Journal of Resources Development and Management
ISSN 2422-8397 An International Peer-reviewed Journal DOI: 10.7176/JRDM
Vol.55, 2019

Review on Contribution of Community-Based Participatory Watershed Management Practice for Sustainable Land Management in Ethiopia

Gemechu Fufa Arfasa Bekele Tona Amenu
Jimma University, P.O.Box, 307, Jimma, Ethiopia

Abstract
Ethiopia has a history of watershed management initiatives dating back to the 1970s. The basic approach has shifted from top-down infrastructure solutions to community-based approaches. Degradation of watersheds in recent decades has brought the long-term reduction of the quantity and quality of land and water resources. **Community-based watershed management** is an approach to water-resource protection, restoration and development that enables individuals, groups, and institutions with a stake in management outcomes (often called stakeholders) to participate in identifying and addressing local issues that affect or are affected by watershed functions. **Sustainable land management** is a knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities) to meet rising food and fiber demands while sustaining ecosystem services and livelihoods. The most common form of land degradation in Ethiopia is soil erosion, and mainly this erosion processes are due to inappropriate land use, poor land management practices on steep slopes, fragile soils, increased pressure on both arable and grazing land, and the traditional farming systems of the people. Moreover, as the Ethiopian government is committed to fasten the overall development of the country, integrating SLM and other natural resource management and development activities in a program (rather than project approach) and complementary base is essential. Currently SLM project is running in 83 districts, which are a subset of a much larger plan of MoA (Ministry of Agriculture) to support sustainable land management activities in 177 priority watersheds across the country and its effectiveness varies from region to region. Especially regions in semi-arid areas, with frequent drought and lower agricultural productivity and loss of biodiversity, have got promising response in the past. The community based watershed management practices in Ethiopia contribute great role in the implementation of sustainable land management and natural resource management.
Keywords: Community Watershed Management, Food and Agriculture Organization, Sustainable Land Management
DOI: 10.7176/JRDM/55-03
Publication date:May 31st 2019

1. INTRODUCTION

In Ethiopia 85% of the population are directly supported by the agricultural economy. However, the productivity of that economy is being seriously eroded by unsustainable land management practices both in areas of food crops and in grazing lands. It is nearly four decades since modern technologies of land management have been introduced in Ethiopia, and over 400 years since traditional land management measures have been practiced in different parts of Ethiopia. The traditional as well as introduced practices, as a matter of fact have been concentrated in the lowlands and mid highlands of the country, which are characterized by low and erratic rainfalls, degraded lands and recurrent failure of crop production (Development 2010). With steady growth in population, clearing of woodland for agriculture has been a continuous process at an estimated rate of 62,000 ha a year; methods of cereal production are conducive to soil loss and dung and crop residues are needed for fuel, reducing their use as fertilizers.(Berry 2013).

In Ethiopia, since the 1970s, considerable efforts have been made to reverse the problem of land degradation. What were once considered to be sustainable land management practices such as soil and water conservation, soil fertility management, controlled- grazing and other land management practices were introduced. However, the impact of those efforts did not curb the impact of land degradation in a meaningful and sustainable manner. Various reasons are often given for the lack of success. Among these the most commonly cited factors include practices, high initial costs which are not affordable to poor farmers and also trying to apply uniform techniques in different agro ecological regions (Annual & Proceedings 2012).

Traditionally through time, farmers have developed different soil conservation and land management practices of their own. With these practices, farmers have been able to sustain their production for centuries. Even up to now, it has been acknowledged that these technologies, which include ploughing of narrow ditches on sloping fields to control run-off, farmland terraces, traditional ditches and furrows, contour ploughing, fallowing, crop rotation, farmyard manure and agroforestry continue to play a significant role in the production of subsistence agriculture (Anon 2015).

Degradation of watersheds in recent decades has brought the long-term reduction of the quantity and quality of land and water resources. Degradation results from a range of natural and anthropogenic factors, including natural soil erosion, changes in farming systems, overgrazing, deforestation, and pollution. Depletion of soil productivity, sedimentation of water courses, reservoirs and coasts, increased runoff and flash flooding, reduced infiltration to groundwater, and water quality deterioration are among the main negative impacts of watershed deterioration.(Ababa 2014).

Several soil and water conservation measures were introduced in the early 1970‘s to improve land management practices. In the 1980s, the WFP consolidated its support to include rehabilitation of forest, grazing and agricultural lands. On government‘s part, the watershed or catchment approach became it key strategy (Nihal 2014).

Watershed management works best when there is a supportive policy and legal framework, particularly (a) policies that facilitate decentralized and participatory development; (b) institutional arrangements that allow and encourage public agencies at all levels to work together; and (c) an approach to access to natural resources that reflects local legislation and tenure practices and problems. The degree of success of watershed management interventions primarily depends on the will of the people and the scale of activities involved in it (Nihal 2014).

Watershed management requires an integration of all scientific knowledge from many disciplines and a combination of technologies, strategies and techniques with the development and use of available tools. It tries to bring about the best possible balance in the environment between natural resources on the one side, and human and other living beings on the other(Final & Document 2013).

A watershed is defined as any surface area from which runoff resulting from rainfall is collected and drained through a common confluence point. Watershed is not simply the hydrological unit, but also socio-political-ecological entity which plays crucial role in determining food, social, and economical security and provides life support services to rural people. Watershed management includes the treatment of land by using appropriate biological and physical measures in such a manner that the results are economically, environmentally and socially acceptable.(Ababa 2014)

Watershed management is increasingly being recognized as the ideal approach for integrated natural resources management in rain fed areas. The success of watershed management largely depends on the community’s participation. The application of community based watershed management (CBWM) is the most modern and recently developed method and widely implemented in the woreda. Yet, these management activities have not been documented and Watershed management cannot be achieved without the willingness of local people to participate(Change 2015).

Watersheds are considered as a unit of management for many natural resources related issues including land degradation, water conservation, non-point source pollution, etc. In most instances watershed boundaries do not correspond to administrative boundaries. Watershed management is simultaneously a technical and social undertaking. From a technical perspective, it involves reducing soil erosion, promoting vegetative cover, and harnessing rainwater resources (Anon 2014). From a socio-economic perspective, it involves coordinating the actions of numerous land users in a watershed who may have multiple, conflicting objectives. In the 1980s watershed management was treated largely as a technical problem, but lack of attention to socio-economic complications undermined numerous projects because people refused to go along with technical plans that conflicted with their diverse interests. Today, watershed professionals are seeking to pay more attention to the socio-economic aspects of watershed management and are incorporating genuine integrated and participatory processes(Anon 2013b).

Watershed management deals with several kinds of resources including soil, water, forest, human resource and integrated knowledge in management. Impact of mismanagement consequently causes many problems such as deforestation, degradation of water quality, soil erosion and soil nutrients loss etc, resulting in degrading living conditions of mankind, therefore, proper management of watershed is important for mankind and badly required (Nihal 2014).

Watershed management implies the judicious use of natural resources such as land, water, biodiversity and biomass in a watershed to obtain optimum production with minimum disturbance to the environment(Anon 2014)

Land degradation in the form of soil erosion and nutrient depletion has been major a national agenda and remains an important issues in Ethiopia because of its adverse impact on crop productivity, the environment, food security and the quality of life in general. Productivity impacts of soil erosion and nutrient depletion are due to a decline in soil fertility and moisture availability on-site where soil erosion and nutrient depletion occur and off-site where sediments are deposited. As a result, vast areas of fertile lands in Ethiopia have become unproductive (Final & Document 2013).

The objective of this review was to revise thecontribution of community-based participatory watershed management practice for sustainable land management in Ethiopia.

2. DEFINITIONS AND BASIC CONCEPTS

Watershed: defined as a catchment or drainage basin. It refers to an area which has a ridgeline on three sides and whose surplus run-off is drained from a drainage point. From a hydrological perspective a watershed is a useful unit of operation and analysis because it facilitates a systems approach to land and water use in interconnected upstream and downstream areas (Change 2015).

Watershed degradation is the long-term reduction of the quantity and quality of land and water resources in a watershed (Change 2015). **Watershed management**: is the art and technique of managing watershed resources in way that maximum benefits can be derived from them without affecting the ecological sustainability. It is a holistic concept, which tries to integrate several components like soil and water conservation, forestry development, agriculture and livestock. It tries to bring about the best possible balance in the environment between natural resources on the one side, and human and other living beings on the other and requires an integration of all scientific knowledge from many disciplines and a combination of technologies, strategies and techniques with the development and use of available tools(Anon 2014).

Watershed management for water production is concerned with the quality and timing of the water which is produced and also referred to as **water management and Basin management**. the sustainable utilization of integrated natural resources and environment by the stakeholder participation under both the principle of watershed and environmental management and the principle of natural resources conservation within the drainage basin area to protect, maintain and improve the water quantity, quality and timing including erosion, waste and pollution management from any human activities in the watershed areas(Change 2015).

Participatory watershed management: the collaborative work of people in the community, officials and researchers to meet the watershed management objectives (Woldemariam 2012).

Community: a group of people that are bound and related by the same traditions and culture, and they have clear grouping and position of households (Ababa 2014).

Land Management:- defined as the process of managing the use and development (both in urban and rural settings) of land resources. It is the methods used in managing land resources – the 'how' of land uses(Anon 2013a)

Community-based watershed management is an approach to water-resource protection, restoration and development that enables individuals, groups, and institutions with a stake in management outcomes (often called stakeholders) to participate in identifying and addressing local issues that affect or are affected by watershed functions(Anon 2014).

Sustainable land management can be defined as "a system of technologies and/or planning that aims to integrate ecological with socio-economic and political principles in the management of land for agricultural and other purposes to achieve intra- and intergenerational equity"(Tadesse 2013).is a knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities) to meet rising food and fiber demands while sustaining ecosystem services and livelihoods (Tadesse 2013).

2.1. History of Watershed Management Practices in Ethiopia

Watershed management practices starts in Ethiopia in 1971: First SWC by USAID,1974:UN/FAO (under WFP), 1976: The derge regime tried to implement SWC, 1988-1990: TPLF (Under REST) started natural resources management, 1991-2001: The current government was involved in SWC; focusing on cultivable land (in order to convince the people), 2001-2009: A new shift in SWC where by: cultivable land was done by individual farmers and uncultivable land was through public mobilization, 2010: SWC measures was given the top priority of the region and massive mobilization was done, 2012: In addition to SWC, irrigation development through public mobilization has started (Woldemariam 2012).

Ethiopia has a history of watershed management initiatives dating back to the 1970s. The basic approach has shifted from top-down infrastructure solutions to community-based approaches. There is now a supportive policy and legal framework in the form of policies that facilitate decentralized and participatory development, institutional arrangements that allow and encourage public agencies at all levels to work together, and an approach to natural resources that rejects local legislation and tenure practices (Nihal 2014).

Evidence suggests that Ethiopia has not yet achieved the full potential of its surface and groundwater resources. Watershed management programs based on lessons learned over the past several decades as new opportunities to reduce farmers' dependence on rain-fed, low-productivity subsistence agriculture, reverse land degradation and increase the level of water use and local participation in water management. The challenge is not one of "'ending solutions" but negotiating solutions that are inclusive and equitable and steer the country towards its stated goal of making rural agriculture the basis of economic growth (Final & Document 2013).

Ethiopia has been seriously affected by soil erosion for centuries. The tolerable rate of soil erosion in Ethiopia is estimated on average of 6 Mg ha-1 per year, while a soil loss tolerance limit of about 10 Mg ha-1 per year is estimated for the Ethiopian highlands, depending on slope gradient and land use type. To reduce the negative consequences of soil erosion, the government of Ethiopia, in collaboration with international donors implemented various mechanical and biological SWC measures in various parts of the country where farmland terracing, micro

basins, stone bunds, fanya juus, soil bunds, vegetative measures are widely implemented practices. The aim different SWC measures were to reduce the effect of soil erosion, improve environmental conditions, sustainable land management and stabilize or improve agricultural productivity(Anon 2014)

Watershed projects in Ethiopia implemented by Food and Agricultural Organization (FAO) were focused on the institutional strengthening and capacity building of the Ministry of Natural Resources‟ technicians and experts and development agents in the highland regions of the country. The projects used the sub-watershed as the planning unit and sought the views of local technicians and members of the farming community to prepare land use and capability plans for soil and water conservation. This approach was tested at the pilot stage through FAO technical assistance under Ministry of Agriculturedуring 1988-1991. This was the first step in the evolution of the participatory planning approach to watershed development. By late 1990, watershed development was considered the focal point for rural development and poverty alleviation in Ethiopia (Final & Document 2013).

Several Non-Governmental Organization (NGO) and bilateral organizations adopted watershed development, in the last decade their perspectives intervention areas were with the collaboration of government partners. Instances where the land rehabilitation project with World Food Programme (WFP) and Food-for-Work assistance was aimed at addressing the problems of food insecurity through the construction of soil conservation structures, community forestry and rural infrastructure works. the Deutsche Gesellschaft for Technische Zusammenarbeit (GTZ) Integrated Food Security Program in South Gondar, with an integrated watershed management approach, was aimed at improving the nutritional food-insecure households in south Gondar through natural resource management by biological and physical soil conservation measures, crops and rural infrastructure works. The project succeeded with a gully rehabilitation approach (Weith et al. 2013).

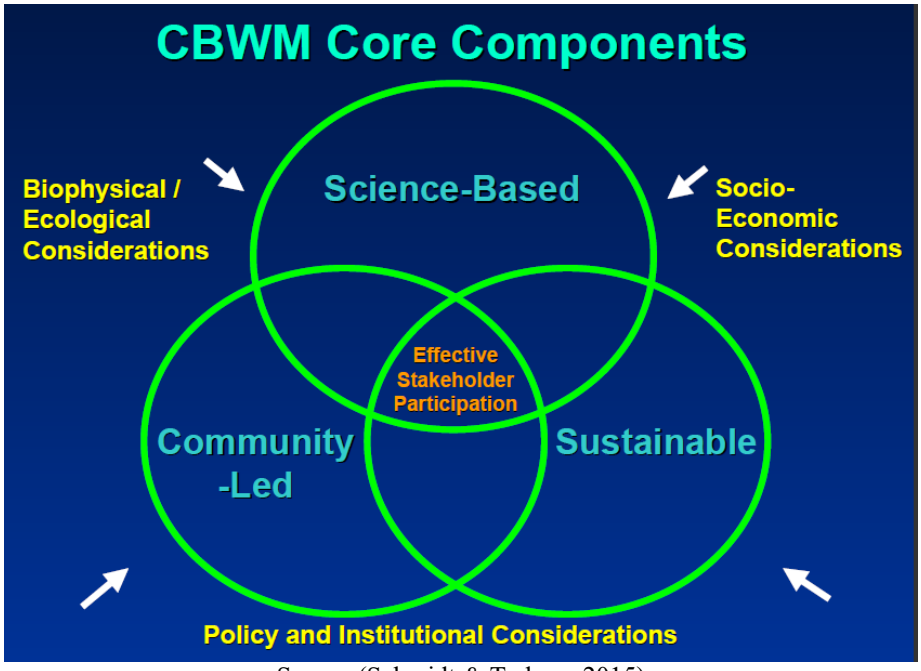
At present, a wide variety of donors and development agencies are promoting watershed development. Watershed management was widely considered as a practice of soil and water conservation and the success of the watershed projects were marked as the basis of major watershed initiatives in Ethiopia. In addition, in the dry lands of the Tigray Regional State in northern Ethiopia, the regional government and the general population have been making efforts to control the degradation of natural resources since 1991. As a result, many SWC measures have been initiated, particularly for soil erosion control, including the construction of stone bunds to conserve *in-situ* moisture and decrease sheet and rill erosion on arable land and hill slopes, the construction of check dams in gullies and the establishment of enclosures on steep slopes. Within the Tigray region, the extensive community involvement in SWC and the provision of free labor represent unique adaptation strategies. As a result, Tigray is among the national regional states in Ethiopia where SWC measures have been implemented extensively through collective decision making and participatory approach (Tadesse 2013).

Over time and in response to changing needs, the scope of watershed management has broadened from the initial concept of technical management of the water resource to an integrated discipline that applies biological, technical, social and economic principles to maintain the productivity of headwater and lowland areas through the scientific management of soil, plant and water resources (Nihal 2014).

2.2. Components of Community Based Watershed Management

1. Science-Based – Decisions based on data
2. Community-Led – Stakeholders decide
3. Sustainable – Long-term coordination

DOI: 10.7176/JRDM



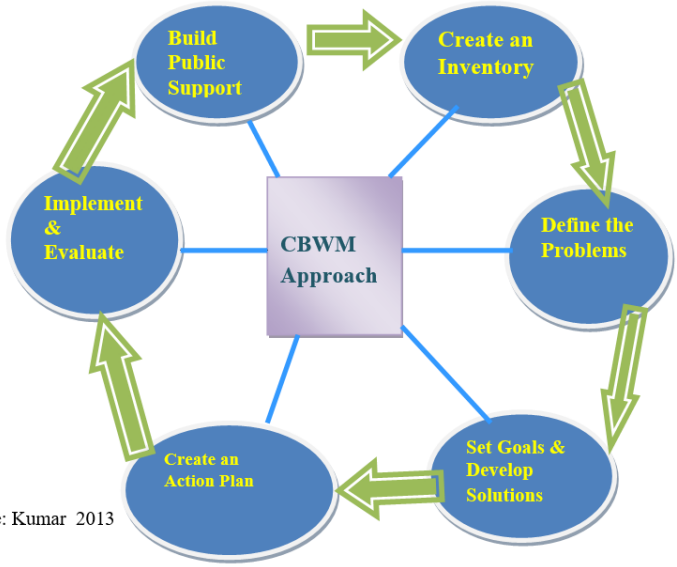
Source:(Schmidt & Tadesse 2015)

2.3. Community-Based Approach to Watershed Management

Since passage of the federal Clean Water Act in 1972 and the Safe Drinking Water Act in 1974, great progress has been made in reducing the amount of pollutants discharged into Ohio's waters from point sources such as wastewater treatment plants and industries. But as point sources of pollution were reduced, other forms of pollution, called non-point source or diffuse pollution, came to the forefront. Non-point source pollution results from human land-use practices such as agriculture, mining, forestry, home septic systems, and contaminated runoff from urban landscapes. Now these non-point sources of pollution, combined with the physical destruction of aquatic habitat, are the major remaining sources of impairment of Ohio's rivers and lakes.

EPA has limited regulatory authority to control land-use practices that alter aquatic habitat and cause non-point source pollution. Consequently, throughout Ohio, government agency representatives, public officials, educators, scientists, concerned citizens, and other private interests are joining together to identify and address land-use practices and other human activities that pollute local water resources or otherwise alter watershed functions.

Community-based watershed management is an approach to water-resource protection that enables individuals, groups, and institutions with a stake in management outcomes (often called stakeholders) to participate in identifying and addressing local issues that affect or are affected by watershed functions.In Ethiopia, some key stakeholders include those people who have the authority to make land-use decisions, such as individual landowners, farmers, and local government officials.



Source: Kumar 2013

2.4. Characteristics of Community-Based Watershed Management

Changing Roles and Relationships: As local communities participate more actively in watershed management, the roles and relationships of resource managers and stakeholders will change. Traditionally, resource managers were viewed as experts who were uniquely qualified to identify and implement watershed management strategies. But community-based watershed management recognizes that all stakeholders have a critical role to play in the management planning process. Resource managers and other stakeholders can contribute in many different ways, but all must work collaboratively to understand and address watershed issues when a community-based approach is used (Ababa 2014).

Whole-System Perspective: Watershed management is not a single strategy, but is a general approach to water resource protection that recognizes the interconnectedness of all the physical and biological components of the landscape, including human communities. A community-based approach considers not only the physical characteristics of a watershed, but it also takes into account the social and economic factors associated with watershed issues. The goal of community-based watershed management is to protect and restore watershed functions while considering the variety of social and economic benefits of those functions (Development 2010).

Integration of Scientific Information and Societal Values: Watershed management decisions should be based on sound scientific information, both in terms of identifying problems and selecting options for addressing those problems. However, resource managers have learned that management decisions that are based on scientific evidence alone often fail in the long-run because they conflict with a community's economic or other social values. Community-based approaches to watershed management attempt to incorporate a broad range of values in the management process by involving representatives from a diverse cross-section of the community throughout the management planning process. In some cases, by involving diverse interests early on, value conflicts can be resolved during the planning process, thereby avoiding more costly battles once plans are put into action (Kumar et al. 2013).

Adaptive Management Style: Addressing environmental, social, and economic issues at the watershed scale is complex, and often there is a high level of uncertainty regarding the outcomes of management decisions. Effective community-based watershed management entails an experimental approach to management in the sense that participants must be prepared to learn from their mistakes and to adapt their management strategies to changing conditions. In many ways, watershed management planning is never complete, because as old issues are resolved, new ones arise. For this reason, the long-term commitment of the stakeholders involved in a community-based watershed-management project is critical to its success (Anon 2014).

2.5. Challenges Associated With Community-Based Watershed Management

Community-based watershed management is not easy, nor is it always effective at protecting or restoring watershed functions (Ababa 2014). Some of the challenges faced by those who adopt a community-based approach include the following:

- Watersheds may cover thousands of acres of public and privately owned land. Developing even a basic understanding of how human activities affect watershed functions is a major undertaking.
- Some key stakeholders may lack the time, motivation, skills, or resources to participate effectively throughout the management planning process.

- Resource management professionals may be reluctant to give up their role as experts and to share authority with lay persons regarding resource management issues.
- Conflicts between stakeholders over management goals and the means to accomplishing those goals are inevitable, and resource management professionals are often ill-prepared to facilitate constructive dialogue to resolve these conflicts.
- Community-based approaches require time and resources to generate interest and to build relationships between stakeholders. Funding agencies and stakeholders may grow impatient with the lack of observable outcomes (Ababa 2014).

2.6. Land Degradation Problems in Ethiopia

In Ethiopia Land degradation has seriously affecting the national economy and well-being of more than 83% of the rural population. It is the major cause of the country's low and declining agricultural productivity, persistent food insecurity, and rural poverty. The most common form of land degradation in Ethiopia is soil erosion, and mainly this erosion processes are due to inappropriate land use, poor land management practices on steep slopes, fragile soils, increased pressure on both arable and grazing land, and the traditional farming systems of the people. Moreover, thousands hectare of forests are cleared and marginal lands are often used for cultivation without any conservation activities annually (Annual & Proceedings 2012).

After the droughts and food shortages of the 1970s and 1980s, the Ethiopian Ministry of Agriculture (MoA) and the World Food Programme began to exchange relief food aid for 'work' in drought-affected areas, focusing on rural land rehabilitation (for example terracing hillsides). Early successes included afforestation, increased livestock feed, soil and water conservation efforts, and restored agricultural productivity. However, the adopted watersheds proved too large to monitor and manage, while the top-down planning methodology lacked community input and the restoration was less effective than had been hoped. Food shortages and out migration remained a feature of rural areas (Ababa 2014).

In Ethiopia the government introduce Sustainable Land Management (SLM) program in order to run it in a holistic approach. SLM program has five integrated components such as Watershed management, Land Certification and Administration, knowledge management, project management and capacity building. Watershed management is the major component of the program, takes 60-70% of the total fund and activities (Tadesse 2013).

In Ethiopia, farmers mainly use this basic resource in traditional ways without any logical organization of different types of land according to their agricultural potential or according to their physical configuration. This leads to further degradation of the soil and disruption of agricultural production resulting in the poor performance of the agricultural sector in particular, and the whole economy in general. However, continued agricultural growth remains a necessity, not an option, for most developing countries like Ethiopia and this growth must be achieved on a sustainable basis not jeopardizing the underlying natural resource base or to impose costly externalities on others (Annual & Proceedings 2012).

2.6.1. Factors Driving Land Degradation in Ethiopia

Land degradation depends on several factors and degradation is the consequence of physical, chemical and biological factors driven by environmental, social and economic pressures. each drivers can be grouped as below:

• **Natural Drivers**:- Drought climate conditions, High erodibility of soils and geographical features, Steep topography, Low land cover rate, Deforestation.

• **Social Drivers**

Rural poverty, Uncertain land tenure, Limited employment opportunities, Poor social infrastructures

• **Economic Drivers**

– Low agriculture productivity, inadequate silvicultural practices and management planning
– Inconsistent marketing systems and poor market information for agricultural products
– Insufficient support for the potential economic activities such as agriculture and eco-tourism

• **Policy and Institutional Drivers**

– Inappropriate government policies , Lack of the required policies, Lack of coordination in and between agencies, Insufficient technical capacity and trained staff, Inadequate attention to participatory approaches (Change 2015).

2.6.2. Causes and Effect of Watershed Degradation in Ethiopia

(a) Causes of Watershed Degradation

The environmental factors contributing to watershed degradation in Ethiopia have been intensified by the following types:

(1) **Natural causes:**

- Geologic instability
- Erodibility of soil
- Drought hazard
- High intensity rainfall
- Strong wind

- Fire

(2) Human causes:

- Deforestation: unwise and poorly logging; Fuelwood cutting due to fuel shortages; Conversion of forests to grazing lands or cultivated croplands; Forest fire set by local inhabitants.
- Inappropriate collection, transportation and use of water resources.
- Inappropriate use of land resources: Conversion of forests to grazing lands or cultivated croplands; Conversion of grasslands to cultivated croplands.
- Unwise farming-cultivation practices
- Overgrazing by livestock
- Road construction on fragile lands
- System of land ownership
- Inadequate policy and legislative support
- Lack of unified planning and extension for integrated watershed management (Kirui 2016).

(b) Effects of Watershed Degradation

While the impact of human activities on watershed are many and varied, some of the main ones may be summarized below:

• Reduced tree and vegetative cover; Reduced water availability and quality;
• Reduced productivity of land, increased siltation of rivers and reservoirs due to soil erosion;
Increased marine and coastal contamination and degradation adversely affecting the tourism industry;
• Increased flooding resulting in loss to human life, property, roads and agricultural crops;
• Loss of habitat for important flora and fauna (Kirui 2016).

2.6.3. Major Issues in Watershed Management

Watershed management is an important part of eco-environment conservation. The main measures of watershed management are: ecosystem diagnosing; water, land and other renewable natural resources use planning; restoration of eroded land; processing of agricultural, forestry and animal husbandry production; supervision and administration; evaluation of benefit. Watersheds bear significant importance from ecological, aesthetic and socio-economic perspectives. These watersheds are home to millions of people, a substantial proportion of whom are indigenous ethnic minorities seeking out their livelihoods by utilizing natural resources available there. To what extent or how long the ecosystem-balancing and economic opportunity-generating roles of watersheds will continue depends on their status as reflected in the distribution, density and type of vegetation cover, and the pace of soil erosion and land productivity. Due to the lack of comprehensive macro-level studies, no conclusions can be drawn about the status of watersheds on a regional scale (Winnegge 2013).

However, findings of several micro-level studies indicate that undergoing soil erosion, soil nutrient depletion and deforestation, though the extent of these problems varies from one area to another.

The specific issues being confronted in regard to watershed management are as follows:

How to control or even reverse the process of forest and rangeland degradation?
How to reduce the rate of soil erosion in agricultural land to a minimum possible limit?
What should be done to improve the soil fertility, so as to increase crop yield on a sustainable basis?
How to enable watershed settlers to improve their quality of life without inflicting damage on natural resources? (Anon 2013b).

2.7. Watershed management approaches

2.7.1. Collaborative watershed management

Collaborative watershed management has emerged in the last two decades as a promising approach to address non-point source pollution in waters. With such a wide variety of land use patterns across watersheds, it is important that collaborative approaches to water resource management are tailored to local land-use planning efforts (Wang, 2001; Scott et.al. 2010). Urban and rural landscapes can have very different biological systems, leading watershed partnerships located in different areas to address different environmental issues. Moreover, collaborative management efforts in each setting can be impacted by different sets of variables, from the level of human capital (e.g., income, education) and social capital (e.g., trust, networks, norms of reciprocity) in watershed communities, to the financial, technical, and human resources made available by government agencies, NGO's, academic units, and local citizens (Hardy and Koontz, 2010).

Successful collaborative watershed management programs emphasize active stakeholder engagement, employ integrated solutions, recognize the authority of multiple agencies and jurisdictions, and build on expertise and resources across sectors. Out of bio-geophysical necessity, managing a watershed involves coordinated stewardship of the water body and the land area that the water body drains. Consequently, watershed conservation and rehabilitation is typically a function of an array of public and private programs (Erdogan 2013).

The collaborative watershed approach is on the agenda of the federal government in the United States.

President Clinton's 1998 Clean Water Action Plan explicitly promotes such an approach nationwide. The plan encourages states to work with watershed stakeholders, including interested citizens, to identify watersheds with critical water quality problems and to focus resources and implement strategies to solve these problems(Weith et al. 2013).

2.7.2. Holistic watershed management

Embraces the idea that all aspects of the watershed human resources, economic development, environmental quality, infrastructure development and public safety must be considered in a holistic watershed management decision-making process. Holistic watershed management's fundament approach is in a facilitated process designed for the integration of organizations and individuals having environmental knowledge, skills and resources in the water quality and comprehensive community planning (Erdogan 2013).

Consider the following roles agencies could play in sustainable holistic watershed management decision-making:

1. Catalyst–incentives or regulation enforcement to improve watershed environment (Water Quality). Agency representative living in the watershed experiencing a problem.
2. Responsive/Supportive–provide technical resources as needed for sound holistic watershed management decision–making.
3. Stand back and let local people control the holistic watershed management planning process (Tadesse 2013).

2.7.3. Integrated watershed management

An "integrated watershed management" approach should strive to create settings for collaboration and innovation by facilitating dialogue among local stakeholders. The overriding charge under the piloting of this approach is fostering a framework for dialogue among stakeholders for problem solving examining interdisciplinary solutions that are inherently multi-objective. That is, solutions able to address more than one problem simultaneously while addressing the entire resource based on local circumstances (Woreda 2010).

The Integrated Watershed Management Program proposes a framework for fostering inter disciplinary on-ground implementation activities. Interdisciplinary takes on a meaning of multiple dimensions and scales. poor integration and coordination, which is either fostered or hindered by a complex set of environmental and socio-economic and institutional factors at various spatial levels such as "(1) legislation and regulations, (2) policies and guidelines, (3) administrative structures, (4) economic and financial arrangements, (5) political structures and processes, (6) historical and traditional customs and values and (7) key participants or actors" (Erdogan 2013).

3. THE THEORIES AND CONCEPT OF SUSTAINABLE LAND MANAGEMENT

The concept of sustainability in sustainable land management refers to a diverse and long running dispute over the direction of societal action. It contains the formulation, "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Weith et al. 2013).

Sustainable Land Management (SLM) is an integrated approach that addresses the sustainable management of land, water and other natural resources, and the services they provide. SLM seeks to counteract land deg-radiation, reclaim degraded areas and ensure the **resilience** of the ecosystems, their services and resources (Weith et al. 2013).

The foundation of sustainable theory lies, first, in recognizing the biological limits to growth, the ecological carrying capacity and the maximum sustainable yield – the ecological sustainability view. Sustainability in this view means environmental sustainability. The environmental and ecological base of sustainable development is very strong (Anon 2015).

The second foundation is sustainable economic growth. This refers to a situation where the economy is growing over a period of time and surviving periods of relative recession. Sustainable economic growth implies that if the economy is growing on its own momentum then there is sustainable (Weith et al. 2013)

The third foundation is sustainable societies. The social approach considers the poor people and their basic needs first. Another key element of the social approach is an emphasis on social equity, justice and liberation (Weith et al. 2013).

SLM is necessary to meet the requirements of a growing population. Improper land management can lead to land degradation and a significant reduction in the productive and service functions **Sustainable Land Management** means managing land without damaging ecological processes or reducing biological diversity. It is a knowledge-based procedure that helps integrate land, water, biodiversity, and environmental management (including input and output externalities)to meet life demands while sustaining ecosystem services and livelihoods. It is the use of land to meet changing human needs (agriculture, forestry and conservation) while ensuring the long term socio economics and ecological functions of the land. Sustainable land management combines technologies, policies and activities aimed at integrating socio economic principles with environmental concerns, so as to simultaneously; maintain and enhance production (productivity),reduce the level of production risk and enhance

soil capacity to buffer against degradation processes (stability/resilience),protect the potential of natural resources and prevent degradation of soil and water quality(protection), be economically viable (viability),be socially acceptable and assure access to the benefits improved land management(acceptability/equity). The definition and these criteria called pillars of SLM are the basic principles and the foundation on which sustainable land management is being developed. Thus, any evaluation of sustainability has to be based on the following objectives: Productivity, stability/resilience and production. SLM is necessary to meet the requirements of a growing population. Improper land management can lead to land degradation and a significant reduction in the productive and service functions (Development 2010).

In lay terms, SLM involves these activities: Preserving and enhancing the productive capabilities of cropland, forestland, and grazing land (such as up land areas, down-slope areas, flatlands, and bottomlands), Sustaining productive forest areas and potentially commercial and noncommercial forest reserves, maintaining the integrity of watersheds for water supply and hydropower-generation needs and water conservation zones, maintaining the ability of aquifers to serve the needs of farm and other productive activities. In addition, SLM includes actions to stop and reverse degradation—or at least to mitigate the adverse effects of earlier misuse. Such actions are increasingly important in uplands and watersheds—especially those where pressures from the resident populations are severe and where the destructive consequences of upland degradation are being felt in far more densely populated areas downstream(Weith et al. 2013).

Sustainable land management (SLM) is crucial to minimizing land degradation, rehabilitating degraded areas and ensuring the optimal use of land resources for the benefit of present and future generations. SLM is based on four common principles:

• land-user-driven and participatory approaches;
• integrated use of natural resources at ecosystem and farming systems levels;
• Multilevel and multi stakeholder involvement; and
• Targeted policy and institutional support, including development of incentive mechanisms for SLM adoption and income generation at the local level.

Its application requires collaboration and partnership at all levels – land users, technical experts and policy-makers – to ensure that the causes of the degradation and corrective measures are properly identified, and that the policy and regulatory environment enables the adoption of the most appropriate management measures (Tadesse 2013).

3.1. The Need for Sustainable Land Management in Ethiopia

In Ethiopia, the adoption of sustainable land management (SLM) innovations; therefore, got renewed priority in the national drive to achieve the much desired food for the increasing population. The need to develop SLM innovations in a participatory manner and creation of a favourable policy environment for wide scale adoption of SLM innovations, necessitated the proliferation of integrated natural resource management (INRM) efforts in Ethiopia (Ababa 2014).

Land-use activities—whether converting natural landscapes for human use or changing management practices on human-dominated lands—have transformed a large proportion of the planet's land surface. By clearing forests, practicing subsistence agriculture, intensifying farmland production, or expanding urban centers, humans are changing the landscapes.

Although land-use practices vary greatly across the country, their ultimate outcome is generally the same: (a) to produce food and fiber and (b) to acquire natural resources for immediate human needs. The sections that follow present the rationale for why SLM is a critical cross-sector driver for maintaining production and services from human-dominated landscapes. The challenges identified are also entry points for carefully targeted interventions and represent opportunities for proper investments (Anon 2015).

3.2. Factors that influence the adoption of sustainable land management

A farmer makes a decision to his farmland whether to adopt a practice or not by considering different factors. Such factors include individual, social, economic, institutional and environmental context. Cary et al. (2012) presented a model of land management practice appraisal. Central to the model is the notion of appraisal, the assessment of the 'fit' between a particular land management practice and the needs and desires of the landholder within a particular social, economic and environmental context. Appraisal has the elements of a 'black box' that may be objectively difficult to know the relative influences of the factors that impact on a decision to adopt a practice or not as shown in Fig. 1 below.

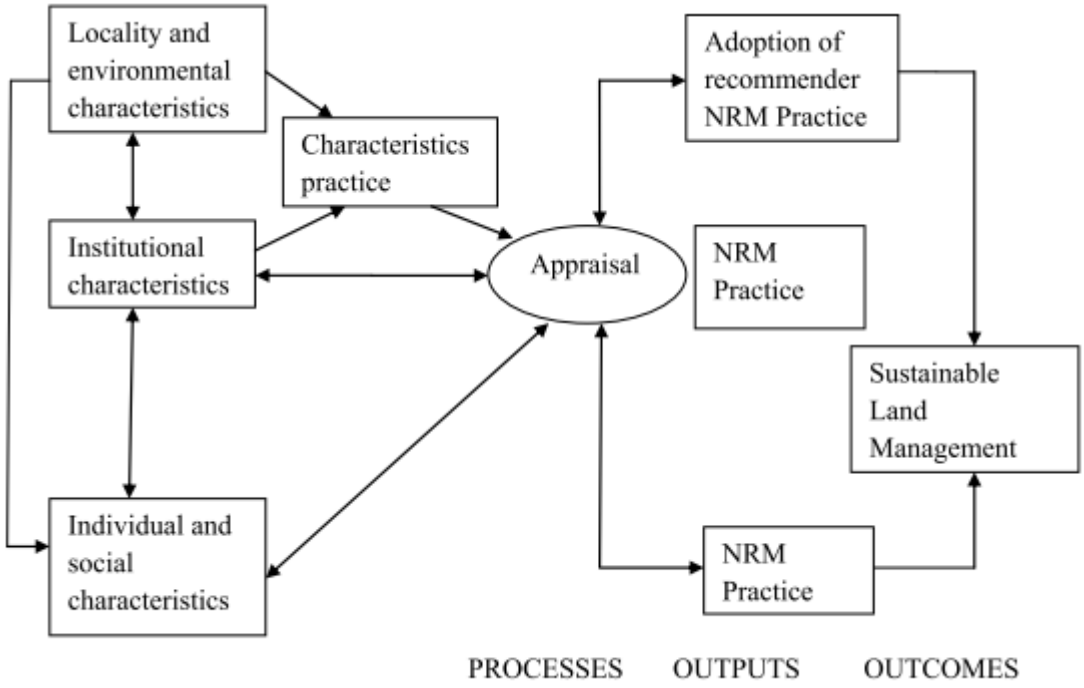


Figure 1: A model of land management practice appraisal

According to Cary et al. (2012) and Webb et al. (2014), characteristics of particular practices and their applicability to the land holders property are extremely significant in their appraisal. Different practices will have varying degrees of relevance to different landholders as a consequence of the practice itself and also as a consequence of local environmental factors. Institutional characteristics refer to the more formal structures that determine the 'social' environment within which landholder makes decisions concerning land management practices. These include the regulatory environment, government agency support structures, and government policy as reflected in incentive and information schemes. Individual and social characteristics include personal, family and demographic characteristics and the economic and property physical circumstances of a landholder (Anon 2013b).

3.3. The attributes of sustainable agriculture land management practices

Land management practices will have different implications for those considering their adoption and those promoting that adoption. For example, some land management practices may just require simple modifications to practices currently used by landholders, while others may require farm-wide changes to the systems of production (Amsalu 2015).

Other practices may not require changes to farming systems but focus on testing and monitoring levels of nutrients or chemical use; others may simply involve bookkeeping changes and record keeping and then some may require retirement of land from agricultural production. The nature of each practice will have different impacts in their adoption(Kumar et al. 2013).

The following characteristics in adoption behavior of innovation in agriculture.

3.3.1. Relative advantage

This is normally interpreted in terms of financial advantage to the farm business. The perceived financial advantages of more sustainable agricultural practices have been shown to be one of the best indicators of their adoption.

3.3.2. Risk

Human behavior is more complex than simply being profit driven. Some practices will encompass greater risks than others in their application to a new property, and individuals will be willing to manage greater or lesser levels of risk. Many farmers are often motivated by a balance between the need for profit and a satisfaction with a comfortable living which minimizes risk and some will trade off profit maximization for risk reduction (Rendell et al., 1996; Webb, 2004). Differing risk implications of different sustainable practices will be an important consideration in their adoption.

3.3.3. Complexity

In many times agricultural innovations which appear simple may in fact imply significant and complex changes to the farming system. More complex practices are less likely to be adopted. Hence, farmers are more attracted to innovations which are simple to use and have significant impact to their produces.

3.3.4. Compatibility

This refers to the extent to which a new idea fits in to existing knowledge and existing social practice. If a new idea fits easily into an existing system, it will be adopted more quickly.

Two systems are important, the current farming system and the social system embracing the region's farming or broader community. If a practice is not readily incorporated into a farming system, then its adoption may be attenuated. Similarly, if the ideas encompassing the new practice do not fit with local norms that will also work against adoption.

3.3.5. Trialability

Practices which can be trialed on a small scale prior to full implementation are more likely to be adopted. Trialing enables decisions about the utility of an innovation with minimal risk. Typically, farmers can easily assess a new crop variety by sowing one compound to the new variety before deciding upon more extensive adoption. Dryland salinity control is clearly not amenable to trialling. Because the benefits of salinity control may not be achievable for up to 50 years, a trial process will delay more extensive salinity control for a century. Trialability is in turn dependent upon observability.

3.3.6. Observability

More sustainable NRM practices whose advantages are observable are more likely to be adopted. Traditionally, new variety of crop is often quite visible to passing observers and this visibility has been used to advantage. Many landcare groups have attempted to locate demonstrations along major roads to enhance visibility

3.4. SLM approaches and Strategies

SLM concept includes more participatory approaches, and includes the social and economic dimensions into the technical planning and design of land management approaches. Though SLM activities are not new in the country but the working principle has come to a new strategy focusing on watershed rather than geographical boundaries. The strategies used to implement the interventions are to follow the prepared national guideline for Community Based Participatory Watershed Development (CBPWD), establishment of federal, regional and community level platforms, organizing awareness creation workshops at all levels, conducting trainings on various topics at all levels, execution of activities on the ground based on the CBPWD, conducting on job training and refreshment workshops, etc. (Amsalu 2015)

- Use of community based participatory integrated watershed management approach (using CBPWD guideline)
- Selection and prioritization of community watersheds
- Organization of the beneficiary communities in teams
- Conducting biophysical and socioeconomic surveys
- Implementation of soil and water conservation measures on the basis of community plan and watershed logic.
- Creating synergy on funds and stakeholder participation
- Well organized institutional set-up and commitment
- Choosing suitable technology

3.5. Achievements

The scale of achievements varies from region to region and in Tigray region the interventions have a higher return. In Arid and semi arid regions of Ethiopia where water is scare, agricultural and non-agricultural sectors are increasingly competing for water supplies, use of SLM practices has improved farming methods. The methods help the people in boost 'crop per drop', enhance food security and livelihoods and cope climate change effects. Thus farmers are reducing risk of crop failure by selecting/ growing crop varieties that can tolerate water stress, adopting improved water management techniques and restoring the ecosystem. This in turn allows them to increase production on marginal lands and cope with short-term or medium-term water deficits under both irrigated and rain-fed conditions. Generally SLM interventions help the people to develop local solutions to loss of biodiversity, land and water degradation, and insecure water supply, moreover a set of measures that farmers could carry out themselves, with their own resources and limited expert help(Branca et al. 2011).

Generally the achievement can be summarized as follows

• Relatively a better status and reliance in Food security situation in the country
• Developing an integrated Natural resource management activities
• Increased public awareness on the role of NRM (Natural resource Management) on productivity and livelihood improvement.
• Reduce degradation of soil resource,
• Environmental rehabilitation on degraded areas and improving productivity of agricultural land.
• A better SLM practices; increased coverage of land under soil and water conservation activity, improved crop management and tree planting.

Responses: Best Experience

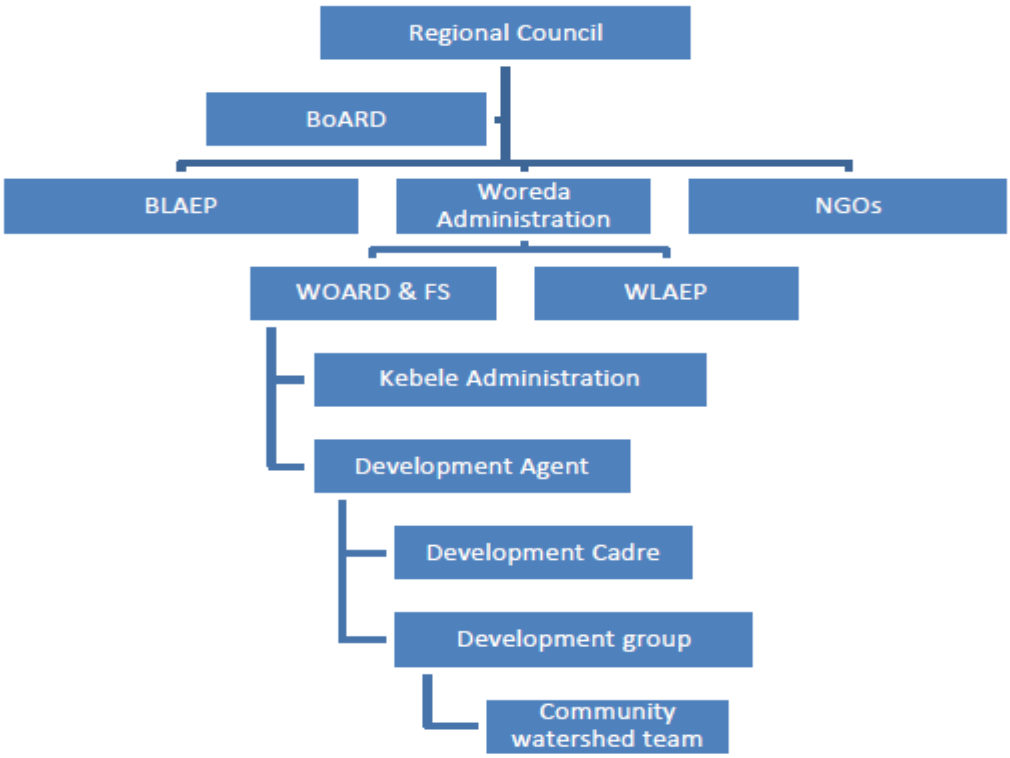
Currently SLM project is running in 83 districts, which are a subset of a much larger plan of MoA (Ministry of Agriculture) to support sustainable land management activities in 177 priority watersheds across the country and its effectiveness varies from region to region. Especially regions in semi arid areas, with frequent drought and lower agricultural productivity and loss of biodiversity, have got promising response in the past. Tigray regional state is one of the regions who have a better experience in this regard. Thus the Tigray regional state clearly set available institutional and technological objectives, and tries to enhance social learning processes for a sustainable improvement of the region. Then the state bureau of agriculture and rural development (TBoARD) tries to develop strong and holistic approaches for the rehabilitation of degraded areas in the region. The bureau involved in developing model sites for the whole country in integrating area closure, with physical and biological Soil and Water conservation (SWC) interventions, and different agricultural development activities. These have been done through a combination of interventions, defining partnerships needed to deliver them, super imposing funds, and people (farmers, experts and political bodies) commitment and mobilization(Weith et al. 2013).

These measures have been done on complementary basis; conservation, re-vegetation, and production undertaken by the farmers at the same time on the same plot. Construction of soil and stone bunds, hillside terraces, trenches, percolation pit, soil sediment dam, river-bed dams, check-dams, eyebrow basin and others on cultivated land and communal land. In addition to these, development of fodder grasses, fruit crops, trees, agro-forestry and bee keeping practices done on cultivable, protected and gullies areas. Area closure is the main practice in the region and people are willing to close/bound an area and set by law to protect and use on a sustainable way. People are participating with full commitment in the construction of SWC measures free of charge for 40 days, planting of trees and fodder grasses to stabilize the structures and manage their livestock not to enter in protected areas and customizing themselves with zero grazing (cut and carry system). Farmers getting better-off in their livelihood conditions from these development activities. Almost 280,000 hectares of land closed for natural regeneration and many other land rehabilitation activities has been done in the region(Tadesse 2013).

The important element for effective implementation of the interventions can be summarized as follows:

• Governance framework and institutional mechanisms—policy, legal and organizational frameworks— is used in Tigray at the region and kebele (lower level administrative office) levels to create an enabling environment for the interventions.

o **Institutional set-up**



4. CONCLUSION AND RECOMMENDATION

The management of watersheds in developing countries is quite different from those in developed countries due to their differences in socio-economic conditions and physical settings. In developing countries, watershed

programs are relatively new and concepts still need to be developed. Development of watershed is not a individual component. It is a combination of components hence individual people not possible to development watershed it is community based. Land degradation and sustainable land management can be considered as two side of the same coin and in order to implement the interventions watershed should be the basis. Watershed is integrated systems whereby the complex relationships exist between people, land, water and other resources. Hence, community based integrated watershed management approach is a better and effective way in natural resource management interventions. Unless it is integrated approach, how water, forests and soil resources are managed and conserved in the upper stream areas affect people living downstream or people living in upper stream areas may not recognize the outcome of their activities on downstream areas. Water quality and availability depend on how other resources such as cropland, pastures or forests are managed. In many watersheds, people find it difficult to appropriately organize their water and land use. Thus it results with inequitable distribution and inefficient use of these precious resources, and leading to degradation of the watershed, and loss of livelihood support. Therefore, it needs selecting effective land and water management practices and technologies, effective targeting of aid and policies instruments, and identifying the complex interactions between individuals, communities and watersheds used for overall benefit.

Moreover, as the Ethiopian government is committed to fasten the overall development of the country, integrating SLM and other natural resource management and development activities in a program (rather than project approach) and complementary base is essential. Also build a basket fund (putting all the funds available from development partners in the same pool) is important step in synergizing the effort by different actor. This will ensure that water and land resources are used effectively, efficiently and fairly to increase the productivity of the land.

SLM technologies can generate both private and public benefits and thus constitute a potentially important means of generating “win-win” solutions to addressing poverty and food insecurity as well as environmental issues. In terms of private benefits to farmers, by increasing and conserving natural capital (including soil organic matter, various forms of biodiversity, water resources) SLM can generate productivity increases, cost decreases and higher stability of production. SLM practices contribute to improving soil fertility and structure, adding high amounts of biomass to the soil, causing minimal soil disturbance, conserving soil and water, enhancing activity and diversity of soil fauna, and strengthening mechanisms of elemental cycling. This in turn translates into better plant nutrient content, increased water retention capacity and better soil structure, potentially leading to higher yields and greater resilience, thus contributing to enhance food security and rural livelihoods and At the same time, widespread adoption of SLM has the potential to generate significant public environmental goods in the form of improved watershed functioning.

Recommendation

The local community must take responsibility for the management of natural resources and ecosystems on which they depend for their livelihood.Improving soil and water conservation, enhancing productivity and sustainable natural resource management must be the major issues of government and local community.The strategies on community based watershed management in Ethiopia must be strongly implemented in the future. community based watershed management contribute more to SLM, so the integration and coordination between them will have to be strong in the future.

Generally, SLM interventions help the people to develop local solutions to loss of biodiversity, land and water degradation, and insecure water supply, moreover a set of measures that farmers must be carry out themselves, with their own resources to improve their livelihood in the future and so further work is needed on SLM in Ethiopia.

5. REFERENCE

Ababa, A., 2014. Community participatory sustainable land management byelaw formulation in the highlands of central ethiopia. , 22(1), pp.9–20.

Amsalu, A., 2015. Institutional Context For Soil Resources Management in Ethiopia : a Review. , (September).

Annual, A. & Proceedings, C., 2012. Sustainable land management (SLM): Adaptation response to climate change , cases in Ethiopia . University of South Australia. , pp.1–13.

Anon, 2013a. REVISITING IMPACT TO COMMUNITY LIVELIHOOD IN WEST.

Anon, 2013b. Scaling up an integrated watershed management approach through social protection programmes in Ethiopia : the MERET and PSNP schemes.

Anon, 2015. SCHOOL OF GRADUATE STUDIES COLLEGE OF SOCIAL SCIENCES FACTORS AFFECTING SUSTAINABLE LAND USE MANAGEMENT : SCHOOL OF GRADUATE STUDIES.

Anon, 2014. The Implication of Integrated Watershed Management for Rehabilitation of Degraded Lands : Case Study of Ethiopian Highlands. , 3(6), pp.78–90.

Berry, L., LAND DEGRADATION IN ETHIOPIA : ITS EXTENT AND IMPACT.

Branca, G. et al., 2011. Branca et al. 2011. , (October), pp.1–42.

Change, C., 2015. THE ROLE OF COMMUNITY BASED WATERSHED MANAGEMENT FOR CLIMATE CHANGE ADAPTATION IN ADWA, CENTRAL TIGRAY ZONE Meaza Hadush Dept.of geography, Adigrat University, Adigrat, Ethiopia. , 1(1), pp.11–35.

Development, R., 2010. Sustainable Land Management Technologies and Approaches in Ethiopia Sustainable Land Management Technologies and Approaches in Ethiopia : , pp.1–321.

Erdogan, R., 2013. Stakeholder Involvement in Sustainable Watershed Management.

Final, R. & Document, D., 2013. The Federal Democratic Republic of Ethiopia Sustainable Land Management Project II Environmental and Social Management Framework (ESMF).

Kirui, O.K., 2016. DRIVERS OF SUSTAINABLE LAND MANAGEMENT IN EASTERN AFRICA.

Kumar, M.K., Rani, M.U. & Pradesh, A., 2013. Horticulture Benefits of Horticulture in Watershed Management Ph . D . Scholar , Division of Fruits and Horticultural Technology , IARI , New. , (2277), pp.74–75.

Nihal, S., 2014. e Integrated Participatory Watershed Rehabilitation Approa -Best Practices from Turkey [1]. , 2(4).

Schmidt, E. & Tadesse, F., 2015. Ensuring Agricultural Productivity over Time : Impact of Sustainable Land Management Program on Rural Farmers in Ethiopia. , pp.1–26.

Submitted, A.T. et al., 2010. College of Business and Economics Department of Management FOOD SECURITY : THE CASE OF MAI ZEG ZEG WATERSHED IN DEGUA.

Tadesse, B.M., 2013. Sustainable Land M anagement Program in Ethiopia " Linking Local REDD + Projects to National REDD + Strategies & Initiatives ."

Weith, T. et al., 2013. The concept of Sustainable Land Management : a comparative discus- sion (at a global scale). , pp.1–13.

Winnegge, R., 2005. Participatory Approach in Integrated Watershed Management. , 3, pp.187–202.

Woldemariam, K.W., 2012. Cost and Benefit of Catchment Management and Regreening in Tigray, Ethiopia.

Woreda, D., 2010. INSTITUTE OF DEVELOPMENT STUDIES CENTER FOR RURAL DEVELOPMEN STUDIES Integrated Watershed Development from Sustainable Livelihood. , (June).