

Livelihood Impacts of Environmental Conservation Programmes in the Amhara Region of Ethiopia

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Abstract

In an era where climate change and environmental variability is having an overwhelming impact on the livelihoods and well-being of poor rural households, ecological conservation and development interventions that ensure sustainable livelihood security of such households have been posited as the most effective approach in addressing both environmental degradations and household well-being in the rural communities of Ethiopia. This study investigated the impact of the 'Tree Gudifecha' ecological conservation project on the livelihoods and well-being of rural households located in two villages in the Amhara regional states of Ethiopia. The data collection and analysis was done using mixed approaches involving household surveys, interviews and focus groups meetings over a period of twelve weeks. The findings show an increase in both household income and savings after the implementation of the 'Tree Gudifecha' ecological conservation project with disparities between households and communities. A moderate association was observed between livelihood diversifications and household income after the 'Tree Gudifecha' ecological conservation project has been implemented. The study also revealed that the extent and amount of the share that each diversification activity brings to the household income is equally important for participation in conservation programmes. The research revealed that skill enhancement interventions in livelihood activities by itself does not necessarily make a contribution to increasing community participation or household income unless a comprehensive livelihood package and adequate credit scheme is made available for potential diversification activities. The results suggest the need to incorporate indigenous livelihood security programmes at both development practice and policy levels aimed at addressing environmental/ecological degradation in rural Ethiopia. Such programmes should involve a composite framework that includes the profitability of diversification activities, identification of new livelihood activities and capacity enhancement.

Keywords: Ethiopia, community resource governance, environmental/ecological degradation, well-being, 'Tree Gudifecha' project, sustainable livelihood diversification

1. Introduction

Human beings are highly dependent on the natural environment for their livelihoods. However, in the 21st century, the impact of environmental variability and climate change has significantly affected the livelihoods of the poor and marginal societies in developing countries. Studies show that the harnessing of environmental resources in order to satisfy the increasing demands of the world's ever-growing population is undermining the sustainability of the earth's ecosystem which is critical to our survival (Kremen, 2007). It is argued that in the absence of any alternative means of survival the poor are forced to use the services of nature such as food, fodder, water and other health requirements. However, once the drivers of climate change, manifested through drought or flood occur, the scope for sustaining these services becomes limited or sometimes impossible. This aggravates the condition of the poor as the material minimum becomes scarce (Comim et al., 2009). This situation is highly prevalent in sub-Saharan Africa where about 70 percent of the population live in rural areas and are mainly dependent on the natural environment and rain fed agriculture (Toulmin, 2009).

Poor households in developing countries, particularly in Africa, rely disproportionately on natural resources and the environment for their livelihoods. Therefore, it is the poor that are more vulnerable to natural disasters such as droughts and floods and to the on-going impacts of environmental degradation and climate change (Assan & Kumar, 2009; Assan, 2009) while a healthy and productive environment contributes significantly to human wellbeing and economic development which benefits the poor (UNEP-UNDP, 2008). However, in order to ensure a healthy environment, there is a general consensus on the importance of investment in projects to conserve and rehabilitate the natural environments (MA, 2005; Dasgupta, 2007).

Ethiopia faces the challenge of providing food for a growing population. One of the major challenges is environmental degradation emanating from population pressure, land use (insecure land tenure, small land size, land fragmentation), weak agricultural research and extension services, a lack of infrastructure, weak institutions, a low level of technology use and inadequate input supply and marketing systems (Shiferaw & Singh, 2010). Loss of biodiversity, particularly in the highlands of the country, is also another factor (MoWRMA, 2007; USAID, 2008). According to the transformation plan of the country, poverty remains widespread in the country although its level is in decline from 44% to 38.7% in 2005 (MoFED, 2010).

Land degradation is an alarming challenge in the Amhara region where erosion is the main cause of the loss of approximately 2 to 4 billion tonnes of soil annually leaving between 20,000 to 30,000 hectares of land unproductive (Taffa, 2009). Although natural factors are to some extent the cause for environmental degradation, coupled with the effects of a long history of settlement, prevailing farming methods and increasing population pressure which forces people to cultivate even steeper slopes have exacerbated the devastating land and resource degradation in the region (Belay, 2010). The poverty in the Amhara region is still high (7.3 million) next to Oromia (9.3 million) although the latter shares the largest population size compared with other regions (DPRD & MoFED, 2008).

In an attempt to tackle environmental degradation and secure the livelihood of rural households in two villages in the Amhara region, an environmental conservation project called 'Tree Gudifecha' has been implemented over the last five years. Within the context of the 'Tree Gudifecha' project, tree plantations and soil and water conservations activities such as the construction of check dams, terraces, trenches, micro basins, water harvesting and spring developments are considered as environmental conservation interventions. Nevertheless, the extent of the impact of the project on people's livelihood has not been systematically researched. The overall objective of the paper is to ascertain the effect of environmental conservation and development interventions on livelihood improvement and household wellbeing. It also seeks to determine the contribution of the environmental conservation programmes to sustainable livelihoods and household economy of the rural communities in the Amhara region of Ethiopia.

The next section of the paper discusses the contemporary concepts of ecosystems and environmental conservation programmes in relation to rural livelihood sustainability and human wellbeing. The third section presents background information on the country's agro ecology, a description of the project areas and the "Tree Gudifecha" project. The methodological framework employed in the research is also discussed in this section. Section Four presents and analyses the major findings of the research. The conclusions and policy implications are highlighted in section Five.

2. Literature Review

2.1 Linking the Ecosystem, Livelihoods and Rural Poverty

The United Nations Food and Agriculture Organisation (2007) defines ecosystem as a "dynamic complex of plant, animal, and micro-organism communities and the non-living environment interacting as a functional unit" while ecosystem services are 'the benefits people obtain from ecosystems'. Ecosystem services are classified into three major categories: provisioning services (food, freshwater, fuel, wood etc); regulating services (climate, disease and water regulation, water purification etc) and cultural services (spiritual and religious, recreation and ecotourism etc.) (MA, 2005; Butler & Oluoch-Kosura, 2006; Gomez-Baggethun & De Groot, 2010). However, these services are in decline due to man's continuous exploitation of the natural environment, which has a huge impact on the scale of land use (FAO, 2010). Foley et al. (2005) emphasize the importance of assessments of trade-offs between meeting immediate human needs and maintaining the capacity of the ecosystem. This is vital because any change in the resilience and condition of the environment and ecosystems and their subsequent ability to deliver services are critical components of any decent livelihood for the poor (Comim et al., 2009).

In view of this, some international organizations such as the UNDP and UNEP have approached poverty reduction from a livelihood and environment perspective. It is emphasized that a major challenge to sustainable livelihoods at the household and community level in rural Africa over the last decade has been the continuous

degradation of the environment. Environmental degradation in this regard refers to both a loss and damage in part of the natural resources such as land, water and air, and a concentration of harmful materials to living organisms (pollution) (Edmonds, 1994). In broader terms, it is a loss of biodiversity and natural/ecological resources in the area while the main causes are inappropriate land use (over-cultivation, over-grazing), pollution and poverty (MA, 2005). The predominant school of thought argues that poverty is a major cause of environmental degradation as poor people tend to depend on resources from their surrounding environment, thus causing its potential destruction, as they do not have options for their survival (Duraiappah, 1998). Consequently policy makers should first address the economic and social aspects of poverty mainly institutional and market failures (Duraiappah, 1998).

On the other hand, it is argued that environmental degradation is often the principal driver of poverty and social-economic conflict (MA, 2005). Other groups also perceive poverty as both an indicator and cause of land degradation (Chikamai & Kigomo, 2006). However, the underlying causes of deforestation vary from one country to another and are too complex to generalize (UN-REDD, 2010). Solutions therefore need to be tailor-made to the environmental and socio-economic conditions of each country/region and their existing institutional capacity towards sustainable conservation.

Conservation of natural resources is perceived in different ways by different groups/people. It is therefore difficult to find a single comprehensive definition of the term “conservation”.

Adapting the IUCN/WWF/UNEP’s World Conservation Strategy definition, however, Talbot (1980) describes conservation as the maintenance of essential ecological processes and ecosystem services and the sustainable utilization of species and ecosystems. This definition however presented a pure scientific concept of conservation (an end in itself), rather than pragmatic (a means) to achieving ends determined within specific political and social context (MacDonald, 2003). Alcorn (1995, p. 15), on the other hand, defines conservation as “*social and political process by which natural resources, including forests, are managed to maintain biodiversity*” emphasizing the influence of human behaviour on conservations. As a result, it is recognized that conservation is an extreme complex matter as it involves balancing the livelihood demand of local people on the natural environment and the provision of ecosystem services (Salafsky et al., 2002).

Three primary approaches have been introduced in the course of environmental conservations (UNRISD, 1994). The first is conservationism, which is an environment-centred approach that perceives humans as detrimental to nature. According to Salafsky (2000), this approach is what often referred to as “protected areas” where local livelihood is assumed to conflict with Conservation, therefore, people are totally excluded. Protected areas remain an important approach for conservation, however, it was difficult to implement due to inadequate government resources, weak management capacities, remote sites, and ineffective legal systems. The second is “Primary Environmental Care”, a more people-centred approach that emphasizes human activity is not necessarily or inherently detrimental to nature and if humans are given the opportunity, people will often manage their environment sustainably because it is in their best interest (UNRISD, 1994). Salafsky (2000) refers this approach as economic substitution where livelihood and conservation are indirectly linked. He further emphasizes that this approach enables local people to continue to meet their livelihood needs while protecting key species and habitats. The limitation of this approach is however, local people often have continued to use resources in the core reserve although they are not allowed (Salafsky, 2000). The third approach is market-based policies introduced with the intention of creating incentives for positive or neutral behaviours for the environment and creating disincentives for environmentally destructive behaviour (UNRISD, 1994). According to UNRISD, the goal of this approach is balancing the trade-offs between human activities and environmental conditions or the natural ecosystems by achieving maximum economic efficiency and thereby ensure sustainable development.

2.2 Sustainable Livelihoods and Poverty Reduction

The improvement of human wellbeing so as to enhance performance capacity now and in the future, is a core aspect of sustainable development (Rogers et al., 2008). According to Butler and Oluoch-Kosura (2006), the concept of human wellbeing has two aspects; material and non-materials. The material aspect is more relevant to ecosystem services while the non-material refers to good health, a sense of security, good social relations, freedom and choice. A livelihood that guarantees access and entitlement to a range of reliable livelihood resources, both tangible and intangible assets and opportunities, is essential to achieving human wellbeing (Chambers, 1997). Similarly, Kulindwa et al. (2006) highlighted that livelihoods should go beyond a particular level of income, paid labour or ability to meet household food security and therefore should include opportunities for investment and business, national economic stability and reliable and accountable governance

systems. Although several definitions have been forwarded for sustainable livelihood, the most widely used is that of Chambers and Conway (1991, p. 6), which says:

“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..., and provide sustainable livelihood opportunities for the next generation... at the local and global level and in the short and long term”.

Adapting this definition, Scoones (1998) also established a practical framework for sustainable rural livelihood development focusing on three main issues: setting indicators, identifying livelihood resources and strategies, and identifying the practical and operational implications of adapting a sustainable livelihood approach. Kollmair and Gamper (2002) and Batterbury (2008) argue that a sustainable livelihood approach is diverse and adaptable to many settings. They further highlighted that the approach delivers a good method to structure development research and increase efficiency of development projects, but also it brings together a relational approach to institutions, practices and forms of capital.

Hussein and Nelson (1998, p. 3) define livelihood diversification as “*attempts by individuals and households to find new ways to raise incomes and reduce environmental risk, which sharply differs by the degree of freedom of choice (to diversify or not) and the reversibility of the outcome*”. They argue that it includes activities both on and off the farm that are undertaken to generate income additional to that of the household’s main agricultural activities. They added that this supplementation is achieved through production of other agricultural and non-agricultural goods and services, the sale of waged labour, self-employment in small firms, and other strategies employed to spread risk.

However, Lemi (2005) further argued that the level of intensity and participation of rural households in diversifications was not uniform. Demographic factors, such as the age and gender of the household head, dependency ratio and number of female household members are determinants of participation. He pointed out that intensity is also affected by the size of land holdings, value of livestock owned and level of income from crop production.

Nevertheless, there have been various push and pull factors for livelihood diversification depending on the wide range of opportunities and potential factors such as seasonality, risk, locations, income, asset and social relations (Lemi, 2005). In their discussion of the reasons for diversification within small-scale farm households, Escobar (2001) and Barrett et al. (2001) explained that diversification occurs for many reasons. Household strategic reasons include:

- Risk reduction
- Overcoming income instability caused by seasonality
- Improving food security
- Taking advantage of opportunities provided by nearby or distant labour markets
- Generating cash to meet family objectives such as paying bills and the education of children

Hussein and Nelson (1998) argued that the underlying conditions, trends and processes that motivate rural households to diversify include:

- Rural population growth
- Farm fragmentation and scarcity of land
- Decline in returns to farming activities
- Rise in real production costs
- Decline in real output prices

In addition to the above, the need to improve status or simply the attraction of enhancement of status could motivate some households to diversify. It is also possible that individuals or households might diversify in an attempt to establish social relationships with others outside the circle of household/family members (Assan, 2008). Furthermore, the fact that an individual or household is poor does not necessarily imply that they will adopt diversification to address their depressed economic state. As a result, diversification strategies that are implemented via interventions and other mass development approaches can in fact fail to address the objectives for which they are outlined, owing to the underlying inconsistency of the reasons for which individuals and groups diversify (Assan et al., 2009).

2.3 Rural Livelihood Diversification and Poverty Reduction in Ethiopia

Block and Webb (2001) point out that the pressure on rural households to diversify increased during the post-famine period in Ethiopia. Also, after the introduction of various new-liberal policies including physical policy reforms, market liberalizations and Structural Adjustment Program (SAP) that opened up local protected markets to external/global market and imports (Lemi, 2005). Rural farmers subsequently experienced a reduction in income due to poor demands for their products and a loss of government subsidies as a result of economic reforms policies under the structural adjustment programme. The implementation of these neo-liberal policies demanded that farmers devise means of generating capital to fund their production, hence the need to diversify and venture into diverse production systems (Assan et al., 2009).

Nevertheless, Ethiopia's economy and social wellbeing, especially rural livelihoods, are exposed to the precarious effects of climatic variability and extreme weather conditions, mainly caused by environmental degradation (MoWRMA, 2007). A number of national policy initiatives have been introduced in order to address environmental degradations and the impact of climate change in the country. The most important documents are Ethiopia's Programme of Adaptation to Climate Change (EPA-CC), and the National Appropriate Mitigation Actions (NAMAs), as supported by the National Environmental Policy of 1997 and the Constitution (FDRE, 2010). A Carbon Neutral Climate Resilient Economy plan (CNCRE) and Carbon Resilient Green Economy policy (CRGE) are other recent documents introduced under the leadership of the Environmental Protection Authority (EPA). These documents envisage ways to help Ethiopia achieve its objective of bringing about a carbon neutral, climate resilient economy by 2025, as shown in the Growth and Transformational Plan published in 2010.

Furthermore, Ethiopia has placed an emphasis on adaptation to climate change through improved management and use of natural resource assets in an attempt to secure rural livelihoods and at the same time to meet international commitments on the reduction of greenhouse gas emissions (MoFED, 2010). Ethiopia is among thirty-seven developing countries that have been able to access funds from the EU-REDD program, through the Forest Carbon Partnership Facility (FCPF) network within the World Bank. Ethiopia has signed the Reduction of Emissions from Forest Deforestation and Degradation (REDD) agreement with FCPF and received the first phase of the fund of USD 200,000, under the facilitation role of EPA (FDRE, 2011). The fund was released as seed money to develop the Readiness Preparation Proposal (R-PP) document for effective implementation of REDD in Ethiopia, which was approved in March, 2011.

3. Study Background and Fieldwork Strategy

3.1 Descriptions of Study Area and the 'Tree Gudifecha' Project

The project area of Basona Worena Woreda (Note 1) is located in the highland of North Shewa, in the administrative zone of the Amhara Regional State. It is one of the 105 woredas (Districts) with the total area coverage of 1,399 square kilometres. Woreda is the fourth level administrative unit after Federal, Region, and Zone in the administrative structure of Ethiopia. The lowest is Got after Kebele. The 2008 estimates show that the Basona Worena woreda had a total population of nearly 166,000 and a population density of 118 persons per sq km. (Table 1). Food crop production in the woreda is highly subsistent where 81% of the annual food crop production is used for household consumptions (Ayele, 2008). Approximately 95% of the population in Basona Worena are rural dwellers consisting of predominantly small village-type settlements of kinship family groups (Ayele, 2008). Residential houses are most commonly situated on hilly outcrops that are less suitable for crops and that also provide better viewpoints of the surrounding farm properties.

Table 1. Biophysical and socio-economic characteristics of Basona Worena Woreda

| Characteristics | Basona Worena Woreda |
|---|----------------------|
| Area (sq. km) | 1,399 |
| Elevations (masl) | 1,980 – 3,000 |
| Climate | |
| - Kolla, WoinaDega, Dega, Wurch* (% of area) | --, 48, 50, 2 |
| - Average annual rainfall (mm) | 1,100 |
| - Temperature (oC) | 6-20 |
| Population (2002/'03 est.) | |
| - Total population | 165,716 |
| - Population density (persons per sq. km) | 118 |
| - % of working age population (15 - 64 years) | 52 |
| - Rural population (%) | 95 |
| Rural farm household | |
| - Average family size | 4.5 |
| - Average land holding (ha) | 1.7 |
| - Male-headed | HH 27,918 |
| - Female-headed | HH 8,796 |
| Land use (%) | |
| - Cultivated land | 13.1 |
| - Grazing land | 47.3 |
| - Forest, shrub, bush land | 8.5 |
| - Others including waste land | 31.1 |

Source: (Ayele, 2008).

Table 2 outlines the agro-climatic zones and their physical characteristics in the five climate types of Ethiopia.

Table 2. Ethiopia's agro-climatic zones and their physical characteristics

| Ethiopian Climatic Zones | Altitude (Meter) | Rainfall (mm/year) | Growing Period (days/year) | Average Annual Temp. (°C) |
|---|------------------|--------------------|----------------------------|---------------------------|
| Wurch(cold and moist highlands) | > 3200 | 900 - 2200 | 211 – 365 | ≤ 11.5 |
| Dega(cool and humid highlands) | 2300 – 3200 | 900 – 1200 | 121 – 210 | 17.5/16.0 – 11.5 |
| WeinaDega (temperate, cool sub humid Highlands) | 1500 – 2300 | 800 – 1200 | 91 – 120 | 20.0 – 17.5/16.0 |
| Kolla(warm semiarid lowlands) | 500 – 1500 | 200 – 800 | 46 – 90 | 27.5 – 20 |
| Bereha(hot and arid Lowlands) | under 500 | under 200 | 0 – 45 | > 27.5 |

Source: (Dejene, 2003).

3.2 Bio-physical, Climate and Socio-economies of Basona Worena Woreda

Integrated Rural Development Association (ADHENO) is a non-profit grassroots organization founded in October 2002. The organization is dedicated to improving the living conditions of the people of North Shoa by working with communities and closely collaborating with government and other development actors through the implementation of various programmes including environmental conservation, livelihood enhancement, expanding access to basic education and promoting health and wellbeing. ADHENO started the implementation of its intervention through the project entitled “*Tree Gudifecha*”, which means “*tree adoption*”, focusing on tree plantation in North Shoa Zone, Basona Worena Woreda, Workegur village in 2005. Since 2007, however, recognizing the importance of integrating a livelihood component, the project has been engaged in the implementation of various soil and water conservation interventions and livelihood activities and expanding its interventions in twelve villages of the woreda. Among these villages Enchelele and Workegur, located in Metkoria and Goshe Bado Kebeles respectively, are selected for this research. The Global Environment Fund (GEF) funded the project in Enchelele Village. The project in Workegur village however, was funded by the Swedish International Development Agency (SIDA) and implemented in partnership with Consortium of Christian Relief and Development Association (CCRDA), a local Non-Governmental Organization. The total amount of budget allocated for the conservation and livelihood interventions in Goshe Bado Kebele is Birr 1,935,664.00 targeting a total beneficiary population of 7,546 (3,830 female & 3,716 male) while for Metkoria Kebele, the allocated budget was Birr 439,000 targeting a total population of 4,920 (2,499 Female & 2421 male). While the project in Metkoria Kebele has come to completion, it is still being implemented in Goshe Bado Kebele.

3.3 Field Strategy and Sampling Procedure

The field work for the study was conducted from May to August 2011. The population for the research was 100 rural households located in two villages namely Enchelele and Workegur, of Basona Worena Woreda in the Amhara regional state that have been targeted for environmental conservation/rehabilitation and livelihood enhancement interventions. The unit of analysis for this research is therefore rural households. The sample comprises 50 households; 25 households from each villages targeting adult members of the sampled household. The sample was systematically selected purposively since the group on which the data collected is already known (Mason, 2007). Data had been collected from households located next to each other because of the nature of the terrain and small village settlement type of community, which means households are located far from each other. The research employed a triangulation of quantitative and qualitative methods to generate the study data.

The households' livelihood outcome resulting from the project intervention was measured by the change in incomes and savings using The Central Tendency Method, mean and chi-squared analysis. A cross-sectional approach is employed to track any changes which occurred in the assets, incomes and savings of households as a result of the project interventions during the project periods. Correlation analysis was also used to examine the relationships between variables in relation to household incomes and savings. The quantitative analysis was done using the statistical package SPSS and Excel programs. Qualitative analysis was done using quotations and thematic characterisation of the household and key informant interviews which were transcribed and through the analysis of focus group discussions.

4. Results and Discussions

This section discusses the data generated from the study and explores how the livelihood and wellbeing of targeted rural households in the two villages have been addressed in an attempt to tackle environmental degradations within the project areas.

4.1 Household Assets

Table 3 outlines the different assets owned by the households before and after the introduction of the project interventions. It was observed that the average number of houses owned in the sample has increased from 1.94 to 2.32. This suggests that the project seems to have had a positive impact on the ability of the respondents to own their homes although this is not statistically significant. Also, with the exception of cattle herds, the average number of livestock within the sampled households has reduced. This pattern can be explained by the increased mortality within the livestock herd, especially with sheep and goats whose average numbers fell from 4.10 to 3.2 and from 2.12 to 1.52 respectively.

Table 3. Households Assets before and after the project

| Type of Assets | Before the Project Interventions | | | After the Project Interventions | | | Total P |
|------------------|----------------------------------|---------------|------------|---------------------------------|---------------|------------|---------|
| | Enchelele Mean | Workegur Mean | Total Mean | Enchelele Mean | Workegur Mean | Total Mean | |
| Household Assets | | | | | | | |
| House | 2.0 | 2.12 | 1.94 | 2.16 | 2.56 | 2.32 | .000 |
| Radio/tape | 1.00 | 1.00 | 0.30 | 1.00 | 1.15 | 0.54 | .000 |
| Livestock | | | | | | | |
| Cattle | 2.37 | 2.48 | 2.00 | 2.37 | 2.72 | 2.12 | |
| Sheep | 7.25 | 6.55 | 4.10 | 5.4 | 4.15 | 3.20 | .000 |
| Goat | 6.23 | 6.25 | 2.12 | 4.69 | 3.00 | 1.52 | .000 |
| Transport | | | | | | | |
| Donkey | 1.25 | 1.14 | 0.62 | 1.35 | 1.33 | 0.78 | .000 |

Number of households = 50

The sampled households frequently mentioned that getting access to timely veterinary services was the major problem which caused the high mortality of chickens, sheep and goats within the project areas. The problem is also well acknowledged by a staff of Basona Woreda Woreda Agriculture Office who confirmed that:

“The lack of adequate personnel and medication is still the biggest challenge for the office especially in times of epidemics. Many households had lost their animals and could not gain much benefit from these activities. Lack of proper management also causes the death of animals. Since the hens are hybrid chickens, they need a different management than the traditional one which is in the open air”.

It is notable, however, that the project had a positive impact on household transport as the average number of donkeys increased, as indicated in Table 3. Nevertheless, none of these increases was statistically significant. The qualitative information shows that house construction was covered through households being paid to carry out various conservation projects as well as vegetable and fruit production). Abebe, one of the interview respondents explained argued that *“... although not significant, the incentive had enabled me to cover some expense of house construction”.*

As depicted in Table 4 the status of household assets in the two villages is similar except in the case of sheep with a mean of 7.2 in Enchelele and 6.5 in Workegur before the project while it decreased in both villages after the project period to 5.4 and 4.1 respectively. Similarly, the ownership status of households for sheep and goats in the two villages varies both before and after the project.

The interviews show that the same is true for hens where the extent of mortality is higher than sheep and goats. Several factors contributing to the decrease in the numbers of hens, sheep and goats were noted. Alemitu, a female beneficiary in Enchelele village expressed her dissatisfaction as follows:

“Ayyyyy [expressing frustration], most of my sheep and hens had died and currently left with only two sheep out of ten. Because of their death, I lost significant income not to mention the wasted time and energy managing the activities”.

As a result, the contribution of such livelihood activities towards increased assets in the project area is therefore not significant. Similar to these findings, other studies conducted in Oromia (Berg et al., 2006) and eastern parts of the country (Berhanu et al., 2008) reveal that livelihood diversification activities in most of rural Ethiopia are largely practiced by poor households with an inadequate income for survival. This suggests that the incomes that poor households derive from various income-generating activities are usually used for survival, limiting their potential for asset creation.

4.2 Community Capacity Development Interventions

In the context of the ‘Tree Gudifecha’ project an attempt has been made to address capacity development through capacity enhancement interventions that enable targeted rural households to become food secure and

develop their confidence as a result of enhanced skill and knowledge. Therefore, human capacity enhancement is considered to be one of the cross cutting issues among other themes such as HIV/AIDS and Gender.

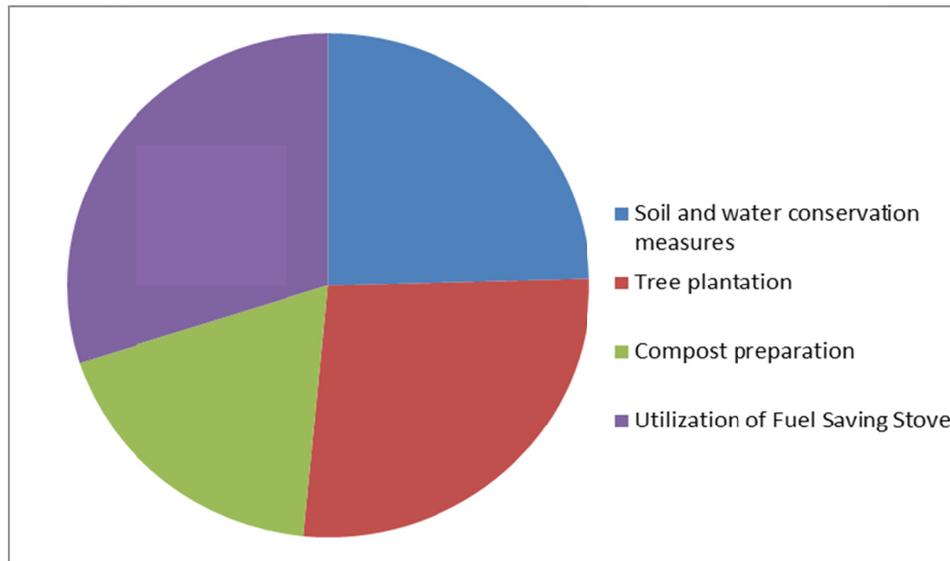


Figure 1. Households trained on soil and water conservations

Figures 1 and 2 demonstrate that the focus of the capacity enhancement interventions has two major components; soil and water conservation measures and various agro-based income diversifications. Accordingly, 82% and 90% of respondents have been trained in various methods of soil and water conservation and tree planting respectively. However, the survey shows that the majority of households engaged in poultry and sheep fattening activities were not provided with relevant training (Figure 1).

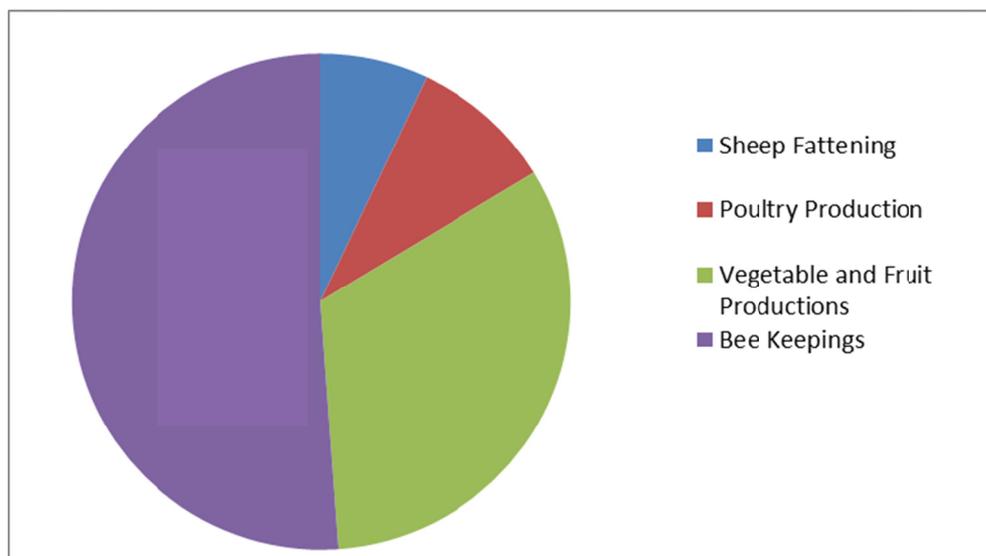


Figure 2. Households trained in various Income Generating Activities (IGAs)

The interviews and focus groups meetings revealed that women and young people have been targeted for poultry and sheep fattening activities based on government policies in an attempt to address the problem of food insecurity in the region. In spite of the fact that no training was provided in poultry and sheep fattening at Enchelele village the number of households involved in these livelihood strategies rose from 32% to 48% after the project. The same is true in the case of Workegur village. Although, 56% of households have been engaged

in both activities before and after the project, only 8% and 6% have been trained in poultry and sheep fattening respectively. This implies that a significant proportion of women were not able to benefit from relevant training. As Ellis (1999) pointed out, enhancing the human capital of rural inhabitants in livelihood diversification is of paramount importance.

4.3 Credit and Input Support

Table 4. Seed money/Input Support Provided to Households

| Financial support/in kind | Village Names | | Total | Percentage |
|---|-----------------|----------------|-------|------------|
| | Enchelele (HHs) | Workegur (HHs) | | |
| Tools for soil and water conservation activities | 16 | 25 | 41 | 100 |
| Sheep | 12 | 15 | 27 | 100 |
| Poultry | 16 | 17 | 33 | 100 |
| Vegetable and fruit seeds, seedlings, geo-membranes | 6 | 13 | 19 | 100 |
| Bee Keepings – bee hives and wax | 14 | 20 | 34 | 100 |
| Fuel Saving Stoves | - | 25 | 25 | 50 |

In an attempt to address the need for credit, the project provided credits in the form of inputs needed for each type of livelihood activity. The inputs include sheep, hens, modern bee hives, wax, fuel saving stoves, geo-membrane, cement and others. The survey shows that all the households engaged in various livelihood activities through the project have received credit in the form of inputs except in the case of fuel-saving stove. All surveyed households in Workegur received fuel-saving stoves while none were provided at Enchelele in order to create market opportunities for people who have been organized into groups (see Table 4). However, the income status of households in the Enchelele village and the household capacity to buy the stove without any credit facility should have been taken into consideration in order to ensure that the stoves contribute towards household economic conditions and the national efforts in reductions of Green House Gas (GHG) emissions in the project areas.

Some of the inputs such as geo-membrane and cement are considered to be very effective for efficient in rain water harvesting for fruits and vegetable production. Similar to this finding, another study conducted on rain water harvesting in rural Ethiopia also pointed out that the provision of such inputs is vital as it reduces seepage losses (Moges, 2009).

The credit scheme was provided in cost-sharing arrangements; households pay 10 to 35% of the input they received as seed money. The cost-sharing approach is employed in order to avoid dependency syndrome amongst the rural communities. All households provided with the inputs as a start-up capital expressed the view that these inputs had motivated them to engage in various forms of livelihood activities. Yohannes, one of the sampled respondents described the benefit of input provision as follows: “*input provision encouraged us to apply new and existing ideas we didn't try before because we didn't have the money*”.

4.4 Community and Social Networks

The conceptualization of social network in the context of the ‘Tree Gudifecha’ project refers to a strategy designed to bring about enhanced and active participation towards environmental conservations through the improvement of livelihoods in the project areas. To that end, Associations and/or Cooperatives have been established with the main objective of improving households’ livelihoods through the integration of interventions into the conservation of natural resources.

Table 5. Nature and Level of Social Networks

| Name of Social Network | Nature/Focus of the social Network | Benefits for Members | Membership Access |
|--|---|--|---|
| Workegur Development Association | Environmental conservations and rehabilitation through Enclosure Area | Fodder for animals | All households in the villages are members of the Association |
| Tegulet Honey Production and Marketing Cooperative | Livelihood development: Honey Production | Creates local market opportunity and share profits | Applicant households should have bee hives and pay registration fees and share benefit. |
| Yemuaguasha Youth Vegetable and Fruit Production Cooperative | Livelihood development: Vegetable and Fruit Production | Share profits | Applicant households should pay registration fee and benefit share, but admission depends on the decision of existing members |

Table 5 outlines the different social associations and production groups that have been established and strengthened through the project. This is noted to have enhanced social capital in the project communities. For example the communities jointly employed a fallow system which involved area closures to allow the enclosed plots to rejuvenate and thereby provide fodder to the livestock. It also encourages people to participate and attain the long-term objective of environmental conservation and rehabilitation. The inclusive nature of the membership, as well as giving the responsibility of managing enclosure areas to community-based associations and organizations as in the case of Workegur Development Association, is a useful approach to ensuring sustainability.

Again, Table 5 illustrates how area enclosure can offer a viable alternative for livelihood improvement in the project areas such as bee-keeping and honey production, as is the case in Tigray (Shyledra, 2002). The Cooperative's approach to collecting honey from individual household members, for example, creates local market opportunities for member households. At the same time, the rejuvenation of the environment within enclosure areas also improves honey production and consequently the profitability of the cooperative.

All households in Workegur village are members of the Association and so no household is excluded. Nevertheless, the open access to membership, taking into account the small coverage of enclosure made the extent of benefits (fodder and grass) limited. Access to membership in the case of two cooperatives however, is not the same as in the Association. In order to join the cooperatives, households are required to pay a registration fee and benefit share, which makes the access restrictive to some extent. This implies that the profitability of cooperative increases, membership becomes unaffordable for households who would like to join the cooperatives.

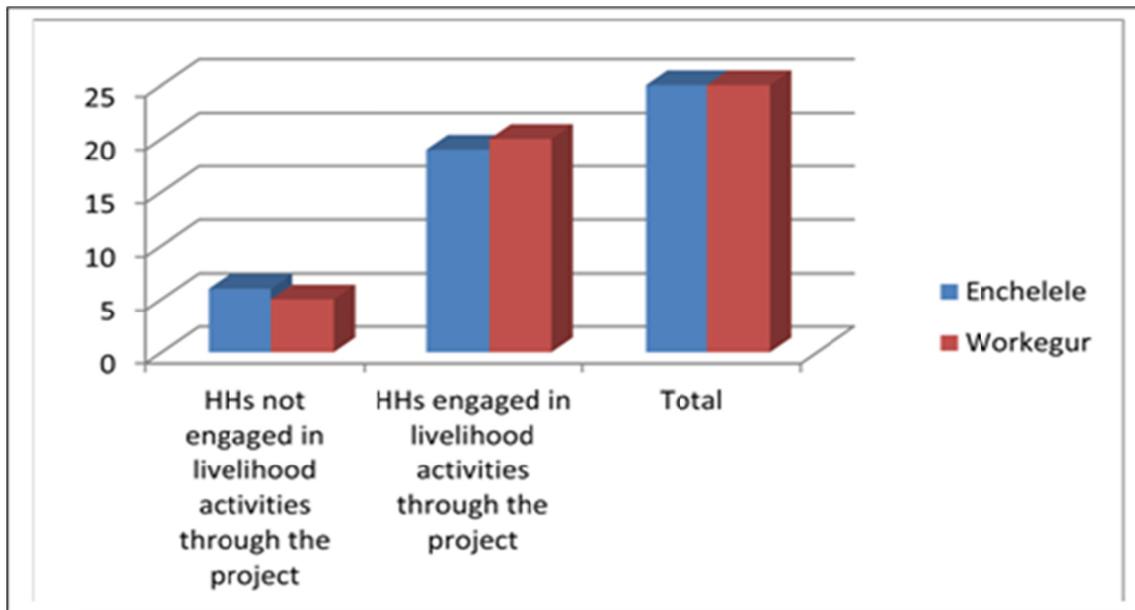


Figure 3. Households engagement in livelihood activities through the project by villages

4.5 Household Income

The study looked at the income generated by the sampled households from diversification activities in an attempt to determine the extent to which such activities have impacted on the households and whether there are any variations.

Table 6. Mean and Variance of Household Income before & after the Project

| HHs by Village | Means/SD | Income before the project (Birr) | Income after the project (Birr) |
|----------------------------|----------------|----------------------------------|---------------------------------|
| Enchelele | Mean | 1535.36 | 1832.17 |
| | Std. Deviation | 1026.20 | 1813.98 |
| Workegur | Mean | 1582.35 | 3738.68 |
| | Std. Deviation | 1596.18 | 4918.67 |
| Total for the two villages | Mean | 1561.13 | 2674.58 |
| | Std. Deviation | 1347.49 | 3617.78 |

Correlation coefficients of household incomes with land size, livelihood diversification, training and tree plantation found to be 0.295, 0.54, 0.0148 and 0.386 respectively.

* \$1 = Birr 18.91 (Source: XE Currency Converter, 2013).

Table 6 shows a mean increase in the total household income from Birr 2,674.58 to 1,561.13 after the project. However, none of these increases was statistically significant. The Standard Deviation was also found to have increased from 1347.49 to 3617.78 after the project. This suggests that the increase in household income after the project also introduced a rise in income disparities between households. However, the increase in income is not similar within the two villages. While in Workegur village the income increased from Birr 1582.35 to 3738.68, it increased from 1535.36 to 1832.17 in Enchelele village.

Also, as depicted in Table 7, sheep fattening and bee-keeping are the dominant means of income-generating activities with a mean Birr 1,500 in each case, followed by a crop sale mean Birr of 750 and a tree plantation mean Birr of 565.80. Despite the high mortality of livestock in the project areas, sheep fattening was found to be one of the leading means of income generating activities.

Table 7. Mean households earning from different income generating activities

| Different IGAs | Mean (Birr) | Different IGAs | Mean (Birr) |
|-------------------------------------|-------------|--|-------------|
| Crop | 750.00 | Crop, tree plantation, sheep fattening, bee-keeping, poultry | 4433.33 |
| Tree plantation | 565.80 | Tree plantation and bee-keeping | 1275.00 |
| Sheep fattening | 1500.00 | Crop, tree plantation, sheep fattening, | 8687.50 |
| Bee-keeping | 1500.00 | Tree plantation, bee-keeping & poultry | 200.00 |
| Poultry | 58.33 | | |
| Crop & bee-keeping | 1762.86 | | |
| Crop, tree plantation & bee-keeping | 1980.00 | | |

The contribution of soil and water conservation activities in the project areas to the households' crop yield are explained by model farmers Ayelech and Gobena as follows.

"The increased work on conservations has been beneficial in terms of prevention of soil erosion. As a result, our crop yields have increased to some extent compared to the previous seasons. For example, crop production on our farm land has increased from one quintal [one quintal is equal to 100kg] to three quintals and from four quintals to eight depending on the size of the land".

The study revealed that the use of similar conservation activities have been practiced in the areas before the project. However, the observed difference after the project as explained by Tasew as follows:

"We know the advantage of carrying out soil and water conservation activities including tree planting before the project started. However, after the project, the benefits are in two aspects. First, the financial incentives of USD 0.3125/day motivated us to us to undertake soil and water conservation activities, and USD 0.0625/tree has contributed to our income therefore encouraged us to participate in the various conservation and rehabilitation activities. Second, our knowledge and skill on conservation activities has been enhanced. This has therefore, enabled us conserve and rehabilitate our land in an improved manner than before".

Households also generate a considerable income from combined livelihood activities where the highest income comes from the combination of crop, tree plantation and sheep fattening with an average income Birr 8,687.50. The least profitable activity is poultry which yeilds an average income of Birr 58.33. This is as a result of the high mortality of hens which was discussed earlier. On the other hand, sheep fattening is still the highest source of income in spite of the decline in the mean numbers of sheep and goats after the project period. This suggests that sheep fattening is the most profitable livelihood activity in the project areas. As depicted in the above table crop sale with a mean income of Birr 750, is the second most profitable income activity while tree plantation with a mean income of Birr 565.80 is the third most profitable activity in the project areas. Furthermore, households that have been engaged in three livelihood activities including crop sale, tree plantation and sheep fattening, have been found to generate the highest mean income of Birr 8,687.50, followed by a mean income of Birr 4,433.33 which was generated through growing of crops, tree plantation, sheep fattening, bee-keeping and poultry.

Vegetable and fruit production was noted to be one of the most profitable activities. This is due to the availability of moisture in the form of spring water and harvested rain water. This finding is consistent with a previous study conducted on rain water harvesting scheme by Teshome et al. (2010). According to Teshome et al. (2010), the average net income from onion seedlings produced using harvested rain water could be as high as US\$ 2,003 per year and is generally higher than income from mixed income of teff and wheat combined.

The correlation coefficient (0.295) shows a positive relationship between land size and income, confirming the findings of other studies on Ethiopia (Lemi, 2005). With a correlation coefficient (0.386), tree plantation also shows a positive relationship with household income, implying that households involved in tree plantation have generated better income by planting trees. The analysis also shows that income has a moderate correlation with livelihood diversification (0.54) in the project areas. However, when we compare the relationship at village level, it has strong correlation in Enchelele (0.78) while it shows a moderate association in Workegur (0.45).

The study showed a relationship between the number of training sessions and household income, with a correlation coefficient of 0.0148. The challenge of households in the project areas in accessing adequate veterinary services and partial provision of livelihood packages in the case of sheep fattening and poultry activities respectively has an impact on household incomes. Block and Webb (2001) argue that assets positively associates with incomes of rural households.

4.6 Household Savings

Table 8. Mean and standard deviation of household's savings

| Villages | Statistical measure | Savings/year | Savings/year |
|-----------|---------------------|--------------------|-------------------|
| | | Before the project | After the project |
| Enchelele | Mean | 658.33 | 1157.64 |
| | Std. Deviation | 726.92 | 2106.39 |
| Workegur | Mean | 2822.22 | 3581.25 |
| | Std. Deviation | 4173.89 | 7160.65 |

Correlation coefficients of household savings with income, tree plantations and livelihood diversifications found to be 0.87, 0.676 and 0.22 respectively.

As outlined in Table 8, the study observed a mean increase in the total household savings from Birr 1,956.67 to Birr 2,596.58. However, such increases were found not to be statistically significant. The Standard Deviation of saving was also found to have increased from Birr 3,368.65 to Birr 5,723.71. This suggests that the increase in household's saving after the project has also introduced a rise in saving disparities between households. However, the increase in mean saving is not similar within the two villages. While in Workegur village the mean saving increased from Birr 2,822.22 to Birr 3,581.25, it increased from Birr 658.33 to 1157.6364 in Enchelele village.

The survey shows that the amount of savings within the majority of households are within the range of Birr 50 and Birr 500. Moreover, the level of disparities within the two villages was found to differ. While the standard deviation of saving in Enchelele village increased from Birr 726.92 to Birr 2,106.39 after the project, it increased from 4,173.55 to Birr 7,160 in Workegur village. This shows a high savings disparity in Workegur despite the fact that the majority of households that do not have savings are from Enchelele village.

The analysis showed a strong correlation between income and savings (0.871). The increase in the value of savings after the project period suggests that livelihood diversification and increased crop productivity subsequently improved household income. The contribution of crop sale towards household saving was expressed by Anteneh as follows: *'To some extent, crop production on my plot has increased contributing to my savings although it is not considerable. I was able to save more money from the sale of eucalyptus trees'*. Also, there was a close correlation between savings and tree planting with a correlation co-efficient of 0.676 while the coefficient of correlation between livelihood diversification and savings was found to be 0.22. This implies that the increase in mean household saving as a result of the sale of tree plantation is considerable amongst other livelihood diversification activities. The low association between diversification and saving also explains the decrease in the mean number of household assets which has a significant impact on household income and savings. This is consistent with Berg et al. (2006) and Berhanu et al. (2008) who argued that livelihood diversification among poor households in rural Ethiopia may not automatically result in a significant contribution to asset creation.

5. Conclusion

In an attempt to achieve environmental conservation, the project 'Tree Gudifecha' has employed livelihood interventions in the project areas. The project contributed to the improvement of households' livelihoods in two ways: household income and saving. The household mean income increased after the project with an associated rise in household income disparities. The increase in mean income came through the provision of incentives for participating households to engage in tree plantation and encourage poor households to practice various livelihood diversification activities. Sheep fattening and bee-keeping are the dominant income-generating

activities followed by crop sale and tree plantation in the two villages. Vegetable and fruit productions are also profitable activities. This is consistent with the findings of Teshome et al. (2010). Household savings were found to be increased after the project interventions with the rise of household saving disparities. The increase nevertheless is not similar between the two villages where the mean increase is higher in Workegur village with most of the households without savings being located in Enchelele village.

The analysis showed a strong correlation between income and saving. The moderate correlation between savings and tree-planting shows the potential of such programmes to improve household income. Access to credit is another central issue. The project addressed credit access through the provision of inputs important for the respective livelihood activities. Nevertheless, credit availability seems to have influenced the degree of participation and profitability of income generating activities. The development of social networks such as Associations/Cooperatives within the project areas is a beneficial strategy to address both rural livelihood and environment conservations. On the other hand, the extent of that benefit to the member also influences the decision that members made as observed with the vegetable and fruit production cooperative.

The paper has highlighted the links between recent adoption of neo-liberal policies particularly within the rural sector and the adoption of livelihood diversification as a means to survive and maintain livelihoods. The withdrawal of government formal input support and incentives to farmers could be seen as having potential impact on the degree to which households are able to engage in conservation programmes and initiatives. There is therefore the need to provide adequate and comprehensive incentive packages for the different rural livelihood activities in order to ensure a balanced economic and ecological sustainability. The registered increment in crop productivity in this study is a direct testament. To further ensure the sustainability of such programmes there should be regular and intensive needs-based training and capacity enhancement activities. There is also the need to continuously research and identify viable and profitable livelihood activities that rural households could adopt.

References

- Adheno. (2010). *Project Annual Report*. Addis Ababa, Ethiopia.
- Alcorn, J. (1995). Big conservation and little conservation: Collaboration in managing global and local heritage. *Yale School of Forestry and Environmental Studies Bulletin*, 98, 13-25.
- Andersson, C., Mekonnen, A., & Stage, J. (2009). Impacts of the Productive Safety Net Program in Ethiopia on Livestock and Tree Holdings of Rural Households. *Environment for Development (EfD)*. Discussion Paper Series. Washington DC.
- Assan, J. K. (2008). Generational differences in internal migration: Derelict economies, exploitative employment and livelihood discontent. *International Development Planning Review*, 30(4), 377-398. <http://dx.doi.org/10.3828/idpr.30.4.4>
- Assan J. K., Caminade, C., & Obeng, F. (2009). Environmental Variability and Vulnerable Livelihoods: Minimising Risks and Optimising Opportunities for Poverty Alleviation. *Journal of International Development*, 21(3), 403-418. <http://dx.doi.org/10.1002/jid.1563>
- Assan, J. K., & Kumar, P. (2009). Livelihood Options for the Poor in the Changing Environment. *International Development*, 21, 393-402. <http://dx.doi.org/10.1002/jid.1565>
- Ayele, Z. (2008). *Smallholder Farmers' Decision Making in Farm Tree Growing in the Highlands of Ethiopia*. PHD Thesis. Oregon State University.
- Barrett, D. B., Reardon, T., & Webb, P. (2001a). Non-farm Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics, and Policy Implications. *Food Policy*, 26(4), 315-331. [http://dx.doi.org/10.1016/S0306-9192\(01\)00014-8](http://dx.doi.org/10.1016/S0306-9192(01)00014-8)
- Batterbury, S. (2008). *Sustainable Livelihoods Framework: ten years of researching the poor*. African Environments Programme, Oxford University Centre for the Environment (OUCE).
- Belay, A. (2010). *The Effect of Rural Land Certification in Securing Land Rights: The Case of Amhara Region, Ethiopia*. Master Thesis, The Netherlands.
- Berg, M., & Kumbi, G. (2006). Poverty and the Rural Nonfarm Economy in Oromia, Ethiopia. *Agricultural Economics*, 35, 469-475. <http://dx.doi.org/10.1111/j.1574-0862.2006.00192.x>
- Berhanu, W., Colman, D., & Fayissa, B. (2008). *Diversification and Livelihood Sustainability in a Semi-arid Environment: A Case Study from Southern Ethiopia*. University of Manchester, UK & Middle Tennessee State University.

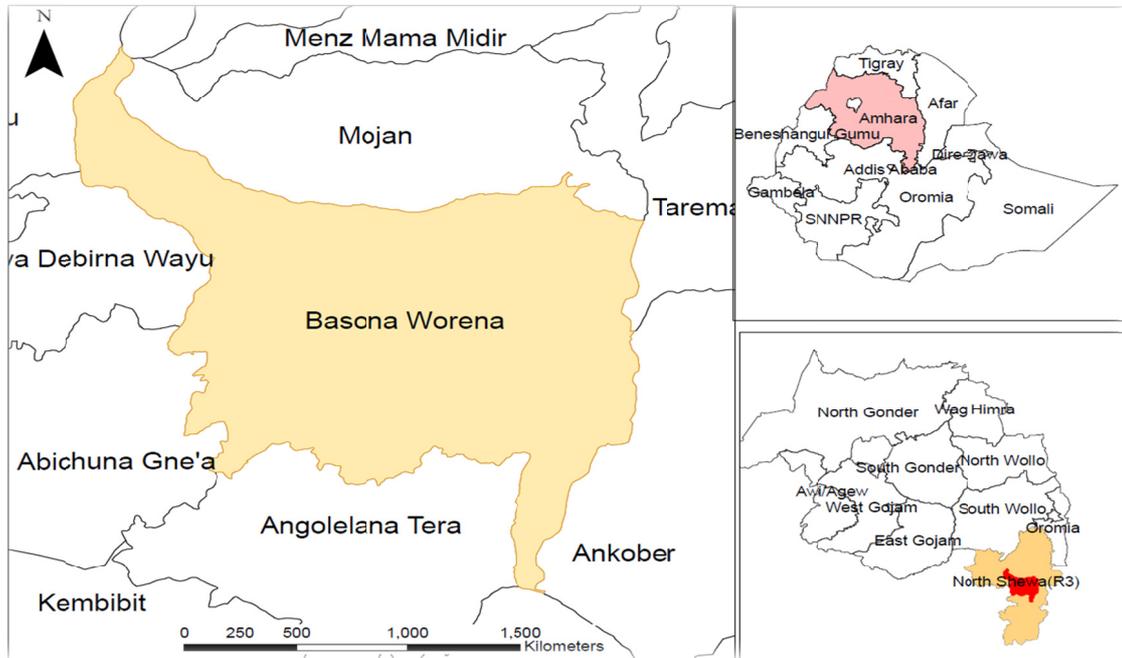
- Bewket, W. (2005). *Biofuel Consumption, Household Level Tree Planting and its Implications for Environmental Management in the North-western Highlands of Ethiopia* (pp. 19-38). MUSE, Today's Research. Tomorrow's Inspiration.
- Bewket, W. (2007). Soil and water conservation intervention with conventional technologies in north-western highlands of Ethiopia: Acceptance and adoption by farmers. *Land Use Policy*, 24, 2. <http://dx.doi.org/10.1016/j.landusepol.2006.05.004>
- Block, S., & Webb, P. (2001). The Dynamics of Livelihood Diversification in Post-Famine Ethiopia. *Food Policy*, 26, 333-350. [http://dx.doi.org/10.1016/S0306-9192\(01\)00015-X](http://dx.doi.org/10.1016/S0306-9192(01)00015-X)
- Butler, C., & Oluoch-Kosura, W. (2006). Linking Future Ecosystem Services and Future Human Well-being. *Ecology and Society*, 11(1), 30.
- Carswell, G. (2002). Livelihood Diversification: Increasing in Importance or Increasingly Recognized? Evidence from Southern Ethiopia. *Journal of International Development*, 14(6), 789-804. <http://dx.doi.org/10.1002/jid.924>
- Central Statistical Agency (CSA). (2008). Summary and Statistical Report of the 2007 Population Housing and Census, Ethiopia, Addis Ababa.
- Chambers, R. (1997). Responsible Well-being – A Personal Agenda for Development. *World Development*, 25, 1743-1745. [http://dx.doi.org/10.1016/S0305-750X\(97\)10001-8](http://dx.doi.org/10.1016/S0305-750X(97)10001-8)
- Chambers, R., & Conway, G. (1991). Sustainable Rural Livelihoods: Practical Concepts for 21st Century – IDS Discussion Paper 296.
- Chikamai, B., & Kigomo, B. (2006). *Rehabilitation of Degraded Lands in Sub-Saharan Africa: A Synthesis. Background Paper on Dryland Ecosystems*. Nairobi.
- Comim, F., Kumar, P., & Sirven, N. (2009). Poverty and Environment Links: An Illustration from Africa. *International Development*, 21, 447-469. <http://dx.doi.org/10.1002/jid.1562>
- Dejene, A. (2003). *Integrated natural resources management to enhance food security: The case for community-based approaches in Ethiopia* (p. 58). Food and Agriculture Organization, Rome.
- Development Planning and Research Department (DPRD) & Ministry of Finance and Economic Development (MOFED). (2008). *Dynamics of Growth and Poverty in Ethiopia* (1995/96-2004/05). Addis Ababa, Ethiopia.
- Duraiappah, A. (1998). Poverty and Environmental Degradation: A Review and Analysis of the Nexus. *World Development*, 26(12), 2169-2179. [http://dx.doi.org/10.1016/S0305-750X\(98\)00100-4](http://dx.doi.org/10.1016/S0305-750X(98)00100-4)
- Edmonds, R. (1994). Patterns of China's Lost Harmony. A Survey of the Country's Environmental Degradation and Protection. London. Retrieved from <http://books.google.com/books?hl=en&lr=&id=iurkg0CsdowC&oi=fnd&pg=PP13&dq=Environmental+degradation>
- Ellis, F. (1999). Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications. *Natural Resource Perspectives*, Number 40.
- Escobar, J. (2001) The Determinants of Non-Farm Income Diversification in Rural Peru. *World Development*, 29(3), 497-508. [http://dx.doi.org/10.1016/S0305-750X\(00\)00104-2](http://dx.doi.org/10.1016/S0305-750X(00)00104-2)
- Fao. (2010). *Global Forest Resources Assessment*. Rome.
- Federal Democratic Republic OF Ethiopia (FDRE). (2010). *Climate Resilient Green Economy: Mission Statement* (1st ed.). Addis Ababa, Ethiopia.
- Federal Democratic Republic OF Ethiopia (FDRE). (2011). REDD Readiness Preparation Proposal (R-PP). Addis Ababa, Ethiopia.
- Foley, J., Defries, R., Asner, G., Barford, C., Bonan, G., Carpenter, S., ... Snyder, P. (2005). Global Consequences of Land Use. *Science*, 309, 570-574. <http://dx.doi.org/10.1126/science.1111772>
- Gebreegziabher, Z., Kooten, G., & Soest, D. (2006). *Land Degradation In Ethiopia: What Do Stoves Have To Do With It?* Contributed paper prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia.
- Gebreselassie, S. (2006). *Land, Land Policy and Smallholder Agriculture in Ethiopia: Options and Scenarios*. Paper prepared for the Future Agriculture Consortium meeting at the Institute of Development Studies.

- Gomez-Baggethun, E., & De Groot, R. (2010). Natural Capital and Ecosystem Services: The Ecological Foundation of Human Society. In R. Hester, & R. Harrison (Eds.), *Ecosystem Services*. UK. <http://dx.doi.org/10.1039/9781849731058-00105>
- Haile, S., & Mansberger, R. (2003). *Land Policy, Urban-Rural Interaction and Land Administration Differentiation in Ethiopia*. Second FIG Regional Conference, Morocco.
- Holden, S., Barrett, C., & Hagos, F. (2003). *Food-for-work for Poverty Reduction and the Promotion of Sustainable Land Use: Can It Work?* Working Paper. USA.
- Hussein, K., & Nelson, J. (1998). *Sustainable Livelihoods and Livelihood Diversification*. IDS Working Paper 69.
- Kollmair, M., & Gamper, S. T. (2002). *The Sustainable Livelihoods Approach*. Input Paper for the Integrated Training Course of NCCR North-South Aeschried, Switzerland.
- Kremen, C. (2007). Managing Ecosystem Services: What Do We Need to Know about Their ecology? *Ecology Letters*, 8, 468-479. <http://dx.doi.org/10.1111/j.1461-0248.2005.00751.x>
- Kulindwa, K., Kameri-Mbote, P., Mohamed-Katerere, J., & Chenje, M. (2006). *Africa Environment Outlook 2: Our Environment, Our Wealth*. The Human Dimension-UNEP.
- Kumar, R. (2011). *Research Methodology: A Step by Step Guide for Beginners* (3rd ed.). SAGE Publication.
- Lemenih, M. (2004). *Effects of Land Use Changes on Soil Quality and Native Flora Degradation and Restoration in the Highlands of Ethiopia*. Implications for sustainable land management. Doctoral Thesis. Swedish University of Agricultural Sciences, Uppsala.
- Lemi, A. (2005). *The Dynamics of Livelihood Diversification in Ethiopia Revisited: Evidence from Panel data*. University of Massachusetts Boston.
- Levin, J., & Fox, A. J. (2007). *Elementary Statistics in Social Research: The Essentials*. Pearson Education, Inc.
- Macdonald, I. K. (2003). *Community-Based Conservation: A Reflection on History*. Working Paper, IUCN-The World Conservation Union, Commission on Economic, Environmental and Social Policy, preparatory to the World Parks Congress, Durban South Africa, Sept. 10-18.
- Mason, J. (2007). *Qualitative Researching* (2nd ed.). Singapore: SAGE Publications Asia-Pacific Pte Ltd.
- Millennium Ecosystem Assessment (MA). (2005). *Ecosystems and Human Well Being: Desertification Synthesis*. Island Press.
- Ministry of Finance and Economic Development (MoFED). (2006). *A Plan for Accelerated and Sustained Development to End Poverty (PASDEP) (2005/06-2009/10)*, Volume I. Addis Ababa, Ethiopia.
- Ministry of Finance and Economic Development (MoFED). (2010). *Growth and Transformational Plan*. Volume 1: Main Text. Addis Ababa, Ethiopia.
- Ministry of Water Resources & National Meteorological Agency (MoWRMA). (2007). *Climate Change National Adaptation Programme of Action (Napa) of Ethiopia*. Addis Ababa, Ethiopia.
- Moges, G. (2009). Identification of potential rain water harvesting areas in the Central Rift Valley of Ethiopia using a GIS based approach. Master Thesis, Agrotechnology and Food Science Group. WAGENINGEN UR.
- Muradian, R., & Kumar, P. (2009). Payment for Ecosystem Services and Valuation: Challenges and Research Gaps. In P. Kumar, & R. Muradian (Eds.), *Payment for Ecosystem Services*. New York.
- Narloch, U., & Pascual, U. (2009). *Agrobiodiversity and Livelihood Diversification under Climatic Risk: Lessons from Eastern Ethiopia*. University of Cambridge, UK.
- Pagiola, S., Arcenas, A., & Platais, G. (2005). Can Payments for Environmental Services Help Reduce Poverty? An Exploration of the Issues and the Evidence to Date from Latin America. *World Development*, 33(2), 237-253. <http://dx.doi.org/10.1016/j.worlddev.2004.07.011>
- Rogers, P., Jalal, K., & Boyd, J. (2008). *An Introduction to Sustainable Development*. Earthscan. UK.
- Salafsky, N. (2000). Linking Livelihoods and Conservation: A Conceptual Framework and Scale for Assessing the Integration of Human Needs and Biodiversity. *World Development*, 28(8), 1421-1438. [http://dx.doi.org/10.1016/S0305-750X\(00\)00031-0](http://dx.doi.org/10.1016/S0305-750X(00)00031-0)
- Salafsky, N., Margoluis, R., & Redford, K. (2002). Improving the Practice of Conservation: a Conceptual Framework and Research Agenda for Conservation Science. *Conservation Biology*, 16(6). <http://dx.doi.org/10.1046/j.1523-1739.2002.01232.x>

- Scoones, I. (1998). *Sustainable Rural Livelihoods: A Framework for Analysis*. Ids working Paper 72. Institute of Development Studies, Brighton.
- Shiferaw, A., & Singh, K. (2010). An Appraisal Of The Challenges That Affect Sustainability And Productivity Of The Land Use In The Borena Woreda Of South Wollo Highlands: Ethiopia. *Journal of Sustainable Development in Africa*, 12(6).
- Shylendra, S. H. (2002). Environmental Rehabilitation and Livelihood Impact: Emerging Trends from Ethiopia and Gujarat. *Economic and Political Weekly*.
- Taffa, T. (2009). Characteristics of Property Units in Ethiopia, the Case of Two Pilot Projects in Amhara National Regional State. *Nordic Journal of Surveying and Real Estate Research*, 6(2), 7-24. <http://dx.doi.org/10.1017/S0376892900007955>
- Talbot, L. M. (1980). The World's Conservation Strategy. *Environmental Conservation*, 7, 259-268. <http://dx.doi.org/10.1017/S0376892900007955>
- Tesfaye, F. (2008). *A Case Study Of Non-Farm Rural Livelihood Diversification In Lume Woreda, Oromiya Reginal State*. Thesis of Master. Addis Ababa University, Ethopla.
- Teshome, A., Adgo, E., & Mati, B. (2010). Impact of water harvesting ponds on household incomes and rural livelihoods in Minjar Shenkora district of Ethiopia. *Ecohydrology & Hydrology*, 10(2-4), 315-322. <http://dx.doi.org/10.2478/v10104-011-0016-5>
- Thomas, G. (2011). *How to do your Case Study: A Guide for Students and Researchers*. London.
- Toulmin, C. (2009). *Climate Change in Africa*. UK.
- UNEP-UNDP. (2008). Environment for the MDGs. Guidance Note: Mainstreaming Poverty-Environment Linkages into National Development Planning, Kenya.
- United Nations Research Institute FOR Social Development (UNRISD). (1994). Environmental Degradation and Social Integration. UNRISD Briefing Paper No. 3 World Summit For Social Development. Switzerland.
- UN-REDD. (2010). Proceedings of the UN-REDD workshop on identifying and promoting ecosystem co-benefits from REDD+. 27-29 April 2010, Kaetsu Centre, Cambridge. In B. Dickson, & L. Miles (Eds.), *Prepared on behalf of the UN-REDD Programme*. UNEP World Conservation Monitoring Centre, Cambridge, UK.
- UNOCHA. (2013). Retrieved September 26, 2013, from <https://ethiopia.humanitarianresponse.info/visuals/3w-map-amhara-region-14-january-2013>
- USAID. (2008). *Ethiopia Biodiversity and Tropical Forests 118/119 Assessment*. Biodiversity Analysis and Technical Support for USAID/Africa is funded by the U.S. Agency for International Development, Bureau for Africa, Office of SustainableDevelopment (AFR/SD).
- Woldenhanna, T., & Oskam, A. (2001). Income diversification and entry barriers: evidence from the Tigray region of northern Ethiopia. *Food Policy*, 26, 351-365. [http://dx.doi.org/10.1016/S0306-9192\(01\)00009-4](http://dx.doi.org/10.1016/S0306-9192(01)00009-4)
- Wunder, S. (2005). *Payments for Environmental Services: Some Nuts and Bolts*. Center for International Forestry Research. Occasional Paper No. 42 .
- XE Currency Converter. (2013). Retrieved September 26, 2013, from <http://www.xe.com/currencyconverter/convert/?Amount=1&From=USD&To=ETB>
- Yin, R. K. (2009). *Case study research. Design and methods* (4th ed.). California: SAGE.

Note

Note 1. Regional Map of the Ethiopia showing the Study Area (source: UNOCHA, 2013).

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