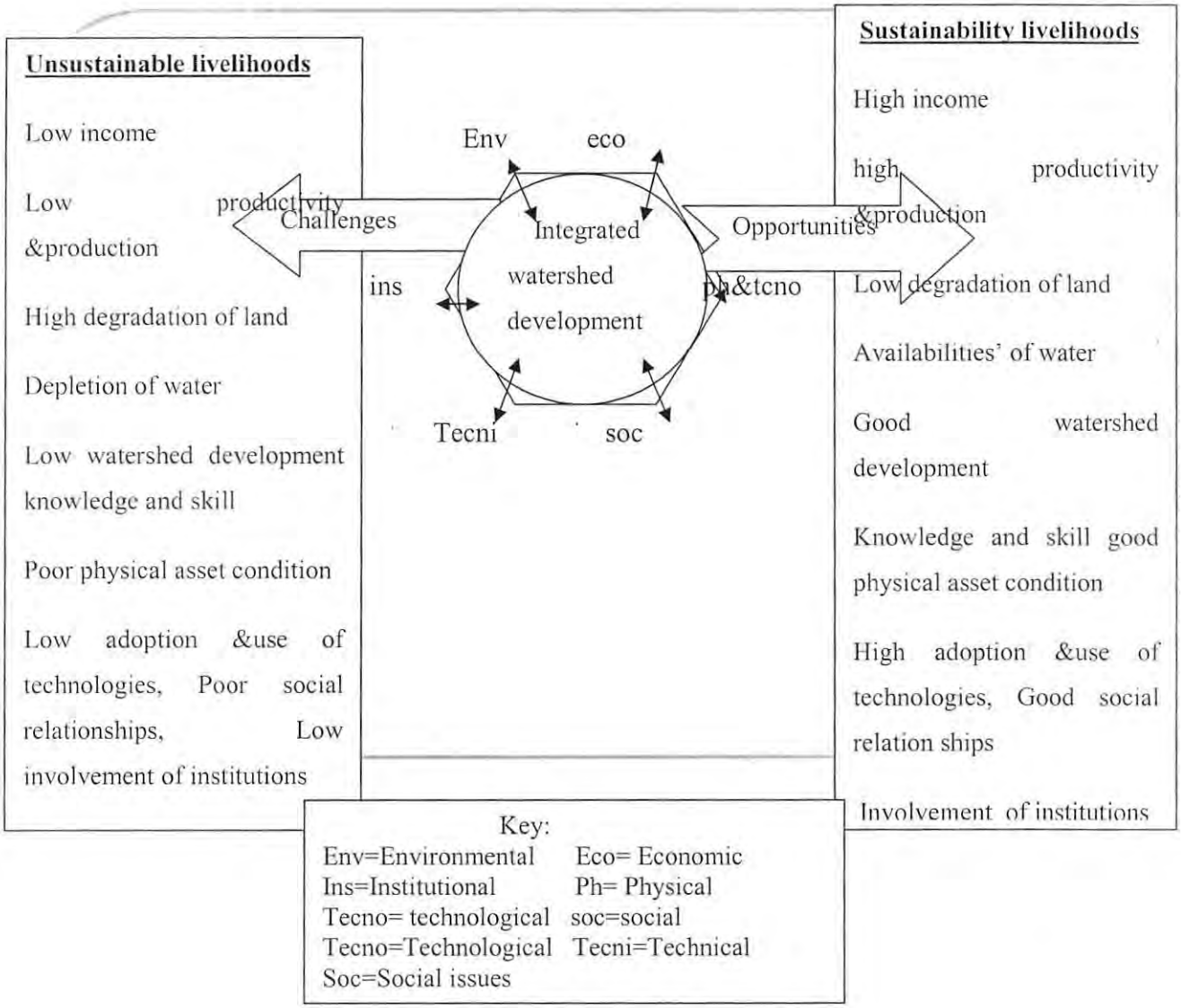
2.4.2 The Analytical Framework

In this study, sustainable livelihood approach was used as guiding framework for integrated watershed development intervention and its nexus with the livelihoods. The framework consists of different components, which are interrelated to each other being one dependent on the other. The major components of the framework are the context (trends, shock, and seasonality affecting livelihoods), livelihoods assets (human, social, financial, natural and physical assets), mediating institutions and, livelihood strategies (agricultural and non-agricultural), and livelihood outcomes, which are the results of different components and their interactions. With in this context of sustainable livelihood

framework, the integrated watershed key elements namely: biophysical, socioeconomic, institutional, technical skill and knowledge, and technologies are parts and parcels.

Therefore, integrated watershed development as the major deriving force as challenges and opportunities to access and control over available critical livelihood assets (human, social, natural, financial and physical assets), has direct focus on the livelihood strategies (dynamism) and the outcomes. From sustainable livelihood frame work in which community based integrated watershed development, consider to be put at the center of asset pentagon.

FIGURE 1: ANALYTICAL FRAMEWORK



CHAPTER THREE
RESEARCH METHODS

3.1. Research Design

To conduct this study, the cross-sectional survey design with the application of both qualitative and quantitative approaches was employed following the sustainable livelihood framework as guiding approach.

3.2. Sample Size and Sampling Procedure

i. Types of sampling and procedures

The study was involved a multistage sampling, i.e. a combination of purposive, stratified, and simple random sampling procedures to select the study area and sample households. The strategy used to identify the study area and sampling procedures involved the following steps. First, the Woreda was purposefully selected because, its food insecure; causes of food shortages include erratic rains, highly degraded farmlands, shallow and infertile soil, pest infestations and livestock diseases. Then after, the watershed Terri was selected purposively, due the fact that is has become many years ago since its establishment and intervention compared to the other watershed in the study area. After this, the sampling frame population and the sample size in the watershed communities of HHs were determined.

To draw the sampled households, the households in the Terri watersheds were stratified into two categories proportionally male and female households based on the population size of male and female-headed households so to avoid the bias in generating sided information.

ii. Sample size

The sample size was decided based on sample size determination formula, which was given a care to have the sample size of the study to be as representative as possible in accordance with the time and budget billed. Having this into consideration, out of 292 households in the watershed the following formula adapted from Israel (1992) was used.

$n=N/1+N\ (e)^2$ where; N= the total population that had been studied

n= the required sample size

e= the precision level which is = (±10%) Precision Levels

Where Confidence Level is 95%

$292/1+292(0.1)^2$= 75.Of which proportionally, 63 of them would be male household and the remaining 12 would be female households.

3.3. Data sources and Collection

i. Data Sources

The data for this study were generated from both secondary and primary sources of data focusing on both qualitative and quantitative natures.

a. **Secondary sources:** The secondary sources of information including, research journals and articles, internet sources, different agriculture and rural development office reports, and document reviewed at different levels of government organizations were used.

b. **Primary sources:** the primary sources of the thematic issues were focused on the status of integrated watershed developments; challenges of integrated watershed development; opportunities of integrated watershed development; the alternative livelihoods so far pursued; socioeconomic aspects ; the biophysical situations; technological and technical aspects of the watershed obtained. The sources of the information were key informants, focus group discussants, field observation and photograph, household survey participants.

ii. Data Collection methods

The field study combined Key Informant Interviews (KIIs), Focus Group Discussions (FGDs), and Household Surveys, Direct Observations and Transect Walks and case story.

a. Key Informant Interviews (KII)

Key informant interviews were conducted with different individuals at different levels. At the PA level, individual interviews with two elderly people, one KA chairperson, one kebele manager and three development agents. Further, at the Woreda level, mainly one Agricultural and Rural Development Office head, one Woreda Women Affair office head, and one expert of women affair were interviewed.

b. Focus Group Discussions (FGDs)

Two focus group discussions were carried out within the watershed committee teams, one at kebele and the other at Woreda level teams. Each group involved ten individuals. The discussions focused on the status of integrated watershed developments, challenges of integrated watershed development and opportunities of integrated watershed development, and the attitude towards different alternative livelihoods and their outcomes on NRM with Challenge and opportunity pair wise matrix were held comparisons among key integrated watershed development factors using pair wise matrix.

c. Field Observations and Photographs

During field surveys, three transect walks down the watershed were carried out with the guidance of the Kebele chairperson and watershed committee team leader, including voluntary farmers, an enumerator, development agents (DAs), and the researcher. In so doing, the researcher had taken notes on specific observation in advance. During the observation period, information were also gathered from different members of the community. The natural resource distribution (trees, forest, rivers, etc.), and the settlement patterns were observed as part of the data collection process.

d. Household Surveys

The household survey using the semi-structured questionnaire was the major data collection process of the study. The questionnaire involves both open and closed-ended questions. It was prepared in English and was translated into Amharic, which is the local language of the study area. Before, collection of data, the questionnaire was pretested with few individuals who are not members of the sampled households. The data were collected by enumerators were given training before data collection was commenced.

e. Case story

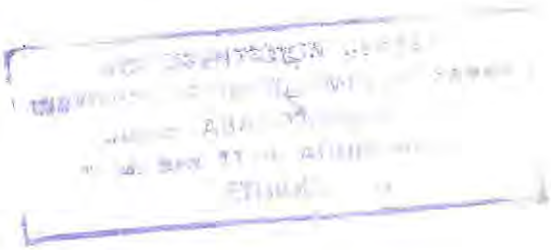
To consolidate the information obtained using different instruments, the case studies were parts of data collection process. There were total of six household for case study (stories), of which the six case households three households were be male headed and three were female headed. From both males and females one elder, one poor, one youth of the watershed communities were involved.

3.4. Data collection tools

The main data collection tools, which were used to investigate the required data, were FGDs and KIIs guide, observation checklist, Structured and semi-structured interview schedules.

3.5. Data Analysis and Presentation

Combinations of qualitative and quantitative methods were employed for data analysis. Quantitative analysis was employed Statistical Package for Social Science (SPSS). The data were edited and coded before entering into the cells of SPSS. The qualitative data, which were generated from different sources were analyzed qualitatively, and the results of the key findings has been displayed in the form of narrations, graphs, diagrams, tables, and pictures to provided evidence and to support the qualitative information.



CHAPTER FOUR

BRIEF DESCRIPTION OF THE STUDY AREA AND STUDY POPULATION

4.1. Brief description of the study area

Delanta Woreda is located in northeastern Ethiopia, in the Eastern Amhara Region South Wollo. It is one of 22 South Wollo Woredas'. It bordered between Wadla and Gubalafto Woredas in north; Dawunt Woreda in the west; Tenta Woreda in the South; and Ambasel Woreda in the East direction. The mighty Beshilo River circumvents Delanta and most central high land of Ethiopia. Beshilo delineates mitts Delanta from Ambasel and Tenta. It is a food unsecured area with a long history of involvement in food aid programs. The major causes of food shortages include erratic rains, highly degraded farmlands, shallow and infertile soil, pest infestations and livestock diseases (Delanta Woreda, 2009; 2008).

Wogeltena, the capital town of Delanta is about 98 km away from Dessie to the north west (the capital city of South Wollo zone),with which it is connected through a dry weather road. There are about 36 peasant associations (PA) in the Worda. According to information obtained from Woreda Administration Office, the population of the Woreda is estimated to be 128,411people, of which about 7,847 are urban dwellers and the rest are rural. The Woreda consists of high plateaus, 2009 to about 3500 m.a.s.l, and the gorges of the Beshilo descending to altitudes of about 1500 m.a.s.l at the bottom of valleys on which the Terri watershed present in Goshmeda kebele. Delanta mainly consist of moist "Dega" and dry to moist "Woina Dega" agro climatic zones with a limited area in the "wurch" (frost) zone. The specific micro-watershed is found in Goshmeda Kebele, 17 kms fared at Wogeltena and its elevation above sea level is 2320 meter on the upstream position of the watershed to 1500 meter in lower stream at the bottom a valley of Beshilo and It is located about 71 km from Dessie (Delanta Woreda, 2009).

According to the project document report, the total area of the project is estimated to be 574 hectares with a population of about 1661. Out of the total 574 ha, annual crops cover 222.75 ha; forest covers 255.25 ha; and pastures cover 59 ha; miscellaneous land 12 ha and village 25 ha. Mixed production of crops and livestock are the corner stone of the area's

economy. Agricultural activities are dependent on the '*kiremet*' rains, which fall from May to October except out of the potential area of 54 hectares, 30 hectares that had been cultivated by irrigation via both water harvesting structure and irrigation scheme mechanisms. The average land holding size of the watershed communities is about 0.5 ha per household. The major crops cultivated in the area are *teff*, pea, sorghum, lentil, chicken pea, wheat and bean, and the bulk of produced are used for household consumption. Raising sheep, cattle and goat are the key economic strategy besides crop production. Sheep and goats are the more commonly sold livestock to supplement the household income and to cope with livelihood shocks (Delanta agriculture office, 2008).

4.2. Brief description of the Project

Terri watershed is one of the watersheds implemented in the Woreda by managing of environmental resources to enable transitions to more sustainable livelihoods (MERET) project. The MERET project has been assisted by World Food Program (WFP) and was executed through the Ministry of Agriculture, Soil and Water Conservation Department as well as the Forestry and Wild Life Conservation of Development Authority.

The organization of the project undertakes activities in the watershed and down to peasant associations through their branches at regional, provincial and district levels. The regional branches play a coordinator role while the later two are engaged in the actual local planning, implementing, and monitoring of the activities. On the other hand at Woreda and communities level there is no an independent institutions which own and run the project. It is pulled with the office of agriculture and rural development (Mintesnot,2007).

The mode of project implementation and central objective as pinpointed according to Betru (2006), is to link the short-term food assistance with the long-term development opportunities in sustainable ways.

The specific objectives intended to be met in the watershed illustrated:

- To bridge the food gap between production and demand in the project area via providing temporary food assistance for sustainable development and food security

- To build the capacity of the implementing government and that of the community to improve the qualities of the development plans and their achievement
- To rehabilitate and sustain or increase the production capacity of degraded lands through appropriate soil and water conservation, afforestation, and land management intervention
- To reduce the crisis of the communities facing during dry periods as result of shortage of water and minimize the shortage of timber, fuel wood and livestock feeds in the project area
- To contribute the control of environment imbalances arising from loss of moisture, vegetation, productivities e.t.c

4.3. The Demographic and Socio-economic characteristics of the Study population

Based on the data generated from surveyed households, the socio-economic and demographic characteristics of study population, which include sex, age, marital status, family size, educational status, land ownership, and major occupation of the households is briefly described below.

4.3.1. Demographic characteristics

According to the survey result, the demographic features of the households in the watershed namely, age, sex, marital status, and family size of the respondent discussed here.

From randomly taken household respondents, the majority 89% are found to be the range of 15 and 64 years old, while rest 11% of household respondents are above 64 year old. From this figure, it could be know that the majority of respondents are under production age group.

The marital status of households in the study area can be categorized as single, married, divorced, and widowed. As result of the survey data, the majority of the respondents in the study area are married accounting about 74% of the total respondents followed by those

who divorced 15%. Out of 73 respondents, only 8 or 11% are found to be widowed and no respondent of household was found single.

Among the demographic characteristics of households, the family size is the most determinant. As the data obtained from the survey indicated, about 4.1% of household respondents are having registered the family size between 1-2 individuals per households. The majority of the household respondents 68.5% have the family size of between 3 and 6 individuals per household, while about 27.4 % of household have registered the family size of more than seven per household, which is more than the national average.

4.3.2. Socio economic characteristics

Amongst the various socio-economic factors that are expected to influence watershed development intervention, major occupation, main sources of income, and educational status of the household were described briefly in this section. According to the survey, the major occupation was farming and the main sources of income were crop, livestock and off-farm income saved. Out of 73 respondents 84.9 %, 2.7%, 12.3% respondents were crop, livestock and off-farm income generating respectively are the main source of income for households.

As far as the educational status of respondents is concerned, about 53.4% of the total respondents have had access to either formal or informal education that enabled them to read and write. Of 53.4 respondents, about 41.1% are between grades 1-4, and 12.3% are between grades 5-8. The remaining 46.6% of the respondents are found to be illiterate.

In the study area, the majority of the respondents from the watershed community are Muslims, who account about 79.5% of the total sampled households and the remaining 20.5 % of the household respondent are Orthodox Christian religion followers. However, the data obtained from Delanta Woreda Agriculture and Rural Development Office indicated that from the total population of the Woreda, Muslim religion followers account only 3% of the total population. This is due the fact that the Kebele where the watershed exists is predominately, Muslim religion followers' settlement.

CHAPTER FIVE

CONTEXT, LIVELIHOOD ASSETS AND ACTIVITIES

Understanding the context where rural households are in is very important for the livelihood analysis. It is also know that the contexts, which include the shocks, trends, and stresses associated with different factors (in the case of this study, associated with Terri Watershed and its challenges and enabling opportunities) shape the livelihood assets used and the strategies pursued by the households. In this chapter, the vulnerability context, the critical livelihood assets, and the livelihood activities experienced based on available assets are presented.

5.1. Vulnerability context (shock, stress, Seasonality and watershed degradation)

The vulnerability factors analysis is now customary in the analysis of livelihoods to identify the shocks and stresses with which people must cope. Sometimes this is done as part of a discussion of the vulnerability context of those livelihoods'(Turner, 2003). Households are vulnerable to different kinds of problems, shocks, stresses, and changing trends. Based on the data obtained from different sources, the context of household is discussed in the following sub-sections.

The information gathered from FGD, KII, case story and reports of the Keble revealed that the main vulnerability factors of the watershed community before intervention were multiple. These were the frequent occurrence of drought, erratic and uneven rain fall distribution, poverty, low technology adoption, land scarcity, land degradation, low crop productivity, livestock disease, shortage of fodder and pasture, lack of motivation of the community to get rid of from poverty net are some to be mentioned. According to their justification, all these resulted low productivity and production for the study area. Some of these challenges still exist and some are reported to be reduced due to the intervention. Among persistent factors, erratic and uneven rain fall distribution, poverty, low technology adoption, land scarcity, livestock disease, shortage of fodder and pasture are still existing. However, land degradation, even drought relatively has been moderately reduced. Pertinent to this, the result of survey data show that out of 73 respondents more than half them, representing 54.8% said that the extent of drought as challenge is medium. On the other hand, the existence of fair seasonal crop price and presence of Work-for-Food

intervention have been mentioned as medium in terms of creating enabling opportunities for better livelihood options. Accordingly, 47.9 % and 42.5% for the existence of the fair seasonal crop price and Work-for-Food program respectively are mentioned medium in term of creating opportunities (see the table 1 below).

Table 1: vulnerability Context (trend, shock, and seasonality)

Opportunities due to seasonality	Frequency (count)				Percent (%)			
	Low	M	H	T	low	M	H	T
Existence of fair crop price	20	35	18	73	27.4	47.9	24.7	100
Extent of presence of food for work	26	31	16	73	35.6	42.5	21.9	100
Challenges								
Extent of drought falls	20	40	13	73	27.4	54.8	17.8	100
Hunger/food crises	17	48	8	73	23.3	65.8	11	100
Low harvest	19	47	7	73	26	64.4	9.6	100

Key :M=medium, H=high, T=total

Source: Own field survey, January 2011

Box 1: A case story of one elderly female

The elderly woman said that before the intervention of the watershed, there was unexpected weather, degradation of soil and high runoff from the steep and hillside areas, which damaged our crop and sometimes there was huge rain that washed away soil, and damages our houses; and there was pest infestation that damages our crops; and I was exposed for begging. In short, I exposed for human and nature due to the situation. However, after watershed project intervention, I relied on Food- for- Work, but not on begging. The physical works that is the soil and water conservation structures that reduce the land degradation show the way of keeping the environment. Still we are depending on nature and poor economical condition. Because of this, if the project stops Food-for-Work, I will come back to begging; what I dislike it. The elderly woman in vulnerability context revealed that the link between integrated watershed development intervention, sustainable livelihood and vulnerability triggered by the fluxes of nature due to the low economic returns of natural resource conservation.

Source: Case story, January 2011

In general, fair crop price and Work- for-Food are the opportunities, but drought, hunger and low harvest were also challenges. In view of these, the majorities' households conceptualized that integrated watershed development intervention are not guarantee for resilience households.

5.2. The Livelihood Assets and Capabilities

This section provides the main livelihood assets possessed and accessed by the sample community in the watershed households. Watershed by its nature is an asset for the community and households. It is an asset of community because of common pool resource and it is an asset for households because of privet resources. Considering the watershed as private as well as common asset, its opportunities and constraining factors are presented in the following sections. For the sake of clarity and simplicity, the assets are categorized according to DFID (2000) into natural, physical, financial, social, and human capitals. The details of each are discussed below.

5.2.1. Natural capital

Land, together with other resources implanted in it, constitutes the natural capital that, normally, influences the livelihoods of the farmers. This is because the livelihood earnings to be generated from the principal production activities – crop production and livestock rearing – depend on access to land (Degefa, 2005). Access to land is a multifaceted issue that involved the ability to use land and other natural resources. Additionally, it helps to control resources, and to transfer rights to the land to take advantage of other opportunities (FAO 2002b cited in Degefa, 2005).Natural capital, on which livelihoods are derived, key to rural poor who focused, used and fronted his or her life in agricultural livelihood strategies. As in problem statement and in chapter two (literatures review) the main challenge in watershed productivity and production was the degradation of natural resources.

i. Natural Resource Status

The status of natural assets such as farmland, grazing land, forest and water are critically seen in this study. According to survey data, about 89% reported that natural resources:

land, forest, grasses were improved following the MERET project intervention. The data obtained from FGDs, KIIs, case story and observation confirmed the fact that the watershed development intervention improved the natural resources. Whereas, 6.8% and 4.1% respondents said that the natural resources have decreased and remained the same respectively. As the respondents have said it, the area closure which prohibited to use the natural assets in the watershed (see table 4 below) is mentioned to be the reason for decreasing and remaining the same in natural resource. The natural assets have been discussed one by one following this.

Table 2: The Current Situation of Natural Resources in Terri Watershed

Situation of NRs	Count	Percent
Increased	65	89.1
Decreased	5	6.8
Remain the same	3	4.1
Total	73	100.0

Source: Own field survey, January 2011

a. *Farm Land and its trend*

Farmland is one of key natural resources in the watershed for farmers who cultivate land to produce crops. According to FGDs & KIIs, farmlands in the watershed are low in soil erosion due to the physical structure and somehow improve in soil fertility due to organic fertilizer such as compost and dung manure. The Survey result revealed that about 87.7% have their own farmlands, while the remaining households do not have farmland. From this, it could be noted that the majority of watershed community members have their own farmlands. However, those who have the land have an average of 0.5 ha which must feed an average of five families (Delanta Agriculture and Rural Development Office, 2001).

The data generated by FGDs and KIIs indicated that the landholding size of household in the watershed community members do not experienced the change. In line with this, the survey result also revealed that about 68.5% said that there was no change in land holding size. In contrary, 16.4% said there is a change in the landholding size of households with decreasing trends. The reasons of decrement were due to the prohibition to cultivate the steep and hillside communal land. However, 5.5% of respondents said that there is an increment of land holding size. This was due to rehabilitations of the gully on top, bottom

and around the farmland, while the remains 9.6% of household respondents said that they had not sensed it since they do not have farmland.

b. *Grazing land and its trends*

Grazing land is one of the important natural resources of households particularly, for those who exercise animal rearing. According to the data generated from qualitative sources and own observation, the grazing land resources particularly, grasses and pasture in the watershed area is found and observed to be improved. The important thing here was not only improvement of the pasture but also the grassland size. The quantitative data of the study indicated that about 45.2% household respondents said that the trend of grazing land is decreasing followed by 27.4% of household respondents who claimed that the size of grazing land remained the same with before and now. However, about 27.4% household respondents said that the size of grazing land increased.

Even if some respondents verified for the increment of grazing land status due to gully treatment, which rehabilitated degraded areas. Most of the respondents argue on the contrary of this and there is changing of grazing land to farmland, and overpopulation is mentioned to be the contributing factors for decrease of grazing land. This facts supports by the FGD and KIIs discussions as well as the observation assures these. In line with this, Ali (2008) noted that overpopulation increased resource depletion or environmental degradation to a degree that has not been sustainable with the potential of ecological collapse or other hazards.

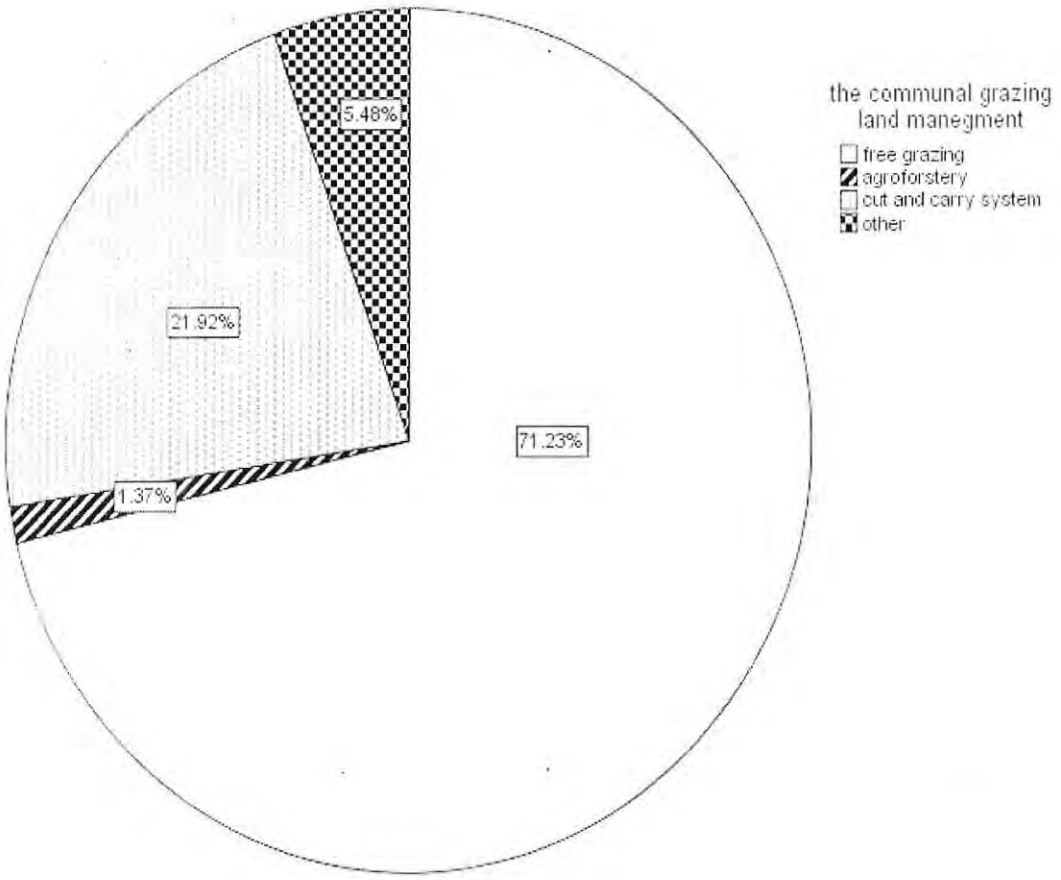
Table 3: Current Status of Grazing Land in Terri Watershed

Grazing land status	Count	Percent
Decreased	33	45.2
Increased	20	27.4
Remained the same	20	27.4
Total	73	100

Source: Own field survey, January 2011

The communal grazing land management was still poor because only part of the watershed area closure had done. The survey result showed that about 71.2% household respondents said the grazing land management was free grazing, whereas the small numbers of the respondent, who are beneficiaries of the area closure said that they managed via cut and carry systems. The remains 6.9% have managed via agro-forestry and haymaking.

Figure 2: The Communal Grazing Land Management



Source: Own field observation, January 2011

c. *Forest and water*

The information obtained from FGDs, KIIs and direct observation revealed that the forest resource in the watershed moderately shown progress. It has also known that different indigenous tree plants' budding and some exogenous plants were introduced in the watershed. Of introduced indigenous trees, Agam (*Carissa edulis*) and Girar (*Acacia hussies*) are some to be mentioned, whereas the exogenous ones are Key Bahirzaf (*Eucalptus camaldulensis*), Sesbania (*Sesbania sesban*), and Gravillia (*Grevillea Australia*) which used to reduce environmental degradation.

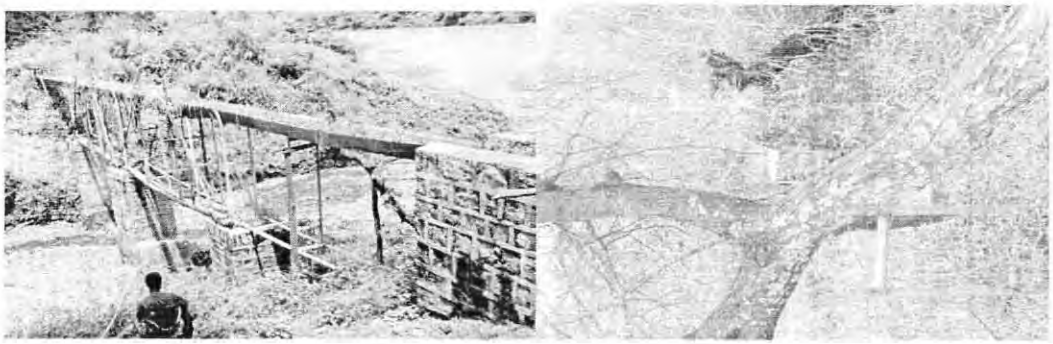
Figure 3: Gravillia in the Area Closure with Grasses

Source: Own field observation, January 2011

d. *Water Resources*

River, spring and hand dug wells are the source of the water for watershed community households. The communities totally rely on these water sources for drinking and agricultural activities like vegetable gardening, and coffee planting. River water particularly, river diversion water is the main source of the irrigation water in the study area. However, conflicts between households over irrigation water have reported to occur. For the shortage of irrigation water, the problem in the structure of canal, which is unable to drain water properly to crop farm, was reported to be the major challenge for the farm household of the watershed community members. This in turn, has constrained household to cultivate crops as the potential of the area. Due to constraints in obtaining clean drinking water for human and their cattle has been reported as the challenge for the households.

Figure 4: From Left Right, the Canal of Irrigation for Previous (Functional) and the Present (Un-functional) one respectively



Source: ARD office and own observation, January2011

ii. Opportunities

There are different enabling opportunities of watershed project to the better livelihood options of households. Natural resources in general and soil and forest in particular have shown improvements after the intervention of the project see the figure 5 below. Considering the different natural resources of the watershed before and after intervention, the opportunities of the watershed are presented in the following table.

Table 4: The Existence of Watershed Degradation Feature Before and After the Intervention in study area

Existence of watershed degradation feature before and after the intervention		Count Frequency			percent		
		Yes	No	Total	Yes	No	Total
On farm land	Soil erosions by water before intervention	68	5	73	93.2	6.8	100
	Soil erosions by water after intervention	33	40	73	45.2	54.8	100
	Soil erosions by wind before intervention	53	20	73	72.6	27.4	100
	Soil erosions by wind after intervention	27	46	73	37	63	100
On communal land	Deforestation before intervention	66	7	100	90.4	9.6	100
	Deforestation after intervention	20	53	100	27.4	72.6	100
	Overgrazing before intervention	48	25	73	65.8	34.2	100
	Overgrazing after intervention	30	43	73	41.1	58.9	100

Source: Own field survey, January 2011

Figure 5: Biophysical Structures in the Watershed

Source: ARD office, 2010

The natural resources development in the watershed and with its improvement benefited both the household and community. With the same token, the information obtained from FGDs, KIIs, and the surveyed households revealed that after the intervention of the watershed, the soil degradation has reduced both in privet farm and in some extent communal land. In connection with it, about 71.2% and 72.6% respondents for private farmland and communal land respectively reported that soil erosion has reduced due to project intervention. In addition to reduction in the soil erosion, access to livestock feeds in the watershed also mentioned to be other opportunity of the project. According to quantitative data, about 67.1% of household respondents said that compared to before intervention, after the implementation of the project better access to livestock feed have been possible. (See the table in the annex table 1).

iii. Challenges

The survey result showed that water resources both potable and irrigation have problems. About 50 % of household respondents in the watershed community claimed that the watershed project has got many problems particularly, potable and irrigations water are the major ones. It is also mentioned that these problems are associated with the problem of structure development, the problem of management and lack of the prober assessment of the problem. The information obtained from FGDs and KIIs confirmed the fact. In addition to the above reasons for the problems of watershed, less concern for key activities and appropriate technologies are also found to be the contributing factors for the problems of observed in the watershed. Even though, there are improvement in some natural resources of the watershed, low, medium and high natural resource degradation by 21.9%, 54.8% and 23.3% of respondents respectively is mentioned to be constraints of the watershed considering the current status.

Table 5: Extent of Natural Resources Degradations as Challenge

Natural resource degradation status	Count	Percent
Low	16	21.9
Medium	40	54.8
High	17	23.3
Total	73	100

Source: Own survey data, January 2011

To sum up the natural capital, even though, there are problems; the natural asset of watershed in general has shown moderate improvements. The enabling opportunities created by the watershed project, helped to reduce the problems of soil erosions by water and wind, deforestation, and overgrazing. This in turn also created access to livestock feed for household in the watershed community member who are the beneficiaries of the area closure. However, the issue of sustainability is still under question due to fact that the existence of the above mentioned challenges.

Box 2: Case story of one youth in the watershed

The youth explained that it was so harsh and only degraded land and rocks were left in the area. Additionally, it was sensed that dry hot air was experienced. he one of the beneficiary of the watershed and landless added that the natural resources soil, grass and forest were highly degraded in the watershed, which was initiated the intervention of the Terri watershed development. But, concerning the current situation he said that thanks to the project, and after the intervention the degradation of the natural resources were decreased and people are receiving cold air from the environment. Moreover, he concluded that the natural resource conservations were improved; however, the economical returns of natural resources really need high concern.

Source: Own case story, January 2011

5.2.2. Economic /financial/ capital

The contribution of the economic capital for the achievement of the livelihood goals along with other assets is very important. This asset is concerned with the economic/ financial resources. Access to financial resources for better utilization of the NRs in the watershed is core issue from the angle of sustainable rural livelihoods.

According to survey households' information, the contribution of access to financial resources for watershed development is mentioned in different degree of agreements. For simplicity, the result provided in to two categories, lack of watershed development and better watershed development are used. The lack of watershed development response are the sum total of disagree and strongly disagree responses, whereas the better watershed development response are the sum total of agree and strongly agree responses. These also

viewed as lack of watershed development as challenges whereas better development of it as opportunities.

Table 6: Financial Resource Contribution level for Watershed Development in Study Area

Level of agreement in contribution for watershed development	Frequency						Percent					
	Sd	D	N	A	Sa	T	Sd	D	N	A	Sa	T
Creates income generation activities	6	6	7	32	22	73	8.2	8.2	9.6	43.8	30.1	100
Create employment opportunities	6	11	8	34	14	73	8.2	15.1	11	46.6	19.2	100
Better utilization of grass & FRs	7	5	5	33	23	73	9.6	6.8	6.8	45.2	31.5	100
Enable to harvest water & use irrigation	11	17	17	13	15	73	15.1	23.3	23.3	17.8	20.5	100
Enable to access and own farm land	19	18	8	18	10	73	26	24.7	11	24.7	13.7	100
Create businesses & reduce dependency on NR	11	12	11	23	16	73	15.1	16.4	15.1	31.5	21.9	100
planting trees for land &soil protection	16	4	-	23	21	73	21.9	5.5	-	43.8	28.8	100
Enable not to deforest for fuel wood/charcoal making	9	6	-	35	23	73	12.3	8.2	-	47.9	31.5	100
Enable me food secure	13	17	2	21	20	73	17.8	23.3	2.7	28.8	27.4	100

Key: Sd=strongly disagree, D=disagree, N=neutral, A=agree, Sa=strongly agree, T=total
Source; own survey, January 2011

Access to financial resources contributed to the watershed in creating income generation activities, employment opportunities, improving utilization of grass & forest resource development &soil protection, as well as avoiding deforestation for fuel wood/charcoal making contribute for an increment of income. According to the survey, more than 60 % of the respondents pointed that the above outcomes are resulted in the watershed. Even if there is an improvement in the financial aspect the qualitative information obtained confirmed the fact that the question of sustainable improvement of the watershed development is still in question mark". It is reported both FGD participants and KIIs that if the Food-for-Work intervention stops, it will become very challenging to sustain those improvements. In line with this, ENTRO (2006) added that most of watershed development

projects in Africa and Asia are still based on conventional approach emphasizing physical planning without attention to local economic and social contexts.

Economic capital that focuses on both crop and livestock are the main one in the watershed. Therefore, in the following sections, issues of status, the potential contribution and their challenges are discussed.

i. **Crop Production**

Crop production is the most important livelihood activity in the watershed. Nevertheless, the qualitative information of the study revealed that the productivity of watershed does not bring considerable improvement.

According to the survey result, out of 73 respondents, 37% said that the production was increased, whereas 52.1% and 11% reflected that the production remained the same and decreased respectively (see the table 9 below).The justification behind those who said there was an increment of crop productivity is due to intensification and diversification of crops in the watershed. The intensification was via the application of compost and dung manures. The diversified crop varieties of the area are mainly horticultural crops, cereals, pulses and oil seeds. However, those intensification and diversification strategies of crop production were limited to those who used organic fertilizer and irrigation. Those who do not use organic fertilizer and irrigation among the respondents who said no change and decreased in productivity of the watershed.

Table 7 Crop Production Status after five years later intervention (2005-2011)

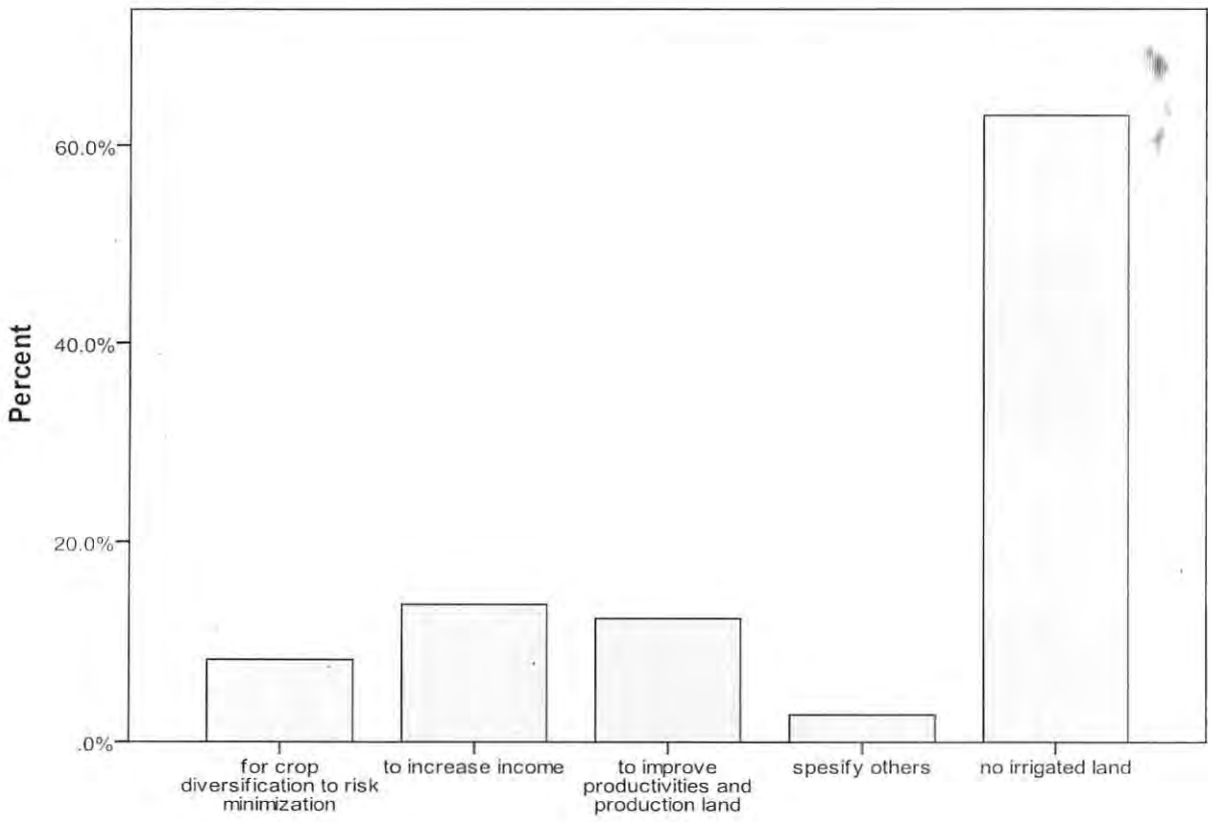
Crop production status	Frequency	Percent
Remain the same	38	52.0
Increased	27	37.0
Decreased	8	11.0
Total	73	100.0

Source: Own field study, January 2011

In crop productivities and production, irrigation is the pillar in general, particularly, in drought prone areas. Whether it brought about the good things to farm households in the

watershed community, it is better to see the household who have exercised irrigation. In case of the watershed community, about 63% of respondents do not have the farmland, which is convenient for irrigation and hence, they do not practice irrigation. However, in spite of its fragmented and small size of farmland, about 37% of the respondents have land, which can be irrigated. The household who have exercise irrigated faming have different opportunities than those who do not practice. Increased income, diversify crops to minimize risk, improved productivities and production of land are some the opportunities out of practicing irrigation. The damage of irrigation canal in the watershed have challenged not get important benefits of using irrigation and also do not enhance motivation of the households in the watershed community. See the figure 6 below and 4 above.

Figure 6 : Irrigated farmland opportunities in the watershed



Source: Own field study, January 2011

The main challenges of crop productivity and production decreases and remain the same were erratic rainfall, drought, land shortage, soil erosion, and pest and diseases of crops. According to the survey result, more than 60% respondents said erratic rainfall, drought, shortage of land, soil erosion, and pests and diseases are the major challenges for crop production in the watershed community households. The FGD participant and KII and the information obtained from case stories confirmed the fact that above problems and the major impediment of productivity of the watershed. Poor irrigation system, less access to input and land shortage are mentioned to be additional problem contributing for less productivity of the watershed (see the table 10 below).Therefore, it can concluded the intervention does not bring expected change in improvement of crop production and productivity.

Table 8 Challenges of Crop Production in the Watershed

Challenges of crop production	Frequency			percent		
	yes	no	total	Yes	no	total
Erratic rain fall	61	12	73	83.6	16.4	100
Labor shortage	19	54	73	26	74	100
Less access to input	24	49	73	32.9	67.1	100
Drought	49	24	73	67.1	32.9	100
Land shortage	47	26	73	64.4	35.6	100
Soil erosions	57	16	73	78.1	21.9	100
Pest and disease	54	19	73	74	26	100
Poor irrigation system	24	49	73	32.9	67.1	100

Source: Own field study, January 2011

ii. Livestock and its challenges

There are several reasons that households rear livestock. The primary purposes of herding livestock include provision of draught power, production of dung to use for bio-fuel and production of compost/manure for farmlands, use as form of capital accumulation, which used for household security, to fulfill social obligations such as dowry, and for dairy and meat products, which have a role for consumption and household income. Therefore, livestock rearing complements crop production and crucial asset diversification mechanisms. Out of 73 respondents, about 82.2% have their own livestock, but the rest do not have. The trend of livestock population in the watershed is reported to be decreased. In line with this, about 47.9% respondents reported that the livestock population is decreasing

in the area from time to time. However, about 23.3% of household respondent said that the livestock population do not show either decreasing or increasing trends, while about 28.8% of the respondents said the trend of livestock population is increasing.

Table 9: Trends of Livestock Population in Terri watershed

Livestock population	Count	Percent
Decreased	35	47.9
Increased	21	28.8
Remain the same	17	23.3
Total	73	100.0

Source: Own field survey, January 2011

As indicated by the above table there is few improvements in the status of livestock production and productivity. Regardless of the different views on the trends of the livestock population over time, the reason for decreasing trend of livestock population and status is mentioned due to the decrease of grazing land due to area closure. The respondents who said differently on the trend of the livestock population over time have their own reasons and rationalities. For instance, those who said the livestock population is increased are beneficiaries form area closure. Regarding the livestock of watershed community, it is clear that in one hand, there are household benefited from watershed area closure for livestock rearing and in the other hand, most household are not beneficiaries from the intervention for the improvement of their livestock status.

Challenges: The information obtained from Delanta Woreda Agricultural and Rural Development Office revealed that the main challenges of livestock in the watershed are livestock disease, drought and scarcity of fodder. According to survey data, about 45.2%, 42.2% and 38.4% of respondents said that livestock diseases, drought and scarcity of fodder respectively are the challenges of livestock production. The KIIs and FGD participants are also confirmed that the aforementioned problems are the impediments of the livestock production in the study area.

Table 10: Livestock and its Constraints

Livestock and its constraints	Frequency			percent		
	yes	no	total	Yes	no	total
Presences of livestock(those who have or not)	60	13	73	82.2	17.8	100
Livestock disease	33	40	73	45.2	54.8	100
Natural disaster/drought	31	42	73	42.5	57.5	100
Scarcity of fodder	28	45	73	38.4	61.6	100
Lack of vet services	6	67	73	8.2	91.8	100
The sector is not profitable	6	67	73	8.2	91.8	100

Source: Own field survey, January 2011

In general, little improvement of productivities and production of crops are enabled due to opportunities and constrained by the challenging issues. Producing different crops using organic fertilizer, rearing livestock as diversification strategies together with crop cultivation, and Food-for-Work program are found to be the fruits of watershed. Erratic rain fall, drought, soil erosions, pest and irrigation water shortage, are the challenges of crop cultivation in the study community households. Livestock rearing is also challenged by livestock disease, drought, and shortage of fodder. The challenges have also in turn, hindered immediate economic return of the watershed to the communities and put economical sustainability to be under question.

5.2.3. Physical capital

Ownership of assets, particularly agricultural technologies, tools, and equipments affect farm household's decision to choice among portfolios. In this sub-topic, the biophysical structures, technologies and production issues with their status, opportunities and challenges are discussed.

i. The biophysical structures

Biophysical structures include the physical soil & water conservation; flood control & improve drainages; water harvesting; biological soil conservation & soil fertility management; agro forestry, forage development & forestry; gully control; and feeder roads.

According to the data of FGDs, which involved both Woreda and kebele watershed committee teams separately, ranked activities as flood control and improve drainage (FC&ID), water harvesting(WH),and Agro forestry, forage development & forestry(A,FD&F) as a problematic areas from first up to third.

The only difference is the order of ranks. The Woreda watershed committee team ranked the constrained area: first, agro forestry forage development & forestry (A, FD&F); second, flood control & improve drainage (FC&ID); and third, water harvesting (WH), whereas kebele watershed committee team ranked as first, flood control & improve drainage (FC&ID); second, water harvesting (WH), and third, Agro forestry, forage development & forestry (A, FD&F).

However, the activities ranked from forth up to seventh are the same for both woreda and kebele watershed teams. Accordingly, forth, biological soil conservation & soil fertility management (BSC&SFM); fifth, Gully control (GC); sixth, feeder roads (FR); and seventh, physical soil & water conservation (PSWC). To see the challenges of biophysical structure, the areas, which are constrained by the problem of adoption rate, practice, and sustainability, are ranked first, and the areas, which are better in terms of adoption rate of technologies and practices, are ranked last.

The information obtained from direct observation and KIIs showed that the activities of agro forestry & forage development activities are almost absent in the watershed. Flood control and improve drainage especially, the irrigation and geo-membrane of water harvesting are poor. Regardless of the difference in identifying the problems of watershed, the FGD discussants from the experts and community teams have witnessed the situation. For instance, experts attempt to explain the gap from the expertise point of view, whereas the community team members try to points the problems practically on the ground.

ii. **The technological issues**

It is one of the physical assets, which supports households to pursue the livelihoods strategy in the watershed community. The physical asset includes the physical technologies (like soil conservation, water conservation, flood control, drainages, water harvesting, biological soil conservation, soil fertility management, agro forestry, forage development, forestry, gully control technologies),crop varieties and farm equipment. According to

survey result of the study, about 39.7% reported that there is access to new agriculture technologies, while 60.3% respondents said that there is no access to new agricultural technologies. The improved crop varieties and farm equipments are reported to be accessed by 35.6% and 30.1% of respondents respectively. Whereas 64.4 % and 69.9 % of respondents reported that, there is no access to use improved crop varieties and farm equipment respectively. In connection with this, Workneh (2006) noted "Sustainable agricultural intensification requires applying land management technologies and practices along with productivities increasing technologies and inputs". However, it is revealed such technologies in the study area are limited.

Table 11 : Access to Feasible Agricultural Technology in Terri Watershed

Agricultural technology	Frequency			percent		
	Yes	No	Total	Yes	No	Total
Different types of improved crop varieties	26	47	73	35.6	64.4	100
Different types of improved farm equipment	22	51	73	30.1	69.9	100

Source: Own field survey, January 2011

iii. Opportunity and Challenges of biophysical and technological issues

The physical assets, which include both physical structures and technologies, created opportunities for enhancing other assets particularly, natural assets. The opportunities have brought about positive change at least in water and soil conservation, capacities building especially the experts, and somehow economical improvement via Food-for-Work intervention. Whereas, low economical return which were lack of access to inputs (crop varieties), low fertilizer application, and lack of access to new agricultural technologies, which calls the attentions on issue of sustainability are found to be the challenges to the watershed community.

In general, the biophysical structures and their respective technologies were practiced in the watershed even if there were differences in their implementation. Because of the practices of biophysical soil and water conservations as well as gully control with their technologies, the natural resources were improved. Whereas the poor performance of water harvesting particularly geo membrane, irrigation scheme, agro forestry and forge development as well

as low utilization of input technologies together have become the key challenges of Terri integrated watershed for its economical returns.

5.2.4 Social capital

It is one of the key assets of livelihood manifested in different ways. The study revealed that the social asset is the most important asset of the watershed community households. It is not disturbed due to the existence of the watershed, nor has it been consolidated more with the sense of belongingness and working together in the watershed area. However, due to this group formation for managing area closure and use cut and carry system as a mechanism for feeding their livestocks new phenomenon which was not before

According to the household survey data, about 90.4 % of household respondents said that they have either relatives or friends in the watershed area. These kinds of relations among individuals and households have contributed them to help each other in terms of the financial and labour force shortages. 17.8 % of households reported that they help each other financially. However, 82.2 % the respondents do not help each other in terms of finance; rather they help each other in terms of working together. The reason, why they prefer to cooperate in term of work than helping each other financially is mentioned to be due the fact that most of households in the watershed community area poor in terms of financial asset.

Table 12: Mutuality among communities in Terri watershed

Social relation in the watershed	Frequency			Percent		
	Yes	No	Total	Yes	No	Total
Membership to watershed community	73	-	73	100	-	100
Presence of relatives /friends	66	7	73	90.4	9.6	100
Relatives /friends help each other in cash	13	60	73	17.8	82.2	100

Source: Own field survey, January 2011

Information as manifestation of the social networks among the people, households in the study area got information from different sources to design and implement their day-to-day activities. The vast majority 82.6% of households get important information from

development agents. Neighbors, farmer organization, and mass media particularly, radio are also the main source of the information for the rest of household respondents. However, the information obtained from FGDs indicated that the households who are linked more with different people have the tendency to get more information than those who are not linked with other people and development agents. The main challenges associated for social capital: there is a conflict among the community members and the surrounding communities in their kebele on using and managing the watershed development intervention and resources together with lack of sense of ownership to manage the project.

5.2.5. Human capital

Human capital is an important asset of individuals and households in the study area. It is developed through education, training and experience. The study revealed that the majority 61.6% of household respondents do not have training, while about 38.4% respondents reported that they have got training particularly, on the compost preparation, soil and water conservation and horticultural crop production.

Based on the training given, about 41.1% respondents reported that they are able to solve some practical problem, such as the problems of soil fertility by producing composed (organic fertilizer), and soil conservation related problems, while about 53.4% of household respondents have reported that they could not solve the problems based of the training given. About 5.5 % of respondents said that they do not realize that whether the training they get helped them or not.

Table 13: Human Capital Status

Training	Frequency				Percent			
	Yes	Not Recognized	No	Total	Yes	Not Recognized	No	Total
Getting training/different types/	28	-	45	73	38.4	-	61.6	100
The training able to solve practical problem	30	4	39	73	41.1	5.5	53.4	100

Source: Own Field Survey, 2010

Opportunity and challenges of human asset: The watershed development has contributed to households develop skills that became an experience sharing for other watershed

development and management, which enable some of individuals, who have got training to solve some practical problems. The information obtained from KIIs and FGDs demonstrated that the existence of the watershed in the area has contributed the practical skill development of individuals and in turn, helped them to solve the problems related to soil and water conservation. The information obtained from Delanta Woreda Agricultural Development and Rural Development Office indicated that the existence of the watershed in the Woreda has helped for promotion of soil and water conservation technologies to the other area.

Regarding its challenges, people reported the trainings given to the watershed community are not based on the felt needs of famers. The training are given only on few skills and do not address the all the watershed community households. As result, farm household have failed to solve many problems, except those, which are related with soil and water conservation.

5.3. The institution and participation in the watershed

Mediating institutions are organizations, processes, social relations and policies that determine access to livelihood assets influence the livelihood activities pursued by the households. Participations and institutionalizing watershed are the corner stone of sustaining integrated watershed development for environment and livelihoods (GTZ, 2005). The institutions in the study are such and Agricultural and Rural Development Office and other informal institution including *Idir*, and *Mahiber* coupled with participations of people are found to be mediating institutions. Managing and coordinating the watershed is the responsibility of Woreda Agricultural and Rural Development Office. Even though, the role of the *Idir* and *Mahiber* in the watershed is important for coordination and mobilization of the local communities; the linkage with Woreda Agricultural and Rural Development Office is reported to be week and hence the watershed community has lost important benefits out of the multiple roles of the informal institution. This could be considered as the gap in implementation of the watershed and FGD participants have confirmed the fact.

The existence of institutions without the participation of the direct beneficiaries and stakeholders do not bring the anticipated results. In line with it, Lakew et *al.* (2005) noted that the key for the success of community based watershed development in creating a self-

supporting system, which is essential for sustainability, lies on people's participation and integration.

The study conducted by GTZ in South Gondar Zone in 2005 has identified the gaps in participation of the people resulted failure in achieving the anticipated objective. This supports GTZs finding. The KIIs and FGD participants reported that communities' participation is existed more during implementation of the activities but less during other types of participations. The quantitative data also supported the fact.

Table 14: Participation of the communities in Terri watershed

Participation	Frequency			Percent		
	Yes	No	Total	Yes	No	Total
Preplanning time	22	51	73	30.1	69.9	100
During planning	23	50	73	31.5	68.5	100
During implementation	66	7	73	90.4	9.6	100
During monitoring and evaluation	35	36	73	47.9	49.3	100

Source: Own field survey, January 2011

In general, the mediating process both institutionalizing the watershed and participating the communities were poor. This in turn, affected the development of watershed and its contribution for the livelihood improvement of the households in the community.

5.4. Livelihood Activities

The livelihood activities of the household in the study area can be broadly categorized into agricultural livelihood activities and non-agricultural livelihood activities. Crop cultivation and animal husbandry are the dominant livelihood activities in the study area. The details of each livelihood activities are presented in the following sub-sections.

5.4.1. Agricultural livelihood Activities

Cereals (wheat, teff and sorghum), pulses (Pea, bean, chickpea) were the important crops cultivated before the project implementation. The qualitative data of the study revealed that the households in the watershed community have started diversifying crop cultivation by improving and the existing ones and introducing other new type of crops due to the

enabling things of the watershed. Cultivation of cash crops such coffee, papaya, avocado, Onion, cabbage, which were uncommon before the watershed project are currently introduced. The watershed community households also exercise bee keeping using modern beehives because; the project has improved the natural resources. The following table depicts that differ agricultural livelihood activities of households in the watershed community.

Table 15: Agricultural Livelihoods Activities

Agriculture activities	Frequency			Percent		
	Yes	No	Total	Yes	No	Total
Own Farm land	70	3	73	95.9	4.1	100
Livestock	55	18	73	75.3	24.7	100
Vegetable garden	45	28	73	61.6	38.4	100
Share cropping	25	48	73	34.2	65.8	100
Beekeeping	15	55	73	20.5	79.5	100

Source: own field survey, January 2011

As it can be seen from the above table, households in the study area are exercising diversification and households have experienced the livestock rearing as part of the diversification strategy of livelihoods. In line with it, different authors argued that diversification is important household survival mechanism and means of livelihood security (see Degeffa, 2005; Yared, 2002).

5.4.2. Non-agriculture Income Generating Livelihood Activities

The non-agricultural activities have significant importance of the rural settings and a particular option for agricultural land less farmers (Reta, 2010). The same is true in the study area. Households in the study area have exercised non-agricultural income generating activities to complement the agricultural activities or as the major livelihood activity. In this regard, about 37%, 17.8%, 15.5%, and 12.3% of household respondents exercise wages, remittance, selling firewood/charcoal/grass, hand craft/local manufacturer/cloth repair as the major income generating activities to support their livelihoods, while about 9.6%, 6.8% and 2.7% respectively exercise local brewing, involvement in saving and credit cooperatives, and traditional healing services.

Table 16: Agricultural Livelihoods activities

Non agricultural activities	Frequency			percent		
	Yes	No	Total	Yes	No	Total
Support from relatives	13	60	73	17.8	82.2	100
Selling fire wood/charcoal/grass	11	62	73	15.1	84.9	100
Wages in any where	27	46	73	37	63	100
Hand craft/local manufacturer/cloth repair	9	64	73	12.3	87.7	100
Brewing and selling local &non local beer	7	66	73	9.6	90.4	100
Traditional healing services	2	71	73	2.7	97.3	100
Saving and credit association	5	68	73	6.8	93.2	100

Source: own field survey, January 2011

In most instances, the non-agricultural livelihood strategies supplement agricultural activities. According to information obtained from Delanta Woreda Women Affairs Office, the non-agricultural income generating activities are worthwhile to note that the non-agricultural sources of income portfolios are important for the land less, for the youth, and female farmers.

In general, the livelihood activities of watershed community can be categorized into agricultural and non-agricultural income generation activities. The watershed project has opened the room for household to exercise diversified livelihood activities, particularly in the crop cultivation and animal rearing.

5.5. Implication of the watershed development

Before directly going to the implication of the intervention, it is better to see the implementation status of the project. Taking physical, environmental, technical, technological, economical, social and institutional issues of project implementation, the pair wise matrix analysis was made to know in which aspects the watershed is well implemented. The matrix was conducted with different group of community, which includes Woreda Watershed Committee and Kebele Watershed Committee separately.

The result of pair wise analysis indicated that in both groups the physical (soil and waters conservation structures) and environmental being first and second respectively .These are found to be the well implemented activities of the watershed project. The social and

institutional activities of the watershed project are reported to be poorly implemented. According to both Woreda and Kebele Watershed Committees, the social and institutional activities respectively are ranked sixth and seventh.

However, the difference is found to be on the technical, technological and economical activities. Both committees of watershed have given different ranks for technical, technological, and economical activities of the watershed project. According to Woreda Watershed Committee, technological, economic and technical activities are ranked from third up to fifth respectively. However, the Kebele Watershed Committee ranked the technical, economical and technological activities from third to fifth respectively.

Regardless of the differences in the ranking technological, technical and economical activities of the watershed project, the study has triangulated to know which activities are best practiced. Additional data obtained from KIIs and own observations supports the view of the Kebele watershed committee, signifying technical, economical and technological stand for third, fourth and fifth respectively.

Table 17: Comparisons among key integrated watershed development factors using pair wise matrix at Woreda level

Success factors	Economical	Environmental	Social	Physical	Technological	Institutional	Technical
Economical(ec)	X	en	ec	p	tecno	ec	ec
Environmental(en)	En	X	en	p	en	en	en
Social(s)	Ec	en	X	p	tecno	s	tecni
Physical(p)	P	p	p	X	p	p	p
Technological(tecno)	tecno	en	tecno	p	X	tecno	
Institutional(ins)	Ec	en	s	p	tecno	X	tecni
Technical(tecni)	Ec	en	tecni	p	tecno	tecni	X
Count	3	5	1	6	4	0	2
Rank	4	2	6	1	3	7	5

Table 18: comparisons among key integrated watershed development factors using pair wise matrix at Keble level

factors	Economical	Environmental	Social	Physical	Technological	Institutional	Technical
Economical(ec)	X	en	ec	p	tecno	ec	tecni
Environmental(en)	En	X	en	p	en	en	en
Social(s)	Ec	en	X	p	tecno	s	tecni
Physical(p)	P	p	p	X	p	p	p
Technological(tecno)	tecno	en	tecno	p	X	tecno	tecni
Institutional(ins)	Ec	en	s	p	tecno	X	tecni
Technical(tecni)	Tecni	en	tecni	p	tecni	tecni	X
Count	2	5	1	6	3	0	4
Rank	5	2	6	1	4	7	3

The next issue is the implication of the watershed development for ensuring sustainable livelihood of the local communities. As mentioned above in this section and the triangulation facts from the previous section. The soil and water conservation structures are more or less well implemented, this resulted in the improvement of biophysical structures to conserve soil and water and reduced environmental degradation. The consequence of these activities and results also leads the improvement of crop and animal production and productivity of the area in some extent. Moreover, it contributes for the improvement of income increment and income source diversification some extent.

On the contrary, the institutional linkage, the social support and relation were not on the way of changing and most of the respondents justified that there are in the same position compared to the intervention of the project before. In addition, there are conflicts on using and managing of the watershed site and its resource as well as lack of sense of ownership for further development of the watershed. The existence of these weakest links of the stakeholders and lack of proper participation in the overall process of the project threaten the sustainability of the project.

Hence unless corrective measures is not made by participating the concerned stakeholders around the project area and the local community at large to solve the above challenges, the ensuring of sustainable livelihood of the project community remain as dream rather it real.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1. Conclusions

The empirical evidences of this thesis indicated that about 89% of the respondents said that the natural capital particularly farmland, and forest were improved due to the existence of the watershed project in the area. The natural resource improvements in the watershed are used as opportunity for the watershed community household. As result, households have benefited in terms of ease access to fodder for their livestock, and reduction in soil degradation. Even if the above changes observed economic return became low on which the extent of improvement in crop productivities and production is not in the way of expected.

The technological (inputs) and technical activities of the watershed have challenged by different factors. As result, the sustainability issue of the watershed has become under question and has exacerbated due to the slow economic return of the natural assets. The dominant livelihood activities of households in the watershed are agricultural and non-farm income generating activities. The existence of the watershed in the area with its enabling opportunities, has contributed to diversify their livelihood portfolio.

Institutionalizing and socializing the watershed in the community are not done well except the watershed committee activities Woreda and kebele teams, which are managed by Woreda Agriculture and Rural Development Office. The participation of the watershed community households is manifested in different stages project activities and about 90% respondents reported the they have participated during implementation, whereas less than 50% respondents of households have been participating during pre planning, planning, monitoring and evaluation. However, more than 61% of them lack to get training.

In general, the word "integrated" has been conceptualized only in concept context but, lack practical application in ground and not bringing the anticipated results due to two reasons: First, all the critical assets of households are not made in integrated way. Second, some

important activities, which make the watershed integrated, are not done well and even the performed ones are not made simultaneously, rather one follow the other, which is time consuming and as result did not give immediate economic return for the rural poor. The technical supports for rural poor except food-for-Work, and poor social and institutional activities of the intervention result in the sustainability of the watershed to be in question.

6.2. Recommendations

Based on the findings and lessons drawn from the study, the following are become the key recommendations from perspectives of sustainable rural livelihood.

- The economic returns become low due to the damage of the irrigation canal and it has disappointed and affected the motivation of farm households in using irrigation, which will have valuable contribution in increasing production and productivity. Therefore, concerned body, particularly the Woreda Agriculture and Rural Development and NGOs should take action to maintain the canal.

- Compared to the other livelihood assets of the households, economic resource is found to be limited in the study area that constrained households not to pursue non-agricultural activities, which supplement agricultural activities and support the livelihoods. Therefore, the household should let to get financial resources for non-agricultural activities.

- The study revealed that technical aspect (human asset) were low in the community that the majority of watershed community does not get training, as result solving some practical problems is found to be challenging. Therefore, to achieve the anticipated goals of the watershed and improve the livelihoods of household, training particularly on institutionalizing, socializing and on income generating activities should be given to the community members.

- The contribution of non-agricultural in supporting the livelihoods of rural household is indispensable, but compared the household who engaged in agricultural activities, the households who are exercising non-agricultural income generating activities as the major livelihood activity are few. To solve the problems associated with increasing trends of land shortage, non-agricultural income

generating activities should given due attention and promoted via institutionalizing and socializing the watershed.

- Integrating practically these institutional, social, economic, technical, technological, environmental and physical aspects should be imperative not an option to sustain livelihoods the rural community in the watershed.

Finally, based on the outcomes of the research findings and gaps, the following thematic areas are suggested for further research. These are:

1. The challenges and opportunities of income diversification and rural livelihood strategies in the watershed,

2. The mechanisms to strengthen community institutions for better development of watershed;

3. Factors determine the livelihood strategies to scale up for sustainable livelihoods in the watershed.

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ANNEXES

Table 1: The benefit of communities and households environmentally

Environmental benefit at community and household level	Frequency			percent		
	yes	no	total	yes	no	total
Reduce soil erosions from farm as community	52	21	73	71.2	28.8	100
Better access for portable water as community	33	40	73	45.2	54.8	100
Increase access to livestock feed as household	49	24	73	67.1	32.9	100
Reduce soil erosions from farm as household	53	20	73	72.6	27.4	100
Better access for portable water as household	31	42	73	42.5	57.4	100
Increase irrigation water as household	21	52	73	28.8	71.3	100

Source: Own field survey, 2010

Table 3 New knowledge as human resources

	frequency				percent			
	Low	M	H	T	low	M	H	T
Develop new knowledge for WD	16	37	20	73	21.9	50.7	27.4	100
Presence of food for work	26	31	16	73	35.6	42.5	21.9	100
Epidemic human diseases	48	22	3	73	65.8	30.1	4.1	100

Key: M=medium, H=high, T=total

Source : own survey, January 2011

APPENDICES

Part one: Survey (Household Survey) Questionnaires

General information

1.1 Date of interview _____

1.2 Identification no /code/ _____

1.3 Name of Enumerator _____

1.4 Name of respondent (optional) _____

Location: Zone _____ Woreda _____Kebele_____watershed

Demographic information

1. Age ----------

2. Sex 1= Male 2= Female

3. Religion 1= Orthodox 2 =Muslim 3=Protestant 4=others (specify)

4. Family size Male_____ Female_____ Total _____

5. Marital status 1=Single 2=Married 3=Divorced 4=Widowed

6. Education 1= illiterate 2=Grade 1-4 3= Grade 5-8 4=Grade 9-12 5=College Certificate

7. Major Occupation 1=Farming only 2=Petty trade only 3= Farming & petty trade 4=hand craft 5= others (specify)

Residence

5. How long did you live in this village? 1= Less than a year 2= 1-5 years 3= 6-10 years 4= 11-25 years 5= since birth

6. Would you like continue for living here anymore? 1= Yes 2= No 3= I am planning to leave after sometimes

7. Why? _____

8. Over the period of your stay, how do you perceive the general living condition of the community after the intervention of the project? 1= Improved 2= showed little improvement 3= Remain the same 4=Worsened 5= I don't know 6= others (specify)

9. How do you perceive the general living condition of yourself over the period of your stay in this community after the intervention of the project? 1=improved 2= Showed little improvement 3= Remain the same 4= Worsened 5= others (Please Specify)...

Vulnerability context (shocks, trend stress, seasonality)

10. Could you please rank and then rate the following challenges /problems/ as low, medium, high in the watershed?

	Items	Rank	Extents		
			low	medium	high
challenges	Low harvest				
	Natural resource Degradation				
	Hunger/food crises				

	Unemployment				
	Epidemics human disease				
	Shortage of land				
	Drought/erratic rain fall				
	Livestock disease				
	Crop pest				
Opportunity	Existence of new technologies				
	Existence of new input (seed, fertilizer)				
	Existence of fair crop price				
	Develop new watershed development knowledge				
	Develop new skill of watershed development				
	Presences of aid				
	Existence of protection in human disease				
	Existence of protection in animal disease				
	Existence of protection in plant disease				

Livelihood asset & Capability

Physical assets (tools, and equipments, technology e.t.c)

11. Do you access to new agriculture technology? 1=Yes 2= No

12. If your answer for Q. 11'Yes' lists them_____

13. If your answers for Q. 11 'No' could you tell me the reasons? 1= there is no new technology at all 2= I don't have any information 3= The cost is high & I don't have money 4= I don't have sufficient land /farm 5= others (Please specify).

Economic and Financial Activities (resources)

14. Farm land

Farm land total (Timad)	Rain fed land(Timad)		Irrigated land(Timad)	
	Outside the watershed	In the watershed	Outside the watershed	In the watershed

15. If you have irrigated farm land in the watershed, could you tell me the opportunity (Choose the major three). 1= for crop diversification to risk minimize 2= to increase income

3= to improve productivity &production of the land 4= to get nutritious food from horticultural crop 5= specify others.

16. What is the trend in your land holding size?

1= Increasing 2= Decreasing 3=No change 4= others (specify) _____

17. If your answer to question no "17" is increasing, what are the reasons behind the increasment? (The major three)

s/n	Response	tick	rank
1	Expansion in to forest area		
2	Land reallocation		
3	Cultivation of marginal land		
4	Other specify		

18. If your answer to Q. # 17 above decreasing, what are the root causes?

s/n	Response	tick	rank

1	Increases marginal land due to erosion		
2	Increases marginal land due to loss quality		
3	Land redistribution within the house hold		
4	Other specify		

19. What do you think is the trends of your crop production (rank)? (Multiple answer possible) 1= productivity (yield) decreased 2= change in a types of crops grown 3=Productivity (yield) increased 4=crop diversification increased 5=there is no change 6=other (please specify)

20. What are the major three constraints to crop production in the watershed?

s/n	Response	Tick	rank
1	Erratic rain fall		
2	Labor shortage		
3	Less access to in put		
4	Drought		
5	Land shortage		
6	Soil erosion		
7	Pest and disease		
8	Low and poor irrigation system		
9	Others(specify)		

21. Have you ever used improved crop varieties after the watershed intervention? 1= Yes 2= No

22. If your answer for question # 22 "Yes" what are they? 1= HYV of teff 2=HYV of wheat 3= HYV of barely 4= HYV of pea 5= HYV of chickpea 6= other (specify)

23. If your answer for Q. # 22 "No", why?

1= Because I don't have farm land at all 2= Because I can't afford it 3=Because I don't have sufficient farm land 4= Because there is no improved variety 5= Because I suspect its productivity no change 6= Because it demands extra Managements 7= others (specify)

24. Have ever used improved farm equipment in the watershed? 1= Yes 2= No

25. If your answer for Q. # 25 is "Yes" what are they?

1=Tridl pump 2= Motor pump3= Arm strong 4= Tie-rigger 5= pedal pump 6=others.

26. If your answer for Q. #25 Is "No" why?_____

27. Do you produce from your land enough to satisfy at least for your food need?

1= Yes 2= No 3= More than enough

28. If your answer for Q. # 28 is "No" how do you maintain your household food needed? 1= income from non-farm 2= income from off farm 3= Food aid (cash aid) 4= Renting the existing land for next cropping seasons. 5= Migrating part of family to relative 6= Borrowing until next harvest 7= other (specify)_____

29. Do you have Livestock? 1=yes 2=no

30. What is the trend of livestock population?

1= increased 2= decreased 3= remain the same

31. If the answer for Q= 31 is decreased? What are the major three constraints?

s/r	Response	tick	rank
1	Livestock disease		
2	Natural disaster/drought		

3	Scarcity of fodder		
4	Lack of vet services		
5	The sector is not profitable		
6	Other specify		

32. What is the trend of grazing land in the watershed?
1= increase 2= decreased 3= remain the same
33. If the answer for Q=33 is decreased, what are the major reasons?
1= contraction of farm land 2= Deforestation 3= outmigration of farm households 4=other (specify).
34. How did you manage the communal grazing land? 1=free grazing 2= develop pasture, 3= Agro forestry 4= cut & carry system 5-= specify (other)
35. Credit

s/r	Types of credit	Sources of credit	Purpose of credit
1			
2			
3			
4			

36. What are your main sources of income (the major three)? 1= crop save 2= livestock 3= off farm income 4= Non-farm income 5= other (Specify)_____
37. Do non-agricultural incomes enable you to use existing watershed better? 1= Yes 2=No
38. If your answer for Q= 42 Yes, what do you do?
1= environmental activities 2= economical activities 3= social activities 4-= institutional activities 5= Technical aspect 6=other (specify).
39. Does the watershed intervention production contribute to market and create incentive for the farmers? 1=yes 2=no
40. Would tell me about the natural resources (land, the forest, and grass) in this watershed after the interventions?
1= decreased 2= increased 3= remain the same 4= other (specify)
41. Do you strongly agree /agree/disagree/neutral/strongly disagrees with the following statement about access to financial /economic/resources & their contribution for watershed development

S/n	Issues	Response				
		1	2	3	4	5
1	Creates income generation activities to invest on watershed management					
2	Creates local rules/institution to protect &manage natural resources in the watershed					
3	creates employment opportunity					
4	Reduce conflicts over contest of NRs					
5	Enable me better utilization of the grass & forest resources					
6	Enable me to harvest water & or use irrigation					
7	Enable me to access and own farm land					
8	Create businesses/entrepreneurship & reduce dependency					

	on NR					
9	Protect soil erosion land resources damaged by planting trees					
10	Enable me not to deforest					
11	Enable me to food secure					

Keys= 5= strongly agree 4= agree 3= neutral 2= disagree 1= strongly disagree

Human resources knowledge, skill and capacity

42. Training (major five)

S/r	types	Knowledge gained	skill	Purpose of training

43. If you received the trainings/skill mentioned above, do you think the trainings were helpful for your practical problems? 1=Yes 2=No

44. If the response for Q=48. No what are the major challenges?

45. What are the sources of new technologies?

1= Development agents 2= Neighbors 3= farmer organizations 4= Radio listening

46. Do you think that your household members access to clean water? 1= Yes 2=No

Social capital /asset recourses

48. Did you recognize as member of the watershed communities? 1= yes 2 = No

49. Do you have relatives (friends)? 1= Yes 2= No

50. If yes do the relative or friends help you in cash? 1= Yes 2= No

51. If you answer for Q=55 Yes, what do you do by that cash?

1= Land improvement 2= Soil and water conservation 3= Input supply for crop production 4=Livestock and forage development 5=others (specify)

52. If your answer for Q= 54 "No" what is the challenge for these? List

Arable land and natural resources

53. How do you perceive the trend in natural resource degradation in your watershed?

1= worsening 2= remain the same 3= increasing.

54. What are the major forms of land degradation before /after/ the watershed intervention? (The major three)

I/n	Response	Before		after	
		Tick	Rank	Tick	rank
1	Soil erosion by water				
2	Soil erosion by wind				
3	Deforestation				
4	Over grazing of range land & degradation				
5	Other (specify)				

55. What are the actual response and communal benefits that you have got from the interventions? (The major three)

S/n	Responses	Household (tick)	Community (field)
1.	increased crop production		
2	increased access to livestock feed		
3	Reduce soil erosion from own		

	farm		
4	Better access to potable water		
5	Increased irrigation water		
6	satisfied demand for fuel wood & construction material		
7	Other (specify)		

56. How do you responses the degradation of natural resources?

1= I am doing nothing 2= I am undertaking soil erosion control measures.

3= I have planted trees 4= B am making shift to non degraded areas.

5= I am creating awareness in the village 6= reduce charcoal /file wood timber extraction

7= other mechanism (specify)

Mediating factors (related to participation)

57. Did you participate in watershed development/management? 1= Yes 2= No

58. If yes in which part you participate?

s/r	Issues	tick	rank
1	Pre-planning discussion of the watershed		
2	During Planning of the watershed		
3	During Implementing of the activities in the watershed		
4	Monitoring and evaluation of activities		

59. Are you still taking part in the watershed? 1=Yes 2=No

60. Do you like to extend your participation in watershed management? 1= Yes 2= No

61. If your response for Q.7.6. "Yes" why?_____

62. If your response for Q.7.6. "No" why?_____

Mediating factors (Related to institutions)

63. Who are the major stakeholders involves in the watershed intervention? (Multiple response possible)

1= gov't 2 =NGOs (specify) 3= others (specify)

64. What are the major informal institutions in the watersheds?

s/r	Traditional institution	tick	rank
1	Idir		
2	Mahber		
3	Others(specify)		

65. Does gov't perform what expected from it? 1=Yes 2=No

66. Does the involved NGO(s) perform what is expected from it? 1=Yes 2= No

Livelihoods strategies

67. What are your major agricultural livelihood strategies (rank the major three)

S/s	A households strategies	Rank	tick
1	Farming own land (not share cropping)		
2	Livestock rearing (selling milk and fattening)		
3	Vegetable garden		
4	share cropping other land		
5	beekeeping		

68. What are your major non -agricultural livelihood strategies (rank the major three)

S/n	A house hold strategies	Rank	tick
	Support from parents/ children, relatives/ or pension.		
	Selling fuel woods /grass/ charcoal		
	Wage in anywhere/ in urban /piece job in kebele/ Woreda/.		
	Handcraft /local manufacturer/ saving/ clothes repairs.		
	Brewing /selling local beer/ selling non local beer/		
	Raising chicken /selling eggs		
	Traditional healing services		
	Saving /credit in the cooperatives		
	Renting out field /urban reason/ other		
	Selling clothes /house utensils/ jewelers		

Part two: Checklist for focus group discussions

Open question for current status, trend & issues

What is/are the situation(s) or status(s) of the micro watershed before and now after the intervention?

1.1Economically

What is the crop productivity and production current status in the watershed?

What is the livestock production in the watershed?

What are off-farm activities in the watershed?

What are the non-farm activities in the watersheds?

What is the situation of landless and land owner?

Does the watershed intervention production contribute to market and create incentive for the farmers?

1.2 Socially

What is the status of trend of social relationship in the water shed?

What is the status of network in the watershed?

What are the norms and beliefs of the society in the watershed?

1.3 Environmentally

What is the status of trends of land degradations in the watersheds before & after?

What is the status of soil and water conservations situation in the watershed?

What is the local response for land degradation and water depilation in the watershed?

1.4 Institutionally

What are the current statuses of formal and informal institutions in the watersheds?

What are the involvements of them?

What is the land tenure policy situation for soil and water conservation?

What is the market situation in the watershed for sustainable livelihoods?

1.5 Technically

What is the technical support and training from government experts in the watershed?

What is the training and technical support from NGOs?
Is the training given beyond the theory and bring radical change practically? If so, what is the radical change?
What are the skills developed due to the intervention of the project?
1.6 Physically
What is the current status of the physical assets (building, dam, check dams, soil of stone bunds and e.t.c?)
What are the trends of soil and water conservation structures in the watersheds?
What is the status of water harvesting structures in the watersheds?
1.7 Technologically
What types of technologies introduced due to the watershed interventions?
Water harvesting----------
Livestock----------
Crop seed technologies ----------
Grass types----------
Soil fertility management ----------
Farm equipment ----------
Forest types----------
What types of technologies adopt due to the watershed interventions?
What is the status of the technologies now?
b) Challenges: what are the challenges of integrated watershed mgmt/development from sustainable livelihoods perspective?
1.1Economically
What are the crop productivity and production challenges?
What are the challenges to expand irrigation?
What are the livestock production challenges?
What are the gender issue challenges in the watersheds?
What are the lands less households' challenges in the watershed?
1.2 Socially
What are the relationship challenges in watershed?
What are the network challenges in the watershed?
What are the norms and beliefs obstacles for sustainable livelihoods in the watershed?
1.3 Environmentally
What are the challenges of soil and water conservation practices?
What are the constraint of land degradation and soil erosion?
What are the degradation features of watershed management's challenges?
1.4 Institutionally
What are the formal institute challenges to involve?
What are the challenges of NRs policy in the watershed?
What are the challenges of land policy in the watersheds for soil and water conservation?
What are the challenges of informal institutions (Idir, mahber, senbete and e.t.c) in the watersheds?
1.5 Technically
What are the challenges technical activities in the planning?
What are the challenges of technical activities in planning implementation?
What are the challenges of technical activities in monitoring and evaluations?
1.6 Physically
What are the challenges of soil and water conservation in the watershed?

What are the challenges of water harvesting structures in the watershed?
What are the challenges of other physical asset in the watershed?
1.7 Technologically
What are the main challenges for technology adoption in the watershed?
What are the major obstacles to introduce technologies in the watershed?
c) Opportunities
1.1 Economically
What are the economic opportunities of watersheds?
Crop production
Livestock production
Credit
What are irrigation contributions for sustainable livelihoods in the watershed?
1.2 Socially
What are the potential use of relationships, networking and norms in the watershed?
1.3 Environmentally
What are the opportunities of land management in the watershed for sustainable livelihoods?
1.4 Institutionally
What is institution that is created due to the intervention of watershed?
What are the opportunities of institutions towards watershed development/management?
1.5 Technically
What is the technical knowledge of skills created to support the farmer in the watershed?
What is the opportunity of them towards watershed developments/ managements?
1.6 Physically
What types of physical assets created due to the watersheds intervention?
What is the opportunity of them in the watersheds development/management/ to words sustainable livelihoods?
1.7 Technologically
What types of technologies adopt due to watershed interventions?
What is the opportunity of technologies to words sustainable livelihoods?
Challenge and opportunity matrix
Biophysical issues

	PSWC	FC&ID	WH	BSC&SFM	A,FD&F
Physical soil and water conservation (PSWC)					
Flood control and improve drainage (FC&ID)					
Water harvesting (WH)					
Biological soil conservation					

and soil fertility management (BSC&SFM)					
Agro forestry .forage development and forestry (A,FD&F)					
Gully control (GC)					
Feeder roads (FR)					

Integrated watershed and sustainable rural livelihoods issues

	economical	environmental	social	physical	
economical					
environmental					
social					
physical					
technological					
institutional					
technical					

Part three: Checklists for Key Informant Interview

3.1. Checklists to Guide Key Informant Interview with Woreda Agricultural and Rural Development Office

1. What are technical and technological challenges and opportunities in the watershed?
2. What are socio-economic challenges and opportunities in the watershed?
4. What is the status and trends of natural resources (forestland, water bodies, arable land, wildlife. etc.), possible cause of NR degradations, efforts made to manage those, threats for sustainable NRM.....? How about the land-use system and changes in the watershed Woreda be?
5. Is there common pool natural resources? How is it managed by the Woreda offices?
6. Are there institutions, Rules, Regulations/Sanctions on resource use, NRM?
7. How do you relate the livelihood strategies vis-à-vis NRM and utilization?
8. Do you think that NR is used in sustainable manner in the watershed?
9. What are the activities that the government performs?
10. What are the activities that the NGO perform?
11. What are the activities that the government did not perform?
12. What are the activities that the NGO did not perform?

3.2. Checklists to Guide Key Informant Interview with Local Elders

1. What are technical and technological challenges and opportunities in the watershed?
2. What are socio-economic challenges and opportunities in the watershed?
2. What Status and trends of natural resources (forestland, water bodies, arable land, wildlife. etc.), possible cause of NR degradations, efforts made to manage those, threats for sustainable NRM.....

Bio physical conditions
Land and soil degradation features
Conservation of soil and water
Forage and agro forestry situation
Water harvesting situation
Soil fertility and management aspect

Part five: Checklists for Case story
Situation of watershed before intervention
Situation of it after intervention
Condition of the communities living in the watershed before intervention
Condition of living in watershed after intervention
Condition of your living situation before the intervention
Condition of your living situation after the intervention
All over situation of communities in the watershed