

SUPPORT FOR SUSTAINABLE DEVELOPMENT/SSD/

Socio-Anthropological Impact and Lessons Learnt Survey

A case of Aura and Alelesebula Small Scale Irrigation Projects

[FINAL REPORT]

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Executive Summary

The principal aim of this study was to investigate and assess the impacts of small-scale irrigation project on the lives of the community in Aura and Uwa Woredas of Afar Region. The study, therefore, has given special attention to assess the impacts on irrigation schemes production and productivity (crop and livestock), the impact on household food security, livelihoods and income levels of the beneficiaries as well as to evaluate the role of irrigation water management in increasing the efficiency and performance of the irrigation scheme under study. To achieve these objectives, a household survey was conducted from November to December 2009. On top of this, focus group discussions and key informants in-depth interviews were also held with various group of people from the target community and concerned stakeholders to generate both quantitative and qualitative data pertaining to food security and economic impact of the small-scale irrigation scheme.

The findings of this study have shown that the beneficiaries of the irrigation project have better performance in agricultural crop production and productivity in both Woredas. The impact of the irrigation scheme on livestock holding revealed that the establishment of the irrigation project has brought considerable impact on the health and productivity of the livestock as compared to pre-irrigation period. On top of that, the study revealed that most of the beneficiaries who have been using the irrigation scheme were able to produce agricultural production which is sufficient for their household and able to earn considerable income as compared to some years ago. As a result, food availability dimension is higher among the beneficiaries of irrigation schemes. Moreover, the study shown that there is significant difference in income between the beneficiaries who have been producing crops using the irrigation scheme and those who have no access to the irrigation scheme.

The irrigation project of Aura and Uwa can be a model as it is evolved over the course of the project years and able to attack the courses of poverty on a wide front with a broad gamut of development interventions combined with intense efforts in capacity building to significant

permanent increases in family income mainly from farm sources. Changes in farm income come from the introduction of cereals, vegetables, fruits and other crops like cassava and sweet potato as well as the development of irrigation scheme to allow intense production on land having access to water, and their rapid adoption based on training in how to utilise them in the family diet.

SSD has also provided incentives for intense participation in training, which has facilitated the rapid technological transfer required by its various interventions and significant attitudinal changes. Consequently, SSD broke the inaccessibility of the project area by intensive initial work in construction/ rehabilitation of roads and water-crossing, without which the intervention would have been impossible. SSD executed its interventions so increasingly in coordination and by exercises planned jointly with line ministries and the local administration, which over time have become full partners in its work plan.

Furthermore, the irrigation scheme had an extremely positive impact (and has great potential for future food security projects in similar areas). The various cereal crops, vegetables and fruits introduced to the project area are economically viable, and they have been widely adopted and presently spreading outside the beneficiary households and Kebeles. These crops represent permanent additions to the local economy and confirm the sustainability of project interventions in permanently improving food security of the community in both Aura and Uwa Woredas.

Changes measured by this study confirms that dramatic changes has been registered in terms of income, assets and food security of a representative sample of households in the project area. Nevertheless, this can't be a guarantee to ensure food security within the target area unless other families or community members outside the beneficiaries of the irrigation project who are in need of similar projects have been addressed in the coming few years. In this regard, the future plan of SSD to construct additional irrigation weir for inhabitants' in the lower streams seem to be encouraged, and community members should be assisted until they too can achieve their own food security.

Chapter One

1. *Background to the Study*

1.1. *Introduction*

Irrigation is an age-old technology involving the artificial application of water to supplement rainfall for the purpose of crop production (Blank et al. 2002). Irrigation, through its role in supplementing moisture, intensifying land use, diversifying production systems and creating employment opportunities, acts as an important strategy of economic development. Rosegrant et al. (2002) stated that irrigated agriculture is critical for food security, economic growth and sustainable livelihood, especially in developing countries through increased production and income. Moreover, irrigation development contributes significantly to poverty alleviation, food security and improving the economic wellbeing of the rural population. Blank et al. (2002) further argued that the ultimate goal of irrigation development is to make irrigation a competitive enterprise comparable to other sectors in the generation of benefits from the utilization of water resources.

However, in many developing countries, the success of irrigation systems is highly affected by policy, institutional and social factors, much more than technical issues (Beets 1990, cited in Birhanu and Peden 2003). In relation to this, Woldeab (2003) stated that management aspects of irrigation are often neglected while priorities are given to the construction of irrigation infrastructure, although both human and physical aspects interact in an irrigation domain. Barghouti and Subramanian (1990) cited in Woldeab (2003) argued that unfavourable policy environments have contributed to the unsatisfactory construction and maintenance of irrigation infrastructure which have had a negative impact on production and income of farmers.

In sub-Saharan Africa, there is little irrigation and that only about 0.5 percent of irrigation potential is being developed so far (Blank et al. 2002). Particularly in Ethiopia, small-scale irrigation schemes constructed and managed by small holder farmers have been given little

attention by the governments and irrigation development has so far not been very important in the development of agriculture (Berhanu and Peden: 2003).

Given the availability of water and land resources, agricultural production was acknowledged as an important component in the development of the country. As a result, irrigated agriculture has been given due attention by the national governments since 1980s (MoA 1986; Berhanu and Peden 2003). More recently, the Ethiopian government has prepared an over-riding policy document for the development and management of water resources. Based on the policy objectives, Ethiopia was irrigating only 5.8 percent of her irrigation potential during the last millennium (IWMI: 2004). Unfortunately, the country suffers from severe food shortage due to chronic droughts (Paulos et al. 2003). The famines of 1973/74, 1984/85, 1987 and 1998-2000 are all recent memories of mass starvation that affected the lives of hundreds of thousands of people and livestock population (Alemayehu 2001).

In view of continuing food shortages in Ethiopia, there is a need to seek measures that will foster sustainable increase in agriculture through better management of irrigation. It was in such vision that Support for Sustainable Development (SSD) started to address the food shortage and other problems facing the inhabitants of Aura and Uwa Woredas of the Afar Region by implementing the irrigation schemes in Aura and Uwa rivers. SSD is a local non-governmental and non-profit humanitarian organization established to support the development initiatives of the poor and neglected communities of Ethiopia, particularly those focusing on pastoralists of Afar. The Afar region located in the Awash valley of the Rift Valley system is extremely arid. SSD's vision is the improved welfare and increasing prosperity for rural poor pastoral and farming communities with whom SSD works.

SSD began its operation with the Aura small-scale irrigation based development in Aura Woreda of Afar National Regional State in the year 2003. The project is part of its on-going food security and development endeavors engaging the transhumant pastoral communities of Hida, Lukuma, Segentole, Lekora and Baduli Kebeles in Aura and Uwa Woredas of the Afar Region. To-date, the project has developed 360 ha of irrigated land benefiting benefit 2,290 households in the two irrigation and rural development projects.

As a result of secure water availability, beneficiary households have begun producing two to three crops per year. Year-round crop production made possible by the irrigation schemes has set in motion a process of sedentarization of the formerly transhumant population. Before the implementation of the project, a baseline survey was carried out and a report was written describing social structure and production organization. Since the project began, SSD has produced a series of project implementation and progress reports which provide a written record of project activities and some estimate of outcomes. In addition to these reports, SSD has also produced a number of case studies and audio-visual materials.

The project is believed to have been successful in achieving a number of its goals:

- Diversification of the livelihood system of pastoral communities
- Improvement in breeds and livestock management
- Improvement in natural resource management
- Improvement in technical and leadership skills of the community and local administrators including the promotion of women's capacity in decision making and in fighting against harmful customary practices.
- Attitudinal changes favorable to crop production based on irrigated agriculture, and
- Promoting of voluntary sedentarization around irrigated farms.

1.2. Objectives of the Study

1.2.1. General Objectives

The overall objective of this study is to critically assess project achievements, to investigate best practices, and to derive lessons learned and to document the impact of the integrated development project based on irrigated agriculture in changing the livelihood system of pastoralist communities and its contribution toward social transformation in the short span of

time covered by project implementation. The study will assess the project's contribution to changes leading to improving the food security status of targeted communities.

1.2.2. Specific Objectives

The specific objectives of the study are:

- To document the overall activities implemented by SSD in its integrated development project based on irrigated agriculture and the contribution of these activities to improving the food security status of the targeted communities;
- To assess the overall social, cultural, and economic changes and transformations that have been occurred in target communities, and to determine the extent to which these changes are attributable to project interventions;
- To determine changes in income and household welfare attributable to project interventions;
- To identify and document best practices and lessons learned which can be derived from SSD's experience and which could be adopted in new projects in areas with similar conditions to those existing in targeted communities;
- To design the strategies that could further enhance the effectiveness of SSD's irrigation project.
- To thoroughly assess the perception of the community with regard to the developmental approach taken and to the specific interventions and other activities of the project, and
- To obtain the view of the community concerning the gradual movement from the pastoralist way of life which prevailed in the past to agro-pastoralism, and eventually to a more sedentary way of life based on irrigated agriculture, and

- To examine in detail how these factors further resulted in changes in gender roles, decision-making within the family and the community and other aspects of changes occurring over the course of the project.

1.3. Methods/ Instruments of the Data Collection

This section will briefly discuss the research methods and techniques employed in the impact assessment.

1.4. Conceptual framework of the methodology

The methodology employed in this study involves an empowering, participatory and learning-oriented approach. This approach combines the principles of Managing for Impact and Outcome Mapping.¹ Unlike the conventional approaches which simply measure accountability of projects for funds obtained against stiff pre-determined targeted results, the study's methodology puts greater emphasis on 'learning', which encompasses the use of data and information for critical reflection and decision-making at all levels.

In a complex and dynamic environment, beneficiaries and other stakeholders will constantly be faced with new challenges both during the duration of a development initiative and after its direct intervention has ceased. Hence, in order to ensure that positive changes brought about by development interventions are sustained and expanded in future years, it is important to empower beneficiaries so that they are able to identify their own needs, make decisions to allow these needs to be met and to realize further positive changes within their own context. Its goal is to empower the community to make those changes which it can with its own resources and to seek outside resources when needed.

With this conceptual framework in mind, the methodology employed by this study will be participatory and learning-oriented. The main tools to be used for data collection will be both quantitative and qualitative methods.

¹ Developed by the Canadian research group, the International Development Research Council (IDRC)

1.5. Qualitative Method:

In general, five qualitative data gathering instruments/tools such as literature and document review, focus group discussions, key informant in-depth interviews, field observation and case studies were used to conduct this study.

- *Document Review* was carefully carried out on SSD's project documents such as its project proposals, annual plan, progress and evaluation reports and others. The team also reviewed relevant literature pertinent to pastoralism, land tenure system, resource conflict, irrigation in general and in Ethiopian context as well as the incorporation of crop production into livestock-based farming systems and the gradual transformation of pastoral community to a more sedentary way of life.
- *Twelve key informants' in-depth interviews* were also employed. A broad spectrum of individuals and groups of people having personal or professional experience in the area and the project were interviewed. Interviews include individual members of all stakeholder groups such as elders and youth, men and women, children and adults. Interviews were also conducted with local people, traditional and religious leaders, teachers, administrators and other government functionaries. Particular attention was paid to consult the administrators and representatives of line offices at a Woreda level, and those at a local level such as Development Agents (DAs), Health Extension Workers and others who have been directly or indirectly involved in project implementation. Staffs of SSD at the head quarters and local levels were also consulted through interviews.
- *Six Focus Group Discussions* were conducted with people who represent various demographic and socio-economic categories defined by age, marital status, education, economic background, and other variables such as traditional and religious leaders, elders, community members (women, men and youth), and the administrators and government functionaries working at different levels in various line offices.
- *Field Observation* was an important part of the team's work that was based on the researchers' long experience with similar projects. For specific points of interest at

different locations, field observation was conducted on the basis of checklists designed in advance to measure the impact of the irrigation project.

- A number of case studies were carried out which reflect the success of certain individuals and best practices developed by the project. Lessons learned were derived from these case studies corroborated with information derived from other research instruments.

1.6. Quantitative Method:

The small survey was conducted as part of the impact assessment to obtain accurate quantitative information on income derived from irrigated agriculture and the impact this change has had on family assets and welfare. It also made possible to collect data on other measurable changes such as improvements in education, changes in family diet and food security, access to health services, etc which accompany this transformation. Accordingly, quantitative information was collected from 110 households (with basic assumption of the most likely scenario of $p=0.5$ indicating households preference to engage in irrigation agriculture, at 95% confidence level and with a confidence interval of 9) of which three questionnaires are discarded for incompleteness during the analysis. The data was entered into SPSS 15.0 version and analyzed using the same software.

1.7. Background of the Organization: SSD

Support for Sustainable Development (SSD) is established to fight against poverty and to address the problems of the poor in this country. The gap between what needs to be done and what can be done with the existing resource and capacity is so wide, it required the involvement and ownership of the process by the beneficiaries, with little support from us. This will ensure sustainability of the development endeavours. SSD is a reflection of the determination of many people having a common interest towards the development of the country and its citizens. The members came together with the belief that it is possible to make a difference on the people's life by using the best of the local resources sustainably to the people and, most importantly, with the people.

SSD is licensed and registered with the Charities and Societies Agency to operate as Ethiopian Resident Charity. The vision of the organization is: “To see a country whose citizens are self-sustained and no more dependent on others support”

The mission of the organization is: “To contribute towards the achievement of citizens with reliable and sustainable economical resources” The goal or overall objective of SSD is “Create citizens with adequate skills and resources to be self-sustained through creation of strong livelihood basis”.

Chapter Two

2. Literature Review

2.1. Food Security: An Overview

The term food security emerged as a concept at FAO's World Food Conference in 1974. Since then, it has been defined in several ways (Saad: 2000). The maiden meaning of the concept of food security was the availability of sufficient food supply at the global, regional and national levels. The focus was therefore, on the aggregate supply of food in the world market to meet the demand for it (Maxwell and Frankenberger: 1992). Since the 1980s, however, the term food security has been recognized that the adequacy of food supply at the global or national levels does not guarantee access to food at community or household levels (Maxwell and Smith: 1992). In other words, the increasing of food production and abundance of supply at macro levels is a necessary, but not sufficient condition to ensure food security and food needs at all households and individuals level. On top of that, the focus and unit of analysis with regard to food security has recently shifted from the global and national to household and individual levels. Hence, food security is attained when all people have the availability and access to sufficient, safe and nutritious food at all times to meet their dietary needs and food preferences for an active and healthy life, without undue risk of losing such access.

According to Deveraux, food insecurity incorporates low food intake, variable access to food, and vulnerability – a livelihood strategy that generates adequate food in good times but is not resilient against shocks. These outcomes correspond broadly to chronic, cyclical and transitory food insecurity, and all are endemic in Ethiopia. The main triggers of transitory food insecurity in Ethiopia are drought and war. Seasonality is a major cause of cyclical food insecurity. Structural factors contributing to chronic food insecurity include poverty (as both cause and consequence), the fragile natural resource base, weak institutions (notably markets and land tenure) and unhelpful or inconsistent government policies.

On the other hand, food security has two major components known as food availability and food entitlements. Food availability, the supply-side indicator of food security, refers to the supply of food at local, national or international levels, whereas food entitlement or access refers to the capability of households or individuals to obtain food. According to Sen (1981), people do not usually starve because of an insufficient supply of food, but because they have insufficient resources (or entitlements) to acquire it. People can have access to food through own production, purchasing from market, and/or food transfer through exchange or gifts. Recent definitions of the concept of food security introduce a third dimension known as utilization, which refers to the way the food ought to be consumed. It includes such aspects of food consumption as nutritional balance, hygiene preparation, and preservation of food, as well as access to potable water.

Apart from this, the concept of food insecurity is simply the opposite of food security. Accordingly, food insecurity refers to a situation where not all people have access to enough food at all times for the desired active and healthy life. Basically, food insecurity refers to some degree of deprivation of food. Like that of food security, food insecurity can be conceptualized at the global, national and household levels. At the global level, it can mean insufficient production of food to meet the global requirement for food; and national level food insecurity can be because of insufficient food production and/or lack of purchasing power to meet the national food requirement. Similarly, household level food insecurity can be induced by insufficient production and/or lack of purchasing power to meet the demand for food at the household level. It should be noted here that household level food insecurity could exist even where there is food security at the national level.

Based on temporal dimension, two types of household food insecurity are distinguished: transitory and chronic. Transitory food insecurity is a temporary decline in a household's access to enough food. In most cases, it is caused by inter-annual variability in food production due to droughts or other factors; fluctuation in food prices and/or income of households leading to periodic variations in a household's food consumption and nutritional status. Transitory food insecurity is sometimes divided into temporary and cyclical food insecurity. Temporary food insecurity is one that occurs over a limited period because of unexpected and unpredictable shocks. On the other hand, cyclical food insecurity occurs in a regular and predictable pattern,

and it is also known as seasonal food insecurity. In fact, some researchers use transitory food insecurity and seasonal food insecurity interchangeably as synonymous concepts (Degefa: 2002). The worst form of transitory food insecurity is famine. Frequent occurrence of transitory food insecurity can cause depletion of household assets and make the household highly vulnerable to sliding down to poverty and chronic food security.

Chronic food insecurity refers to a constant failure of food acquisition by a household, which results from lack of resources either to produce or purchase enough food from the market. Thus, it is mainly a problem of poor households in the developing world, and it is in most cases regarded as being synonymous with poverty. In other words, whereas transitory food insecurity is more of a product of shocks, natural or man-made chronic food insecurity, which is a result of abject poverty, and hence a chronically food insecure population will experience food deficits irrespective of occurrence of transitory shocks. Obviously, chronic and transitory food insecurity are interrelated. Repeated occurrence of transitory food insecurity leads to depletion of household assets and there-by to poverty, and increases the vulnerability of the household to chronic food insecurity. Accordingly, food security is generally closely associated with poverty.

Food insecurity is different from famine and hunger, but these three concepts are closely linked. Famine and hunger refer to the outcomes of food insecurity. Famine is a large-scale disaster resulting from an absolute lack of food and affecting a large number of people for a long period of time (Mesfin: 1964). Hunger, on the other hand, refers to the state of under-nourishment, which is normally highly prevalent in poor countries. For instance, seasonal food insecurity that commonly occurs towards the end of one harvest and just before a coming harvest in subsistence economies leads to seasonal hunger. During such occasions, people may not have adequate food over some days and as a result, they would be in poor health. Hunger develops into famine when it persists for a longer period, and it would affect an increasing number of people, and results in mass migrations and deaths (Mesfin: 1984; Melaku 1997). In other words, the occurrence of famine is a slow process and as such, it is predictable. Its predictability makes famine a preventable disaster, and whenever it occurs, some researchers believe that it must be due to the

failure of governments to discharge their responsibilities effectively (Mesfin: 1984; Melaku: 1997). Maxwell and Smith (1992) underlined that “if a state does nothing to avert a famine, it is violating its duty to provide food”. From this perspective, famine is even considered to be a man-made disaster (Mesfin 1984; Melaku 1997). Whatever differences there may be between hunger and famine, the root cause for both is vulnerability of societies to food insecurity. In vulnerable societies, slight anomalies in food production or income of households easily translate into famines. In other words, famine is a disaster that is always closely associated with food insecure societies.

Globally, the growth in aggregate food production has thus far successfully kept ahead of population growth. It is predicted that this trend could continue for the next 25 years and beyond if appropriate research and policy action is taken. Against this reality, however, as much as one billion people in the world are very poor and suffer from food insecurity and around 800 million are chronically malnourished (Saad: 2000). The overwhelming majority of the food insecure population lives in sub-Saharan Africa. Food insecurity, specifically in sub-Saharan Africa, is attributed to a multitude of factors that interact in complex ways, and the major ones include: recurrent droughts, land degradation, limited use of agricultural technologies, rapid population growth, conflicts and civil wars; and rampant poverty.

2.2. Food Insecurity in Ethiopia: Extent and Determinants

Ethiopia is presently one of the most food insecure and food aid dependent sub-Saharan African countries. According to available evidence, Ethiopia was food self-sufficient, and even produced a surplus and exported food until the late 1950s. The country received food aid for the first time in 1959 when drought and crop pests damaged harvest in some areas (Mulat, Fantu and Tadele 2004). Ethiopia has since then remained one of the major food aid recipient countries in the world, as domestic production of food has never been sufficient to meet the food requirements of the national population. Indeed, since the 1960s, the number of food insecure households has been increasing, whilst per capita food availability has been decreasing. According to Mulat, Fantu and Tadele (2004), per capita food availability was on average, 128.08 kg for the period 1961-1974, and it declined to 119.99 kg in 1975-1991.

During the decade 1992-2001, average per capita food availability was 125.41 kg, which is better than its previous level, but still far below the recommended minimum quantity. The minimum weighted average per capita daily food requirement set by the Ethiopian government is 2,100Kcal, which is equivalent to about 225 kg of grain per annum (FDRE 1996; Ministry of Economic Development and Cooperation (MEDaC) 1999). This suggests that the per capita food supply simply stagnated below the minimum required level for over four decades. A large gap remained between the demand for and the supply of food that was filled by food imports and food aid, the latter contributing the largest share. FDRE (1996) estimates that some 52 percent of the rural population are food insecure, with a daily average per capita consumption of about 1770Kcal, which is 16 percent below the minimum level accepted by the government.

During the 1990s, per capita food availability generally followed an increasing trend from 113.2 kg in 1992 to 149.33kg in 2001, an annual growth rate of 3.0 percent (Mulat, Fantu and Tadele 2004). However, growth rates in agricultural production fell sharply to -3.1 percent in 2001/2002 and -12.2 percent in 2002/03 (World Bank 2003). Indeed, growth rates were negative in four of the 11 years between 1992/93 and 2002/03 or in five of the 14 years between 1989/90 and 2002/03 (Afrint 2003). The overall increase in food availability during the 1990s had not been sufficient to bring sustainable food security to the country at both national and household levels, instead, the annual food deficit consistently increased from about 0.75 million tons in 1979/80 to 1.4 million tons in 2000 (Mulat, Fantu and Tadele 2004).

Between 1985 and 2000, the annual average proportion of food aid to total domestic food grain production was 10.01percent, which means that the country produced about 90 percent of the national food requirements over the 15 years (Table 2.1). Expectedly, the largest amount of food aid- accounting for about 26 percent of the total domestic production was received in 1984, the year well remembered for the devastating drought. According to Robinson (2003), Ethiopia produces a much higher proportion of its own food than do most European countries. However, Ethiopia does not have the economic capability to import to make up the balance, and as a result, depends on food aid.

2.3. Resource Conflict: An Overview

Sustainable development is incompatible with human aspirations under conditions where insecurity plagues human life. It is to be noted that security is a necessary condition for human development. As a concept, human security consists of access to economic betterment, food availability, health services, environmental safety, personal and community freedoms and liberties, and political stability (UNDP cited in Edralin 2000). Conflict is one of the main factors that threaten social life and all the different elements of well-being and advancement. Similarly, ethnic conflicts, civil wars, and communicable diseases are viewed as having their roots in uncertainties resulting from poverty, unemployment, lack of human rights, and unequal access to basic needs (Edralin 2000). Unfortunately, many development planners and architects of international aid programs have tended to overlook conflicts, chaos and insecurity when planning and implementing development policies. They often regard conflicts as external and not central to the problem of development. As a result, conflict analysis did not figure out prominently in conventional development strategies. It could thus be argued that a new and more dynamic approach that relates development strategies to the causes and effects of insecurity is needed.

There are several instances that could lead to risks of violent conflicts. Regional insecurity, fragmentation of homogenous groups in the course of state formation processes, loss of access to resources and failure of previously established livelihood systems, incoherent policy environment particularly in the management of natural resources, absence of effective channels of community representation in decision making, and marginalization of disadvantaged groups are some of the factors that lead to conflict situations. Conflicts breed violence and instability particularly if they are associated with exclusivist primordial attributes anchored in ethnicity.

Ideological positions and established value systems that trigger conflict between actors who think in terms of ‘we and they’ based on primordial considerations could be taken as one source of conflict. Another category of sources of conflict originates from competition over “positional goods” that relates to vying for managerial and other decision and policymaking power. In instances where disaffected aspirants have failed to realize their ambitions, they resort to measures presumed to be useful for offsetting disadvantages by calling upon the support of those who share with them similar attributes of values, religion, and ethnicity. It is worth noting that

"positional goods" are sought as a result of recognizing the fact that these could provide added leverage for easily accessing scarce goods and services. In this regard, ethnicity can serve as a potent force that camouflages underlying interests and concerns associated with the quest for securing scarce resources. As Saideman (1995) noted "ethnicity often provides a key marker for self-aggrandizing politicians seeking to build constituencies for attaining or keeping political power..."

Ethnic conflict also takes shape as a result of the power elite's quest to get access to scarce resources. Hardin (1995) noted that the conflict between competing groups is an economic conflict over limited resources. In the face of scarcity of available resources, control of state power is accorded primacy since this provides privileged access. Competing ethnic interests are therefore mediated by the lust to make policies and decisions that could create easy access to essential and basic amenities. As Mitchell (1981: 7) noted "conflict is inevitable because it can originate in individual and group reactions to situations of resources..." It is also argued that several conflict situations involve conditions of scarcity and value dis-sensus thereby forcing those interested to put a high premium in owning contested resources and positions. Thus a combination of factors like existing value systems and perceptions of scarcity are likely to cause conflict between and among individuals, families, groups and communities (*ibid.*: 18).

Among the different causes of ethnic conflicts outlined above, competition over limited resources underlie the most frequent conflict, and forms the objective basis for inter and intra-ethnic conflict analysis (Markakis 1998). Questions of access to, and control over resources by different people so as to sustain their livelihoods are crucial to understanding environment-people relations that underlie intra and inter-group conflicts.

2.4. Background of Land Tenure System: An Overview

For centuries, rural land policy in Ethiopia had been highly oriented to sedentary agriculture, and never addressed concerns associated with pastoral ways of life. The neglect of the pastoral sub-sector in policy formulation means that the prospect for pastoral development is gloomy. This leads to haphazard use of pastoral resource and lack of alternatives on the part of the pastoralists

that are induced to enter into non-amicable relations with their neighbours and states. A typical influence of policy on pastoral development is the land tenure policy. In other words, the land tenure system is a key factor that determines use rights, security and access to land. Bruce (cited in Ayalew 1997) defined land tenure as the “terms and conditions on which natural resources are held and used”.

Pastoral land tenure in general and the land tenure system in particular, has been influenced by the state at different times. Prior to the 1975 Land Reform in the country, pastoral lands were put under state control on the premise that all land that is unsettled and uncultivated was appropriated as state property. The Revised Constitution of 1955 formalized state ownership. Tax assessment was based not on land but on the type and number of animals possessed by pastoralists (Yacob 1998). Pastoral land was subject to reassignment to individuals, large estate concessionaries, national parks, etc., by the state. The 1975 Land Reform further affirmed state monopoly ownership of land thereby limiting pastoralists to usufruct rights only though the government recognized their possessory title. Subsequent to the 1975 Land Reform, large state farms were further consolidated and developed. Article 40 of the 1995 Constitution of the Federal Democratic Republic of Ethiopia specified that “Ethiopian pastoralists have the rights to free land for grazing and cultivation as well as the right not to be displaced from their own lands” (FDRE, 1995). Despite this statement, however, the loss of land and water in favour of new encroachment of investment continues (Yacob, 1999). It could thus be argued that the pastoral land tenure system has not addressed the challenges of pastoral production system and the needs and dynamics of pastoral environment, and as a result of which a continued loss of pastoral resources is experienced.

2.5. Population Pressure and Drought

As Yacob (2000) argues, high population increase or pressure in the pastoral areas itself is the major cause for the shrinking of its grazing land, and often accompanied by a frequent recurrence of drought. The main causes for shrinking of pastoral resources in this study area have been frequent drought, and shortage and erratic nature of rainfall. Particularly, the lowlands are those areas that have been hardly hit by drought. In recent years, the most devastating droughts in the

area have been the great famines of 1973/74, 1983/84 and 2002/2003. These have caused severe loss of human and animal lives. In addition to the loss of human and animal lives, drought has also changed the agro-ecology of the area, disintegrated the social structure, and changed the vegetation composition from grass to bush which is consumed only by browsers (Harbeson and Teferawork cited in Said 1994).

2.6. Irrigated Agriculture: Development and Experience

The precise origin of irrigated agriculture is not well known, but there is no doubt that it has been in existence for many thousands of years in arid and semi-arid regions of Asia, Africa and America (Cantor 1967). Ancient civilizations developed along the rivers that supplied water for farming. As early as 5000 BC, the Egyptians cultivated land made fertile by the floodwater of the Nile River. By 3000 BC, they had built elaborate canal systems that carried water from the Nile to their fields. Large irrigation systems had also been constructed by that time in Parts of China, India and Southwest Asia (World Book of Encyclopaedia 1992). Modern large-scale irrigation may be said to have began in the third decades of the 19th century in North and Southern India and in The Nile Delta of Northern Egypt (Hagan et al.1978). In the mid of 1980s, about 220 million hectares of land were under irrigation throughout the world (World book of Encyclopaedia: 1992).

But, the irrigated land has great variations in Continent and countries. Asia constitutes 38 per cent, Latin America 15 percent and only 4 per cent or 12.2 million hectare goes to Sub-Sahara African countries. Egypt, Madagascar, Morocco, Nigeria, South Africa and Sudan accounted for 75 percent of the total irrigated land (FAO: 1997). Most of the irrigated lands in the world use old technology that is very inefficient in using fresh water. About 70 percent of the freshwater is used in irrigation techniques with an average efficiency of 37 percent (Power 1986; Tolk and Howell 2001; Ghacha 2003). In the developing countries, irrigated area is expected to increase by 3 million hectares between 1995 and 2020, at an annual rate of growth of just 0.2 percent compared to 0.8 percent annually during 1982 to 1993.

For the world as a whole irrigated area is projected to grow at 0.6 percent per year compared to 1.5 percent during 1982-1993 (Rosegrant and Ringler 1998). It is estimated that only about one-third of the potentially irrigable land is under irrigation in Africa (Berhanu and Peden 2002). According to FAO (1997) there are 42,082,000 hectares of irrigable land in sub-Saharan Africa of which only about 5,564,000 hectares or 13 percent is actually under irrigation. In the eastern Africa countries of Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda, less than 10 percent of the potential area is irrigated (Berhanu and Peden 2002).

2.7. Irrigated Agriculture and Food Production

During the past three decades, agricultural production In Africa has increased at the rate of less than 2 percent per annum, while population has increased at an average annual growth rate of about 3 percent. As a result, food demand is expected to increase by about 3.3 percent annually (World Bank 1996). In sub-Saharan Africa, in particular, inadequate growth in food production and increasing water scarcity poses serious challenges to agricultural and economic development (Berhanu and Peden 2003). One important strategy to increase food production in the face of increasing water scarcity is to increase the water productivity (Rosegrant et al. 2002:79). Irrigated agriculture currently accounts for about 72 percent of the global water withdrawals, and about 80 percent of water use in the lowest income developing countries (Rosegrant and Ringler 1998). The role of irrigation systems in stabilizing and expanding national and world food supplied; increasing agricultural production, farm income and food availability (Tangka et al. 2002). in the mid 1990s, irrigated agriculture contributed nearly 40 percent of the world food production on 17 percent of the world-cultivated land (Rosegrant and Ringler 1998), and plays a dominant role in cereal production accounting for 57 percent of cereal production growth in developing countries and four-fifths of the growth in global irrigated cereal production (Rosegrant et al.2002:106).

In many developing countries, irrigated agriculture constitutes an important element of rural development policies, as it provides higher rural income; employment and allows for increased agricultural and rural diversification through secondary economic activities derived from extended and more varied agricultural production as compared to rain-fed agriculture (Rosegrant

and Ringler 1998). Berhanu and Peden (2003) stated that an improvement in access to water through irrigation development serves as a powerful tool to increase income, diversify livelihoods and reduces vulnerability, since irrigation creates option for extended production across the year; increase yields and outputs; and creates employment opportunities. As a result, irrigated agriculture plays a vital role in achieving food security and sustainable livelihoods both locally through increased income and improved health and nutrition; and nationally through bridging the gap between agricultural production and food demand. McCornick et al. (2003) stated that:

Irrigation development benefit the poor by raising labour productivity, promoting the production of high –value crops, and the generation of farm and non-farm income opportunities; especially when increased production stimulates the local economy through backward and forward linkages (i.e. water systems can be used as “growth centre” which markets and employment are also stimulated).

Irrigation development plays a critical role in the sustainable livelihood of the rural poor through increased agricultural productivity. With the security provided by irrigated agriculture, additional inputs needed to intensity production become economically feasible and reduce the risk of these expensive inputs being wasted by crop failure resulting from lack of water (FAO 1997). Irrigation, therefore, increases the use of all inputs like labour, fertilizers and manure (Benin 2003:104).

Zewdie (1994) stated that the existence of an irrigation system provides a safe ground against seasonal unforeseen droughts and eliminates the prospects of crop failure. Irrigation development, therefore, can bring about increased agricultural production and consequently improve the economic and social well-being of the population. Irrigated cultivation, according to Manzungu and Zaag (1996) also offers a compromise between the high margins of horticultural production, production stability, and food security. In general, well-managed irrigation systems can control the supply of water so as to promote growth and yield, and enhance the economic efficiency of crop production (Merriam and Keller 1978). Thus, properly applied irrigation can

increase yield, reduce drainage and promote the integration of irrigation with essential concurrent operations (agricultural inputs). Other potential benefits of irrigated agriculture include increased crop diversification and cropping intensity (Delgado: 1995).

2.8. Water Resource Potential and Agriculture in Ethiopia

With its per capita fresh water resources estimated at 1924m³, Ethiopia is endowed with one of the largest surface water resources in Sub Saharan Africa. Ethiopia has abundant water resource potentials with 12 major rivers basins (valleys), 11 major lakes (9 saline and 4 craters) and over 12 major swamps with total mean annual surface runoff estimated to be 123.25 billion m³ (Mateos 2003; Merry et al. 2003; MoWR 1999). These uneven distributions of water resources coupled with a wide range of climatic and topographic conditions create a diversity of agro-ecological and soil conditions across the country (Merry et al.2003; MoWR 1999). Besides, these uneven distributions of water resources either demand huge investment to develop or constrained the utility at required time and place (Mateos 2003). On the other hand, most of the major rivers have created deep gorge in the country and the water they contain passes to neighboring countries, thus constraining development and utilization of the water resources in the country. Furthermore, most perennial springs and streams exist only in the highlands comprising just over 40 percent of the county's geographic area; while there is hardly any surface run-off and perennial springs and streams in areas below 1500 meters above sea level (m.a.s.l.) that comprises over 55 percent of the country (Mateos, 2003:115).

Even though the country's estimated 2.6 billion m³ ground water is fairly distributed in the lowlands, it is not appropriately developed and utilized because of financial and capacity problems (Mateos: 20003). Such failures in developing and utilizing the country's water resources and mismanagement of the available water have been the real cause of low level of agricultural development in the country. Thus, agricultural production remains far below expectations, and makes large part of the country vulnerable to recurrent droughts; the most recent drought (2002-2003) had had a devastating impact on millions of people. As a result of these factors, rural poverty is endemic in the country (Merry et al. 2003). The major limitation, therefore, lies in the uneven distribution and mismatch of the available water resources with the agro-ecological and settlement patterns of the country.

On the other hand, the natural resource base of the country seems to have a potential for supporting a far greater number of the population; and the geographic location and natural resource endowments of the country and favorable climatic condition have provided it with a relatively higher rainfall with annual rainfall ranging between 2700mm in the south western highlands and less than 200mm in some parts of the northern and southeastern lowlands with further decrease to 100mm in the northeastern lowlands. However, despite Ethiopia's high aggregate annual rainfall, the use of water resources to meet the socio-economic needs of the population is very limited. As a result, irrigated agricultural development in Ethiopia has not been given adequate attention to utilize the available water potential for agricultural production and productivity.

Table 1: Ethiopian Surface Water Resources by Major River Basins

<i>River Basin</i>	<i>Catchment's Area (km²)</i>	<i>Share out of total (%)</i>	<i>Annual Run off (.10⁹m³)</i>	<i>Share out of total (%)</i>	<i>Specific Discharge (Liters/ km²)</i>
<i>Abbay</i>	<i>199812</i>	<i>17.56</i>	<i>52.6</i>	<i>43.03</i>	<i>7.8</i>
<i>Awash</i>	<i>112700</i>	<i>9.9</i>	<i>4.6</i>	<i>3.76</i>	<i>1.4</i>
<i>Baro-Akobo</i>	<i>74000</i>	<i>6.51</i>	<i>23.6</i>	<i>19.31</i>	<i>9.7</i>
<i>Genale-Dawa</i>	<i>171,050</i>	<i>15.03</i>	<i>5.88</i>	<i>4.81</i>	<i>1.2</i>
<i>Mereb</i>	<i>5900</i>	<i>0.52</i>	<i>0.26</i>	<i>0.21</i>	<i>3.2</i>
<i>Omo/Ghibe</i>	<i>78200</i>	<i>6.82</i>	<i>17.96</i>	<i>14.7</i>	<i>6.7</i>
<i>Rift Valley</i>	<i>52740</i>	<i>4.63</i>	<i>5.64</i>	<i>4.62</i>	<i>3.4</i>
<i>Tekeze</i>	<i>90, 000</i>	<i>7.9</i>	<i>7.63</i>	<i>6.24</i>	<i>3.2</i>
<i>Wabe Shebele</i>	<i>200, 214</i>	<i>17.59</i>	<i>3.16</i>	<i>2.59</i>	<i>0.5</i>
<i>Denakil</i>	<i>74, 000</i>	<i>6.5</i>	<i>0.86</i>	<i>0.7</i>	<i>0</i>
<i>Ogaden</i>	<i>77, 100</i>	<i>6.77</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Ayisha</i>	<i>2, 200</i>	<i>0.19</i>	<i>0</i>	<i>0</i>	<i>0</i>
<i>Total</i>	<i>1, 138,016</i>	<i>—</i>	<i>122.19</i>		

Source: Adopted from Gulilat (2003)

2.9. Status of Irrigation Development in Ethiopia

The irrigation potential in Ethiopia is one of the most underutilized opportunities in the country. Since there are various estimates, the irrigation potential of the country ranges from 1.0 to 3.5 million hectares of irrigable land, of which between 160 to 190 thousand hectares (5-10%) is estimated to be currently irrigated. The per capita irrigated area is also estimated to about 35m², compared with the world average of 450m² and about 352 thousand hectares of land is said to be irrigable using small-scale irrigation schemes in the country (Berhanu:2003).

The Imperial government in the 1950s took the first initiative in water resource development and large-scale water development projects both for agricultural purposes and power generation were

constructed at the end of the 1950s. At the beginning of the 1970s, about 100 thousand hectares of land was under modern irrigation in Ethiopia with the main objective of providing industrial crops to the growing agro-industries (Berhanu and Peden 2003). In 1975, the Derg regime nationalized all large-scale irrigation schemes that were constructed during the imperial regime. Likewise, the Derg regime was keen to develop large-scale irrigation projects and the focus was on commercial farming. Accordingly, little attention was given to small-scale and traditional irrigation schemes constructed and managed by smallholder farmers.

It was during the second half of the 1980s, and after the devastating famine of the 1984/85 that the Derg regime started to show interest in small-scale irrigation schemes (Berhanu and Peden 2003; MOA 1986). This interest was signaled by the establishment of the Irrigation Development Department (IDD) within the Ministry of Agriculture in 1984, a department that was entrusted with task of developing small-scale irrigation projects that would benefit smallholder farmers. Nevertheless, IDD's performance was too low, and very few small-scale irrigation projects were constructed between 1984 and 1991 (MOA 1993). The focus on large-scale irrigation development and the neglect of small-scale schemes was reversed after the current Ethiopian People's Revolutionary democratic Front (EPRDF) took power in 1991. The current government put the development of small-scale irrigation schemes and improvement of farmer managed traditional schemes at the forefront of its water development policy and created the Ministry of Water Resources (MoWR), which is a unified public agency of water resources development (MoWR). Then, IDD was dissolved in 1994 and the government interest in small-scale irrigation remained very high as manifested by the creation of the regional Commission for Sustainable Agriculture and Environmental rehabilitations (Co-SAERs) in a number of regions.

The primary mandate of the Co-SAERs has been to promote small-scale irrigation for the benefit of smallholders. However, like IDD the focus of the Co-SAERs also remained to be technical oriented with inadequate attention accorded to policy, socio-economic and industrial issues. More recently, the government has prepared Water Resource Management Policy (WRMP) as an overriding policy document for the development and management of the nation's water

resources. Thereafter, Water Sector Development Strategy and water Sector Development Program (WSDP) have been adopted. Based on the policy objectives, Ethiopia was irrigating a total of 247,500 hectares, i.e. 5.8 percent of the total potential of 4, 256, 457 hectares during the last millennium (IWMI 2004).

The nationwide area under traditional irrigation reported by IWMI (2004) was 138, 000 hectares; out of which about 48, 000 hectares were developed by small-scale irrigation. Whereas the total area developed as large and medium-scale irrigation schemes amounts to 61,000 hectares (IWMI: 2004).

Chapter Three

3. Results and Discussion

3.1. Demographic Socio-Economic Information

This section presents an overview of the socio-economic and demographic characteristics of the study population such as age composition, marital status, religious affinity, ethnic background, household compositions, employment/occupation and educational attainment. According to CSA (2007), the total population of zone 4 was 255,542, among which 145,471 were males and 110,071 were females. With regard to area of residence, only 9,430 are urban, while the remaining overwhelming majority resides in rural area. This lesson learnt study (LLS) is conducted in Aura (population of 35,755) and Uwa (population of 47,195) districts. The total urban population in the districts is 2,879 (CSA: 2007).

Through this Lessons Learned Study (LLS), a total of 107 respondents were consulted through structured questionnaire. In the sample size determination 10% contingency was included from the beginning, thus we found that it is enough for valid analysis. All respondents were from two Woredas/districts in Zone 4 of the Afar Region, namely Aura and Uwa. The distribution of respondents in this survey is displayed by Woredas and Kebeles of residence in the following table.

Table 2: Distribution of respondents by Woreda and Kebele of residence, December 2009

<i>Woreda</i>	<i>K'ebele</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Uwa</i>	<i>Baduli 01 & 02</i>	25	23.4	23.4	25.2
<i>Aura</i>	<i>Hida</i>	59	55.1	55.1	80.4
	<i>Lekora</i>	15	14.0	14.0	94.4
	<i>Segentole</i>	6	5.6	5.6	100.0
	<i>Not registered</i>	2	1.9	1.9	1.9

	<i>Total</i>	<i>107</i>	<i>100.0</i>	<i>100.0</i>	
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Source: LLS, 2009

Among the total respondents, 23.4% were selected from Uwa Woreda, while the remaining 66.6% were selected from Aura Woreda of the Afar Regional State. With regard to age of the respondents, the age of the respondents ranged from 18 to 62 years with a range of 44 and standard deviation of 9 years. The median and mode (most repeated) age of the study population was 35, while the mean is 33.5 years. However, most of the respondents 75 (70.1%) were at the age between 25 and 40. On the whole, 79 (83%) were male and 28 (26%) were female respondents. In terms of religious affiliation, almost all respondents (99.1%) were Muslims, while only 1 respondent was identified to be adherent of other religion.

Table 3: Position of the Respondents in the Household

<i>Position in the household</i>	<i>Sex</i>		<i>Total</i>
	<i>Male</i>	<i>Female</i>	
<i>Head of household</i>	<i>79</i>	<i>10</i>	<i>89</i>
<i>Wife – not head of HH</i>	<i>0</i>	<i>18</i>	<i>18</i>
<i>Total</i>	<i>79</i>	<i>28</i>	<i>107</i>

Source: LLS, 2009

Regarding the position of respondents in the household, 89 (83%) of the respondents were heads of households, among which 79 (74%) were men and 10 (9%) were women. All men respondents identified themselves as husbands, and reported to be heads of their respective households, while from 28 women respondents, 10 (36%) of the respondents identified themselves to be heads of households. The remaining 18 (64%) female respondents reported to be housewives, but they are not heads of households.

3.2. Livelihood and Associated Transformations

Regarding the livelihood, the majority of respondents 99 (92.5%) informed that they have one major activity of making their livelihood. Among the respondents, 8 (7.5%) are making their

livelihood from multiple activities, and are not precisely able to indicate one major source of livelihood. This can be explained from the presence of individuals who are engaged in mixed farming, food for work, and in farming or livestock rearing. The majority 94 (88.7%) of those who identified they have a primary livelihood activities indicated mixed farming (both crop production and livestock rearing) as a major source of their livelihood, and followed by those identifying livestock rearing (excluding crop production) and food for work (each 5.7%) as major source of livelihood during the study period. According to the baseline results, however, livestock rearing was the major occupation and source of livelihood for most of the inhabitants in the project area, and augmented by selling of machine guns and food aid. In short, there is consistency between the information obtained from the baseline survey and this lesson learned study.

Table 4: Major sources of livelihood

<i>Major source of Livelihood</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>Mixed (livestock & crop production)</i>	94	88.7%	98.9%
<i>Livestock rearing only</i>	6	5.7%	6.3%
<i>Food For Work</i>	6	5.7%	6.3%
<i>Total</i>	106	100.0%	111.6%

Source: LLS, 2009

For validity purpose and retrospective understanding of the same issue, certain questions were asked at the end of the interview session in different form and the following results were gained. Before the implementation of the irrigation projects in both Aura and Uwa Woredas, livestock rearing was the major economic activity as it was affirmed by 100 (93.5%) of the respondents, and followed by 4 (3.7%) of the respondents who claimed to undertake both farming and livestock rearing simultaneously. This information matches with the baseline result that

underlines the beginning of farming initiative (which was at a rudimentary level) during the Derg regime. However, this rudimentary form of farming initiative which was started during the Derg regime could not continue in progressive manner due to lack of knowledge and experience in making canals, in utilizing the irrigation schemes and other economic constraints.

Table 5: Major Livelihood before the Irrigation Project (Retrospective Analysis)

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	3	2.8	2.8	2.8
<i> mixed farming</i>	4	3.7	3.7	6.5
<i> Livestock</i>	100	93.5	93.5	100.0
<i> Total</i>	107	100.0	100.0	

Source: LLS, 2009

The survey result of this study shows that the beneficiaries undergone a significant transformation in terms of their livelihood since the beginning of the irrigation project. In other words, a significant proportion of beneficiaries have transformed from pure livestock herding to mixed farming within the last couple of years. Currently, 83 (77.6%) of the respondents reported that they are engaged in both livestock rearing and crop farming. Moreover, a significant proportion of respondents are showing a tendency of transformation from livestock rearing to sedentary farming. This has been due to adapting irrigation farming, and the discontent they have towards the pastoral way of life which has been seriously affected by various factors. In this regard, however, only 17 (15.9%) of the respondents are mostly engaged in livestock rearing.

The above data shows that a dramatic change has been taking place as compared to the baseline result which state that some pastoralists are shifting from pastoral way of life to agro-pastoralism due to various reasons. In this connection, the participants of FGD and in-depth interviews expressed their transformation as follows: “Initially we started farming gradually after we became aware that it is very hard to sustain our life only through pastoral way of life, which has been frequently affected by recurrent drought and erratic nature of rainfall especially since the

last few decades. Then, we convinced our mind that it is possible to produce various crops through irrigation and feed our families. Finally, we started to settle voluntarily and adapted a sedentary life after we gained some knowledge, skills and techniques of using irrigation through continuous trainings provided by SDD”.

Table 6: Major Livelihood after the Project Intervention

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid mixed farming</i>	83	77.6	77.6	77.6
<i>Livestock</i>	7	6.5	6.5	84.1
<i>Farming</i>	17	15.9	15.9	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

Regarding self reported wealth ranking in comparison to other community members (actually neighbours), the majority of the respondents 77 (72.0%) reported that they are well off their neighbours (medium), while 4 (3.7%) of the respondents reported that they are wealthy/reach when they compare themselves with rest of their community members. Still significant proportion 25 (23.4%) of the respondents consider themselves to be poor. Nevertheless, none of the respondents considered/ put themselves in the category of the bottom line or the poorest of the poor. Among the respondents only 1 respondent (0.9%) was not able to identify himself in any of the categories mentioned above.

Table 7: Wealth/Poverty Ranking (self-compared-to others)

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	1	.9	.9	.9
<i>Wealthy/rich</i>	4	3.7	3.7	4.7
<i>Medium</i>	77	72.0	72.0	76.6
<i>Poor</i>	25	23.4	23.4	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

Concerning source of income, livestock sale was the major, if not the sole, source of income in most of the arid areas as a result of the climate. Hence, the logical indicator to see changes in production systems becomes looking at the trend of income from the newly introduced ventures. Among 24 households who have sold their grains produced in the last few years, the minimum income was 60 Birr, while the maximum was 3000 Birr without including the amount of production used for consumption. Therefore, the median and mean incomes were 500 and 926 Birr respectively. However, SSD Progress Report (2008) presented to government and partners by SSD indicate that there are some households who were able to earn more than 10 thousand Birr from the sale of their farm products. In this connection, the average yield of maize and sorghum in per hectare in 2008 was 40 and 35 quintals respectively with a maximum yield of 60 quintal/hectare maize and 32 Quintal/hectare of sorghum. Due to the introduction of varieties of vegetables and fruits, many households (21% of the respondents) reported to earn relatively higher income in the last few years. For instance, 23 households were able to earn an average income of 193 Birr, and a maximum income of 800 Birr in 2009.

Regarding land ownership, almost all study population have been the beneficiaries of the project. Except 3 responses that were disregarded for their incompleteness, all the rest respondents underlined that they have their own plot of land, which is used for farming purpose. It is clear that land is communally owned in Afar society, and every Afar has a right to claim land ownership. As it was expected to obtain yes answer from all respondents regarding a plot of

farming land, all of them approved that they have landownership. As a number of respondents reported, the difference is only in terms of size they owned. For instance, some households have grabbed farming land from the communal land and fenced it, while others have extended their farm land to the forests. As a result of the aforementioned reason, the land owned by each household has exceeded half hectare with an average and median holdings of .6 and .33 hectares respectively. Nonetheless, the findings obtained through FGD and in-depth interviews indicate that the maximum reported landholding in the project area was to be 5 hectare, while the minimum land holding is 0.3 hectare. The following table shows land holding variations across the project Kebeles. The majority of beneficiaries in Hida Kebele remained to own not more than 1/3rd hectare of land initially allocated by the project partners.

Table 8: Average Land area Owned by Respondents during LLS in selected kebeles

	<i>Land area</i>				<i>Total</i>
	<i>.25</i>	<i>.33</i>	<i>1.00</i>	<i>2.00</i>	
<i>Kebele</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>0</i>	<i>3</i>
<i>Baduli</i>	<i>9</i>	<i>0</i>	<i>14</i>	<i>2</i>	<i>25</i>
<i>Hida</i>	<i>7</i>	<i>36</i>	<i>13</i>	<i>0</i>	<i>56</i>
<i>Lekora</i>	<i>5</i>	<i>0</i>	<i>7</i>	<i>1</i>	<i>13</i>
<i>Segentole</i>	<i>3</i>	<i>0</i>	<i>3</i>	<i>0</i>	<i>6</i>
<i>Total</i>	<i>24</i>	<i>37</i>	<i>39</i>	<i>3</i>	<i>103</i>

Source: LLS, 2009

Regarding the current coverage of the land holdings, 65.6% of the respondents indicated that 0.25 hectare of their land is found to be farmland. Moreover, 30.6% of the respondents indicated that .33 hectare of their land is under farm. However, 2.8% of the beneficiaries are not able to exactly point out how much of their land is currently covered by farmland. Based on the

cumulative analysis, an average of 0.28 hectare of land is currently considered to be farmland with a median of 0.25 hectare. As it was indicated in the baseline survey, the potential farmland for irrigation production was estimated to be 200 hectare. However, the total command areas of the diversion weir in both Aura and Uwa Woredas have been 200 and 160 hectares respectively.

Table 9: Land ownership and size

<i>Land ownership (ha)</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
.25	71	65.7	67.6	67.6
.33	32	30.6	31.4	99.0
1.00	1	.9	1.0	100.0
<i>Total</i>	104	97.2	100.0	
<i>Missing System</i>	3	2.8		
<i>Total</i>	107	100.0		

Source: LLS, 2009

Thus, there is a significant increase of land ownership compared to the baseline result where an average household landholding was only 0.2 hectare. The expansion of the project area and increasingly growing support for engaging in farming and sedentary way of life led the households to expand the size of their landholding through grabbing. According to field observation, some households have established permanent structures and fences after they have grabbed some area of land from communal holding. This indicates that the beneficiaries of the irrigation project have developed an interest towards crop farming and sedentary way of life. In relation to this, respondents were asked about the number of plots they have. The majority 87 (80.6) of project beneficiaries have reported that they have single plot, while 16 (14.8%) beneficiaries reported that they have two plots. Having multiple plots of land may be explained in terms of dividing and using the same plot of land for various crops such as vegetables, fruits, cereal crops or forage production.

Table 10: Average number of plots

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>One plot</i>	87	80.6	84.5	84.5
<i>Two plots</i>	16	14.8	15.5	100.0
<i>Total</i>	103	95.4	100.0	
<i>Missin System</i>	5	4.6		
<i>Total</i>	107	100.0		

Source: LLS, 2009

As it is indicated in the following table, all of the project beneficiaries utilize household labour for farming. In addition to that, they were seeking assistance from close relatives or friends, and using employed labour (paying for some activities) constitutes significant proportion of labour source for irrigation farming.

Table 11: Source of Labour for Farming

<i>Source of Labor</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>Own Labor (household labor)</i>	107	59.4%	100.0%
<i>Assisted by Relatives or friends</i>	55	30.6%	51.4%
<i>Temporary Employment</i>	9	5.0%	8.4%
<i>Other labor sources</i>	9	5.0%	8.4%
<i>Total</i>	180	100.0%	168.2%

Source: LLS, 2009

3.3. The Emerging Institutional arrangement

The information obtained through the qualitative data collection techniques indicated that new forms of institutional arrangements were introduced to the project area to manage land and water related issues. The project initially facilitated the establishment of a Joint Project Committee comprising the *Balabat*, clan leaders, community elders, *kebele administrators* and representatives of the district line offices. The project staff remained to play a key role as facilitators which enabled the committee to devise mechanisms for agreed up on land allocation by-laws. This by-law was found to be a vital issue for managing potential conflicts related to land and the traditional land tenure system.

3.4. The Evolving Food Security Interventions and Their Impact

The information obtained from households who are able to precisely remember the situation some years ago; there has been strong trend of increasing food security among the beneficiaries of the study area. When respondents were also asked for how long their household production was able to feed them (the food security situation in their household) in 2007, 2008 and 2009, they reported that it was enough for 4.5, 6.5 and 9.4 months respectively. Most of the households attributed the positive change in terms of food security to the introduction of the irrigation project, activities of food for work, and their ability to store food grains for certain period of time. It is also evident that some households have developed reliable food sources for a year and others not. The variation is very significant in 2009 than in 2007 where the range was 5 (all were equally food insecure). As a result, the transition can be generalized as a transition from mass food insecurity to a community having better food availability.

Table 12: Estimates of food availability (number of months per year)

		<i>2007</i>	<i>2008</i>	<i>2009</i>
<i>N</i>	<i>Valid</i>	<i>17</i>	<i>17</i>	<i>107</i>
	<i>Missing</i>	<i>91</i>	<i>91</i>	<i>1</i>
	<i>Mean</i>	<i>4.5294</i>	<i>6.4706</i>	<i>9.4</i>
	<i>Median</i>	<i>5.0000</i>	<i>6.0000</i>	<i>11.0</i>
	<i>Range</i>	<i>1.00</i>	<i>1.00</i>	<i>11.0</i>
	<i>Minimum</i>	<i>4.00</i>	<i>6.00</i>	<i>1.0</i>
	<i>Maximum</i>	<i>5.00</i>	<i>7.00</i>	<i>12.0</i>

Source: LLS, 2009

In relation to this, additional information was collected mainly through Focus Group Discussions (FGD) and in-depth interviews concerning various issues. Accordingly, informants were asked about their attitude and practices with regard to food for work and the irrigation project of SSD. Most of them seem to want to continue with the activities of food for work, while some mentioned that what they want is that their land and water are blessed, and wanting no assistance from SSD. They underlined that one of the advantages of the having access to food for work is that it provides employment assurance for certain months. The income obtained by selling the grain provided for involving in food for work is considerable size and helps to buy even some important household equipment, and to engage in off-farm activities that could generate additional income, which can be used to buy some small ruminants like goats and sheep. Another advantage of food for work is the possibility of having two or more members of a family to participate in its activities, and an opportunity which augments the income of the household. This, at the same time opens-up employment opportunities for other members of the household. They finally underlined that food for work has contributed a lot in saving the lives of thousands by filling the gap of food shortage facing them for certain years.

Consequently, they expressed that they have been informed that SSD is planned to stay for only one year, and pointed out that they had they enough assets, they would have not minded for the phasing out of the irrigation project. On the contrary, some of them complained that the assets they created so far are not enough when combined with growing cost of basic requirements of life. Therefore, it is difficult to cope up with the vulnerability to food crisis resulted from frequent droughts unless SSD stays for the coming couple of years and expanded the magnitude of irrigation schemes by constructing additional irrigation weirs and canals.

On the other hand, all participants of FGD and in-depth interviews are positive that the activities of the irrigation projects have improved their livelihood in many respects. They further stated,

“We were often starved and forced to migrate mainly to the neighbouring highland areas of Amhara Region in search of pasture and water during the drought years prior to the beginning of the irrigation project in our locality. Especially during the highest peak of the drought period, the influx of human and animal population to the neighbouring areas of Amhara region was more than three fold as compared to the influx of human and animal population during the initial period of the drought year. As a result of frequent mobility, we were also exposed to various health problems, and overburdened by carrying and transporting our children and property from one place to the other. Similarly, our animals were exposed to serious weight loss and various diseases due to shortage of pasture and because of long hours travel for consecutive days. Above all, there were many occasions we had been in conflict with the neighbouring ethnic groups as a result of creating scarcity by competing their pasture and water resources.

Since the beginning of the irrigation project, however, we have gained several benefits in terms of our livelihood. For instance, we are relieved of frequent mobility and migration to the territory of others as a result of sedentary life. Our stock number which was rapidly declined due to the drought of 2002/3 has been increasing owing to various reasons. Firstly, we have got adequate knowledge of collecting and storing crop residues during the harvesting season, and feeding our animals during the dry season. By doing so, we are able to minimize the shortage in terms of pasture within our own household, and among our relatives. Secondly, we became aware of reserving some portion of our land for growing pasture, and feeding our animals during the dry season either by making hay or by grazing it as standing hay. Thirdly, we have

gained knowledge of planting several varieties of grasses and fodder plants within our own plot of land. Fourthly, we started feeding our animals by removing and cutting the weeds and the grass from our own crop farms, and by cutting and carrying from our reserved plots of pasture. Fifthly, we even developed an interest in preparing silage and preserving it for the dry season.”

3.5. Impacts of the Project on Livestock and its Production

The LLS study clearly identified that there is a transition from predominantly livestock dependent economy to sedentary life of mixed farming. As it is indicated in the table below, the transition from pastoralism to mixed farming found to be significant. Proportionally, the transition from mixed farming to predominately irrigation based agriculture seems to take place enormously in the coming few years.

Table13: Transition of major household economic activities

<i>Major Activity</i>	<i>Before the Project intervention</i>		<i>After the project intervention</i>	
	<i>Frequency</i>	<i>Percent</i>	<i>Frequency</i>	<i>Percent</i>
<i>Mixed farming</i>	18	16.8	83	77.6
<i>Livestock</i>	68	63.6	7	6.5
<i>Farming</i>	18	16.8	17	15.9
<i>Missing data</i>	3	2.8	0	0
<i>Total</i>	107	100	107	100

Source: LLS, 2009

According to the information from the current survey, there is a slight increase in number of livestock population in the project area compared to result of the baseline survey. The result of the baseline survey indicated that livestock production was the main component of their livelihood. The production of this sector is traditional that domestic breed cattle and small ruminants are produced on extensive grazing method. The role of livestock production is mainly

to supply milk production to every household and serve as a symbol of social status among the pastoralists. However, the productivity of this sector is very low as compared to the number of livestock population in the area. This is attributable to the inefficient productivity of livestock population arising from shortage and poor feeding, lack of quality health care and poor supporting services. According to the information obtained from respondents of the survey, the livestock population found in the area is estimated as follows:

Table 14: Estimates of Livestock population in the project areas

<i>Source</i>	<i>Oxen</i>	<i>Cows</i>	<i>Sheep</i>	<i>Goat</i>	<i>Camels</i>	<i>Donkey</i>
<i>Baseline</i>	<i>4,000</i>	<i>6,000</i>	<i>10,000</i>	<i>9000</i>	<i>4000</i>	<i>500</i>
Estimate of LLS	12,595		26,335		8,015	N/A

Source: Baseline survey; LLS, 2009

Cattle included cows, oxen and all their off springs. Shoats included all sheep and goats including their offspring. Very insignificant proportion of respondents (5.6%) asserted that herd size has been gradually increasing after several shocks of drought in the project area especially in 2002 and 2003. This can be attributed to relatively stable access to forage, crop residue and other feeding resources in addition to communal grazing land. Furthermore, most of the respondents tend to accept the increasing of herd size in their project area, but they believed that the change is minimal as compared to the number of livestock some four or five decades ago. In this connection, the participants of FGD and in-depth interviews underlined that four decades ago the richest household had more than 200 head of cattle, while the poorest had 20 heads of cattle. However, these days the richest household may have 30 to 40 heads of cattle on average. The decline in number of cattle in each household has been caused by frequent drought that aggravates the death of livestock population and shrinking of pastoral resources.

Table 15: Perceived position about livestock population

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid Increased</i>	6	5.6	5.6	5.6
<i>Decreased</i>	45	42.1	42.1	47.7
<i>No significant change</i>	56	52.3	52.3	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009



As far as the livestock has a significant contribution to livelihood of the Afar society, its loss or poor productivity would adversely affect their economy. Therefore, pastoralists need to have forage production all year round in order to have continuous yield from their livestock and to sustain their life in the area. As it is indicated in the brochure of the project, SSD has intervened in long term production of

fodder. In accordance with this, the integrated component of SSD was able to introduce several varieties of improved fodder crops/plant (leucaena, sesbania and fodder beet) and grass species (alfalfa, Rhodes grass and others) for animal feed together with innovative ideas and practices of managing and conserving forage production. The establishments of demonstration sites, multiplication and dissemination of seeds and cuttings of fodder plants and grass species to beneficiary irrigators have been among the few ones. The introduction of various species of grasses and fodder plants as well as using crop residues for feeding their animals enabled the pastoralists to keep milking cows in the village even during the drought period. Furthermore, the availability of milk has increased among those beneficiaries who planted newly introduced grass species and fodder plants in their irrigable land. Unlike the baseline information, which shows that open grazing/browsing on communal land was the dominant way of livestock feeding in pastoral areas, all respondents (100%) underlined that they started to use hay and crop residues to feed their animals. Moreover, the researchers were able to observe when the project beneficiaries were feeding their animals by crop residues. Nevertheless, open grazing on communal land has still remained to be the major source of animal feeding.

Table 16: Source of animal feeds

<i>Source of animal feeds</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>forage(a) Common grazing</i>	107	50.0%	100.0%
<i>Hey and straw</i>	107	50.0%	100.0%
<i>Total</i>	214	100.0%	200.0%

Source: LLS, 2009

Regarding the availability of pasture and forage for their animals, the majority (50.5%) of the respondents indicated that there is scarcity. This can be attributed to the slight increasing of livestock population in the area. On the contrary, however, 22.4% of the respondents indicated that livestock feed is moderately available, while 16.3% of the respondents reported its better availability. Among the respondents 10.3% were indifferent to make a choice linking it with variability in terms of seasons and nature of rainfall.

Table 17: Availability of livestock feeds

<i>Availability of livestock feed</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Indifferent</i>	11	10.3	10.3	10.3
<i>Available</i>	18	16.8	16.8	27.1
<i>Moderately available</i>	24	22.4	22.4	49.5
<i>Very scarce</i>	54	50.5	50.5	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

Because of limited sample size and concomitant limitations for rigorous statistical analysis, the research team identified milk production as a proxy indicator to look at the quality side (improvement) in livestock products. Among the total respondents 73 (68.2%) have milk cows currently being milked, and a significant proportion 31 (29%) of the respondents reported that they do not have any milk in their house. This can be explained in terms of either lack of cows and/or pastoralist herd management strategy of sending them to other place where pasture is relatively abundant. For instance, a woman among the 3 (2.8%) respondents who responded ‘I don’t know’ reported that her herds are with the ‘herders.’

Table 18: Presence of milk cow

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>I don't know</i>	3	2.8	2.8	2.8
<i>No Milk Cow</i>	31	29.0	29.0	31.8
<i>Have Milk Cow</i>	73	68.2	68.2	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

In connection with milk productivity, the participants of FGD say that three decades ago a single milk cow would feed a large family, while this day milk from a single cow would not suffice to feed even a baby. In other words, the milk-cow of indigenous stock may not give more than a liter per day unless it is provided with additional feed rich in nutrients. At the same time, there was no any preferential treatment for milk cows prior to the irrigation project except grazing on open fields together with other herds. But now due to availability of improved fodder crops/trees and species, and preferential treatment, milk cows are providing better results. Among the 73 households who have reported to have milk cows, the researchers learnt that the indigenous stock of Afar cow would give 3 liters a day if it is treated in a better way. There are also some families who reported that they do get around 5 liters per day from a single cow during the wet seasons. In general, the maximum and minimum range of milk production within the study area is between 1 and 5 liters.

Apart from this, SSD brought a number of dairy heifers from Borena and distributed to some households. This effort seems to be productive in yielding quick return in the coming few years, and found to be relevant in improving the nutritional status of the target communities. Furthermore, it has multiple effects in the long run, namely: milk for consumption and market, income from sales of offspring, and reproduction of assets. However, further effort should be made to increase the number of beneficiaries having preserved plot of pasture, and able to graze their animals through paddock system.

Table 19: Estimated milk yield from the best milk cow owned - currently lactating

		<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	<i>1.00</i>	4	3.7	5.5	5.5
	<i>2.00</i>	23	21.5	31.5	37.0
	<i>3.00</i>	31	29.0	42.5	79.5
	<i>4.00</i>	1	.9	1.4	80.8
	<i>5.00</i>	14	13.1	19.2	100.0
	<i>Total</i>	73	68.2	100.0	
<i>Missing</i>	<i>System</i>	34	31.8		
<i>Total</i>		107	100.0		

Source: LLS, 2009

Regarding the change in knowledge and attitude towards animal health from a total of 107 respondents, 56.1% reported that they know the presence of a clinic providing treatment for their animals. A significant proportion (40.2%) of the respondents takes their livestock for treatment at least once to the nearby veterinary clinic. They further stated that the project has contributed a lot in promoting the awareness of the community towards seeking health treatment for their animals. Currently, the traditional way of treating animals is almost rare, if not nonexistent because modern veterinary service is widely accepted among most of the pastoralists. As an

additional input, the existence of extension services at a local level largely contributed to rapid behavioral change of pastoralists towards seeking health treatment for their animals.

Table 20: knowledge regarding the presence of veterinary clinic

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	7	6.5	6.5	6.5
1	40	37.4	37.4	43.9
2	60	56.1	56.1	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

In terms of veterinary services, seeking vaccination services for animal diseases is significantly high among the respondents. The result became higher as a result of mobile vaccination services provided by extension workers, and the existence of Rural and Pastoral Development Office in the area. According to the current survey, over 81.3% of the respondents have taken their animals for vaccination. However, only 15% of the respondents reported that they have never taken their animals for vaccination.

Table 21: Practice of seeking treatment and vaccination for veterinary diseases

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Not remember</i>	4	3.7	3.7	18.7
<i>Occasionally</i>	51	47.7	47.7	66.4
<i>Always</i>	36	33.6	33.6	100.0
<i>Not at all</i>	16	15.0	15.0	15.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

3.6. Impacts of the project on Nutrition

Apart from this, the survey attempted to pay attention to nutrition related transformations in the study area. In addition to understanding the situation retrospectively (and to validate the qualitative information from the baseline report), questions related to the frequency of eating and volume of food were asked. As a result the respondents indicated that the average daily frequency for consumption is 1.8 with a median of 2 times a day. The range between the highest and the lowest frequency for consumption is 1 and 3. Regarding the variety of food stuffs consumed by the respondents, milk was the dominant item of consumption before the intervention of the project because they do not consume other food stuffs like cereals, vegetables, fruits and other root crops.

Table 22: Comparative Estimates of frequency of daily food consumption

		<i>Frequency before project</i>	<i>Frequency after project</i>
<i>N</i>	<i>Valid</i>	107	107
	<i>Missing</i>	0	0
<i>Mean</i>		1.8037	2.8411
<i>Median</i>		2.0000	3.0000
<i>Mode</i>		2.00	3.00
<i>Std. Deviation</i>		.70630	.41549
<i>Minimum</i>		1.00	1.00
<i>Maximum</i>		3.00	3.00

Source: LLS, 2009

The baseline survey conducted in Aura indicated that 70% of the people in the area eat two times a day under normal circumstances (morning and evening), while the rest 30% of people consume only one meal a day due to shortage of food. In addition, due to scarcity of food consumption in the family one bread was shared by three members of a family. Particularly, vegetables and fruits were not consumed or known at all prior to implementation of the irrigation project. Almost all respondents witnessed that they did not consume animal products like meat, milk and eggs frequently due to the occurrence of droughts in past few years.

Table 23: Pre-Post intervention results for daily consumption

<i>Frequency of daily consumption</i>	<i>Baseline Data</i>	<i>LLS</i>	
<i>Indicator</i>	<i>Qualitative</i>	<i>LLS (Retrospective result)</i>	<i>LLS (Current)</i>
<i>Eating once a day</i>	<i>Not Available</i>	36.4%	1.9%
<i>Eating twice a day</i>	<i>Not Available</i>	46.7%	12.1
<i>Eating 3 times a day</i>	<i>Not Available</i>	16.8%	86%
<i>% eating less than three meals per day</i>	100%	83.2%	14.0%
<i>Average number of food groups consumed</i>	2	<i>Multiple</i>	

Source: LLS, 2009

When the baseline result is compared with the information obtained through qualitative methods, there has been a significant change among the community in terms of variety and amount of food that has been consumed. The LLS result shows that food items that could be consumed by the beneficiaries have been diversified, and cereal grains became the major source of food since the intervention of SSD. Currently, milk is no more the only diet for the majority of inhabitants as it had been before. Newly introduced vegetables and fruits are also incorporated in the diet lists of many households.

Table 24: Comparison of diversity of edible varieties

	<i>Baseline</i>			<i>LLS</i>	
	<i>Yes</i>	<i>No</i>	<i>Remark</i>	<i>Yes</i>	<i>No</i>
<i>Cereals</i>	<i>Wheat</i>	<i>X</i>		<i>X</i>	
<i>Roots-potato, cassava</i>		<i>X</i>	<i>Not Known</i>	<i>X</i>	
<i>Legumes (Lentils, beans, peas)</i>		<i>X</i>	<i>Not known</i>	<i>X</i>	
<i>Milk/Milk products</i>	<i>X</i>		<i>Not often</i>	<i>X</i>	
<i>Eggs</i>		<i>X</i>		<i>X</i>	
<i>Meat</i>		<i>X</i>	<i>Don't slaughter animals</i>	<i>X</i>	
<i>Fish</i>		<i>X</i>			<i>X</i>
<i>Oil/butter</i>		<i>X</i>		<i>X</i>	
<i>Sugar/Honey</i>		<i>X</i>		<i>X</i>	
<i>Fruits</i>		<i>X</i>		<i>X</i>	
<i>Vegetables</i>		<i>X</i>		<i>X</i>	
<i>Total</i>	<i>2</i>				

Source: Baseline survey, 2004; LLS, 2009

The detail information with regard to before – after comparison derived from retrospective questions is summarized in the following table.

Table 25: Frequency of daily consumption (before-after intervention comparison)

<i>Frequency of Eating</i>	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Before the Project</i>				
1.00	39	36.4	36.4	36.4
2.00	50	46.7	46.7	83.2
3.00	18	16.8	16.8	100.0
Total	107	100.0	100.0	
<i>After the Project</i>				
1.00	2	1.9	1.9	1.9
2.00	13	12.1	12.1	14.0
3.00	92	86.0	86.0	100.0
Total	107	100.0	100.0	

Source: LLS, 2009

Regarding the amount of food that would be consumed at a time, 70% of the respondents indicated that it has increased after the coming of the project due to the production of various crops and vegetables in the area. Many respondents agreed that the variety of food items has increased significantly after the irrigation project.

Table 26: volume of food consumption at a point

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	2	1.9	1.9	1.9
<i>Increased</i>	75	70.1	70.1	72.0
<i>decreased</i>	12	11.2	11.2	83.2
<i>No change</i>	18	16.8	16.8	100.0
<i>Total</i>	107	100.0	100.0	

Apart from this, the participants of FGD and in-depth interviews underlined that the irrigation project has enabled them either have or buy nutritious food stuffs. Even more, most of them confidently state that their dietary habit and its nutritional mix have positively changed after the beginning of the irrigation project in their localities. The person producing crops through irrigation from Hida Kebele speaks of the improvement by saying, “Before the beginning of the irrigation project, my family usually feeds on the same type of food for most of the days in a week. This is because we did not have other means to subsist on. But after the irrigation project of SSD has started, my wife is preparing various types of food from cereals and vegetables produced in my own backyard. Now we have about 3quintals of maize, 2 quintals of sorghum and products of vegetables at any time in my house. All the changes happened for nothing, but due to the irrigation project of SSD”.

Another beneficiary from the same Kebele affirmed the positive change of the irrigation project by saying, “The life of many irrigators (beneficiaries) in my Kebele has improved. This is manifested through many things. For instance, most of the beneficiaries were known to sell their livestock and other assets to purchase food grains before the irrigation project scenario. But now they don’t purchase food grains from others, because they have enough food to eat, which has been produced within their own plot of land or obtained through food for work. Some of them can feed their families properly and even managed to buy oxen, sheep, goats, camels, cows, and

hence are able to provide their family members milk and butter. Moreover, they have more financial capacity to buy other necessary things to their family.”

Subsequently, the official from the Aura Woreda administration office stated, “We have tangible evidence that there is an improvement in obtaining nutritious food among beneficiaries, and the type of food our people are eating today. We have also an information that some irrigators (beneficiaries of the project) have bought oxen, cows, and now have access for milk products. On top of that, some irrigators have even managed to construct houses with corrugated iron sheets. Furthermore, it enabled them not to rent out their land for sharecropper or renter, helping them to work on their plots by themselves. As a result, labor productivity has increased and there is a positive change in the livelihood of the project beneficiaries”.

3.7. Impact of the Project on Social Services and Infrastructural Facilities

The informants were also asked whether the irrigation project has positively impacted the social services other aspects of their life or not. Most of the participants of FGD and In-depth interviews agree that it has a positive impact. In accordance with this, they stressed that most of the infrastructural facilities like road networks connecting the Kebeles with the Woreda towns, and the social services like schools, health posts, farmers’ training centres, agriculture research centres, and others that presently exist in their localities have started to be implemented after the coming of the irrigation project. Consequently, other services such as health centre and facilities of telecommunication and electricity have been under construction since the last one year. Moreover, the intervention of the project paves the way for the implementation of other social services in the area. For instance, a number of boreholes have been dug in the last two and three years, and enabled them to have access to safe water. As a result, the health situation of the beneficiaries has improved and the time spent to fetch water has declined significantly. In short, SSD has been the major cause for the emergence of all forms of social services and infrastructural facilities in the area.

On the other hand, the Principal of Hida Primary School underlined that SSD has made various assistance to their school in addition to enabling the community to produce food crops through

irrigation such as stationeries, playing balls, t-shirts, gown for teachers and school uniforms for school children respectively. The school was also upgraded from Primary to Complete Primary, and the number of school children has increased from 150 in 2006 to 307 in 2009, which is more than 100 percent increase in school enrollment. Since then, over 250 students are admitted in this academic year to pursue their education in the school. Besides this, one of the model beneficiaries underlined, “Of course the irrigation project has helped our children in their education. For instance, it makes them to follow the lesson with a bright mind and they get the food ready when they come back home.” The chairman of the same Kebele stated “Children are showing improvement in their education. They keep themselves clean and study harder.” He further argued that if children have enough food at home they can go to school regularly and do their home works. If there is no food at home, children usually go to the neighboring house in search of food. So the irrigation project is giving hope to our children. A student interviewed from Hida Primary School stated, “Yes the presence of SSD has made us access nutritious food and go to school regularly. If it is not there, we don’t have any other alternative except serving our parents as shepherd.”

3.8. Impact of the Project on Health of the Beneficiaries

A significant number of informants are largely positive that the irrigation project and its benefits have enabled them have better access to health services. A woman from the beneficiary household argued, “Previously we were not taken to health facilities in time because we have no income that could be used for medication, and there were no health facilities in a place close to us. As a consequence, our husbands used to take us after we got sick seriously or we had been on the verge of death. But now they take us to health institutions even by borrowing from someone. Currently, no one refuses to lend them because they will pay back when they sell their farm products.” In addition, the participants of FGD briefed that it was very difficult for parents to take sick children for treatment before the irrigation project scenario. It was common to stay for sometime on bed before seeing a physician. Getting loan to cover treatment costs was also very difficult. But now parents are relatively better off for such purposes. Even if they don’t have money at hand, they can borrow from their neighbours and pay it back by selling any of their products.

A Health Extension Worker from Hida Kebele postulated that since the children of the beneficiaries are getting relatively better food, the chance of falling ill due to malnutrition or food related diseases is getting narrow. Prior to the irrigation project, most of the current beneficiaries used to be frequently ill due to food related causes. But after the project, beneficiaries are getting better food because they are producing various crops like cereals, vegetables and fruits on their own land. According to health workers in the project area, as increasingly the community is settling, children are continuously able to access health services. Improvement in food security has reduced their chance of being ill, and has declined drastically. Before the project, infant morbidity was very high among children. But now this situation has been improved significantly.

Apart from this, data on causes of food insecurity was also collected through this survey. Some years ago for instance, the reasons for food shortage were attributed mainly to drought and erratic, insufficient and unevenly distributed nature of rainfall. The indirect indicator for evolving production system and diversification of crops indicated and confirmed by respondents of this study, food insecurity has been started to be related to crop failure. Multiple causal factors such as drought, erratic nature of rain and inadequate precipitation were attributed by 100% of the respondents as the primary factor, while pests are mentioned by over 73% of the respondents as the secondary reason. Nevertheless, the majority of the respondents confirmed that pests affect mostly fruits and vegetables.

Table 27: Reasons for food shortage in the area in any of the last 5 years

<i>Reason for food shortage in the project area</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>Drought/lack of prime season rainfall</i>	89	53.9%	100.0%
<i>Pest</i>	63	38.2%	70.8%

<i>Other reason</i>	9	5.5%	10.1%
<i>Total</i>	165	100.0%	185.4%

Source: LLS, 2009

According to the findings from field observation, and confirmed by the participants of FGD, rodents and birds have been the other challenges for a number of farm owners. Rodents mostly attack root crops and vegetables, while birds attack fruits and cereal crops. We also observed that households are assigning small children to watch for rodents and birds. The field observation indicated that most project beneficiaries have better understanding towards the effects of pests, rodents, birds and other mammals.



Picture 1: Young boys watching for rodents²

3.9. Food insecurity, Survival Strategies and implications for interventions

Data on survival strategies was also collected through this survey. As it is indicated in the studies conducted in Wollo of Ethiopia and elsewhere, people made decisions rationally and develop survival strategy when they encounter with food insecurity. Among the several survival strategies that were identified by respondents, livestock sell (84.7%) is the major one, and followed by engaging in food for work (86.7%), credit/borrowing 42% (both cash and kind), and austerity in consumption behaviour (reducing the quantity and frequency of daily consumption (30%). As the baseline results indicate, however, relying on less preferred items,

² The researchers asked the boy whether he is attending primary school or not. He informed that he often assists his families after school. Actually, he considers himself responsible for watching rodents as his major activity.

borrowing/credit, disposing assets and austerity (minimizing the quantity and frequency of eating) were the main survival strategies opt by most of the inhabitants of the project area.

Table 28: Survival strategies during food shortage and/or drought

<i>Survival strategy</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>Cumulative frequency</i>
<i>Reduced frequency</i>	29	10.5%	29.6%
<i>Reduce volume</i>	6	2.2%	6.1%
<i>Engage in any form of Labor work</i>	6	2.2%	6.1%
<i>Credit</i>	41	14.9%	41.8%
<i>Begging</i>	14	5.1%	14.3%
<i>Livestock sells</i>	83	30.2%	84.7%
<i>Asset disposal</i>	11	4.0%	11.2%
<i>Engage FFW</i>	85	30.9%	86.7%
<i>Total</i>	275	100.0%	280.6%

Source: LLS, 2009

3.10. Learning and Adaptation

According to the project staff and its partners, the most challenging component of the project was getting the buy-in of the project activities. Initially, farming was a new activity among the pastoral communities of the intervention area. Furthermore, farming is a relegated economic activity among the pastoral communities. Accordingly, the major challenge of SSD during the initial period of the project was lack of role models who could be exemplary by demonstrating the irrigation activities for others. As it is indicated in the methods section of this study, almost all informants of this study are the project beneficiaries. According to the 2007 preliminary report of CSA a total population of zone 4 is estimated at 255,542 among which 35,755 and 47,195 live in Awra and Uwa woredas respectively. The project is able to attract over 2290 direct beneficiaries, and additional thousands of indirect beneficiaries.

As this lesson learning study indicates, the majority of project beneficiaries (75.9%) are using agricultural extension services which will facilitate learning and adaption of new ways of doing business. A significant proportion of the respondents indicated that some of the beneficiaries are not adequately using extension services. This is in line with the challenges posed by some respondents that there is a gap in having comprehensive knowledge in using the packages of the extension services adequately and effectively. From the researchers' point of view, 'lack of knowledge' shouldn't have come at such magnitude if all beneficiaries were equally benefiting from the extension services.

Table 29: Extension use

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i>	4	4.6	4.6	4.6
<i>Not using extension</i>	21	19.4	19.4	24.1
<i>Using extension</i>	82	75.9	75.9	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

As it is indicated both in baseline survey and LLS, farming was introduced in the area before the intervention of SSD even though it could not be widely adapted by the majority of inhabitants due to several factors. Among the total respondents, 100% of them reported their reliance on irrigation water from river diversion, while 15.9% of the respondents use rain water as alternative means for farming. This is undeniable fact that the whole farm can be watered at a time by rainfall. But some indicated that they sometimes harvest rainwater for crop planting and farming purposes.

Table 30: Major Source of Water for farming

<i>Source of water for farming</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>Rain fall</i>	17	13.7%	15.9%
<i>River diversion</i>	107	86.3%	100.0%
<i>Total</i>	124	100.0%	115.9%

Source: LLS, 2009

3.11. Impact of Irrigation on productivity of Crops

It is unanimously reported that the project enabled the beneficiaries to produce cereals like maize and sorghum twice a year. It was learnt that maize and sorghum are planted at different seasons. Maize is planted during the main crop season, while sorghum is planted during the minor crop season. In addition to cereals such as maize and sorghum, the project has introduced fruits and vegetables such as guava, mango and papaya as well as onion, cabbage, carrot, garlic, tomato, pepper and red beet etc., Moreover, *Moringa* tree is introduced to the project area, yet its consumption is reported to be very low.

Table 31: Estimates of number of Annual Production

<i>N</i>	<i>Valid</i>	1.07
	<i>Missing</i>	0
<i>Mean</i>		2.00
<i>Median</i>		2.00
<i>Range</i>		0
<i>Minimum</i>		1
<i>Maximum</i>		3

Source: LLS, 2009



Among the total respondents, the majority 84 (78.5%) of the respondents are presently growing vegetables in some plots of their farm, while 86 (80.4%) are growing fruits. The project was also able to introduce drought resisting crops like cassava and sweet potato, and distributed thousands of their cuttings to beneficiaries by multiplying

them in its demonstration sites. We also observed that fruits are used as wind breaks, shades for crops (mainly for vegetables) and fences for farm fields.



Table 32: Proportion of households reported currently producing vegetables or fruits

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid Vegetables</i>				
<i>No</i>	23	21.5	21.5	21.5
<i>Yes</i>	84	78.5	78.5	100.0
<i>Total</i>	107	100.0	100.0	
<i>Valid Fruits</i>				
<i>No</i>	6	5.6	5.6	19.6
<i>Yes</i>	86	80.4	80.4	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

When the information is cross tabulated, it is clear that the innovative approach is the best working modality concerning fruits and vegetables. Among the total respondents, 69 have both fruits and vegetables, while 17 are growing fruits only. Only 6 respondents reported that they have neither fruits nor vegetables. We also found that there has been very high demand for seedlings of improved varieties of fruits like mango, orange and avocado because they have better market access in the neighboring towns. Accordingly, it is advisable that SSD should move aggressively to multiply the seedlings of improved varieties of fruits and cuttings of drought resistant crops in its demonstration sites, or by purchasing them from research centers like Malkassa on credit or cost sharing basis.

Table 332: Cross tabulation of household producing (or not) both fruits and vegetable

		<i>Fruits</i>			<i>Total</i>
		<i>No</i>	<i>Yes</i>	<i>No response</i>	
<i>Vegetables</i>	<i>No</i>	6	17	0	23
	<i>yes</i>	0	69	15	84
<i>Total</i>		6	86	15	107

Source: LLS, 2009

All informants were also asked about the problems associated with growing fruits and vegetables, despite their current ownership or not. The major challenge for vegetable production remains lack of comprehensive knowledge on how to produce and consume as it is alleged by 77% of the respondents. On the contrary, however, most of the participants of FGD and in-depth interviews stressed that they have been provided with practical trainings of various types on food preparations several times, and they were able to internalize the skills of preparing various food stuffs.

Subsequently, scarcity of seeds/seedlings has been mentioned as a major challenge in relation to the production of fruits and vegetables as it was mentioned by nearly 70% of the respondents. Pests, rodents, and other wild animals were considered as a challenge by 26% of the respondents, while market and land related problems are mentioned by 17.8% and 9.3% of the respondents respectively.



Picture 3: Onion farm under the shade of Papaya tree

Table 34: Challenges reported to affect production of vegetables

<i>Challenges</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>Lack of comprehensive knowledge (production and consumption)</i>	82	28.4%	76.6%
<i>Lack of seeds/seedlings</i>	76	26.3%	71.0%
<i>Scarcity/lack of water</i>	74	25.6%	69.2%
<i>Market</i>	19	6.6%	17.8%
<i>Land not suitable</i>	10	3.5%	9.3%
<i>Pests, rodents, and other wild animals</i>	28	9.7%	26.2%
<i>Total</i>	289	100.0%	270.1%

Source: LLS, 2009

Regarding the challenges related to fruit production, lack of knowledge and access to adequate and reliable water source are reported by over 73% of the respondents. While problems related to

seeds, pests, land, rodents and wild animals are reported to be the major challenges by the significant number of respondents.

Table 35: challenges reported to affect production of fruits

<i>Challenges</i>	<i>Responses</i>		<i>Percent of Cases</i>
	<i>N</i>	<i>Percent</i>	<i>N</i>
<i>Lack of comprehensive knowledge (production and consumption)</i>	79	24.5%	79
<i>Lack of seeds/seedlings</i>	62	19.3%	62
<i>Scarcity/lack of water</i>	78	24.2%	78
<i>Market</i>	23	7.1%	23
<i>Land not suitable</i>	23	7.1%	23
<i>Pests, rodents, and other wild animals</i>	57	17.7%	57
<i>Total</i>	322	100.0%	322

Source: LLS, 2009

Regarding the role of the project in providing training, the overwhelming majority 91 (89.7%) of the respondents have received at least one training during the project period. Only 11 (10.3%) of the respondents reported that they did not involve in any type of training during the whole years of project cycle.

Table 36: Proportion of respondents benefiting from training

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid No</i>	11	10.3	10.3	10.3
<i>Yes</i>	96	89.7	89.7	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

According to the survey result, the minimum duration of the trainings received ranged from one day to one month. Kebele and community leaders have received trainings repetitively on different issues at different times. Individuals who have reported to involve in longer trainings have been those who attended multiple trainings. The mean and median duration of training was found to be 1.4 and 1 months respectively with a standard deviation of 0.74 from the mean. From the statistical point of validity, median is the best indicator for the observed type of population distributions, and one month training can be a good estimate across the population. Most repeated frequency (mode) is also 1 month. The minimum and maximum duration of the training is 3 days and 1 month respectively.

Table 37: Duration of trainings attended

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Valid</i> <i>Below 3 day</i>	68	63.6	69.4	69.4
<i>3 days</i>	15	14.0	15.3	84.7
<i>1- 3 months</i>	15	14.0	15.3	100.0
<i>Total</i>	98	91.6	100.0	
<i>Missing</i> <i>System</i>	9	8.4		
<i>Total</i>	107	100.0		

Source: LLS, 2009

The project was able to deliver several kinds of training for the community. The majority of the respondents 78 (73.6%) have received training on soil and water conservation. When this cluster of training is unpacked for many respondents, training on soil and water conservation includes trainings on agronomy and all other trainings related to farming. Many respondents 47.2% have reported to be trained on income generating activities, small business and market related issues. Moreover, still significant proportions have received training on animal fattening. This is also unpacked to fattening and other fodder development trainings.

Table 38: Types of trainings attended

<i>Types of Trainings Attended</i>		<i>Responses</i>		<i>Percent of Cases</i>
		<i>N</i>	<i>Percent</i>	<i>N</i>
<i>type(a)</i>	<i>Livestock fattening</i>	36	22.0%	34.0%
	<i>Soil and water conservation</i>	78	47.6%	73.6%
	<i>Small business</i>	50	30.5%	47.2%
<i>Total</i>		164	100.0%	154.7%

Source: LLS, 2009

Finally the respondents were asked about changes in income, and the impact of the project over their earnings. An overwhelming majority of the respondents mentioned that their income has been increased significantly after the project, but they argue that expenditures are also increasing as a result of increase in the prices of inputs, livestock and food items. Among the total respondents, 15% also indicated that their income has declined. This can be attributed to loss of livestock and/or declining of herd size at the household level.

Table 39: Respondents view about post project income

	<i>Frequency</i>	<i>Percent</i>	<i>Valid Percent</i>	<i>Cumulative Percent</i>
<i>Indifferent</i>	3	2.8	2.8	2.8
<i>Increased</i>	87	81.3	81.3	84.1
<i>Decreased</i>	16	15.0	15.0	99.1
<i>No change</i>	1	.9	.9	100.0
<i>Total</i>	107	100.0	100.0	

Source: LLS, 2009

3.12. Socio-Political Dynamics and Conflicts in the Study Areas

Ethiopia got the background for government structure and the current size comprising an area of 1,133,380 square kilometres (437,600 square mile) and various ethnic groups after King Menelik came into power in the 1970s. However, the political system of Ethiopia was changed from an absolute monarchy of Menelik (1889- 1913) and Haile Sellassie (1923-1974) regimes to socialism of the Derg regime (1974-1991). During these successive regimes, Ethiopia had been divided into the administrative structures of various forms and sizes, and administratively divided into various Provinces “*T’eklay-Gizates*”, (Sub-provinces), “*Awrajas*” and Districts “*Woredas*” on the basis of geographical features cross-cutting the ethnic lines (Paulos, 1998:22-24). Accordingly, the Afar people currently living in the study area and the neighbouring Amhara were administered within the same province of Wollo. According to the information obtained from informants through FGDs and in-depth interviews, there had been relative peace between the Afar and the neighbouring Amhara during these successive regimes. There has been strong bond of intermarriage between the Afar and the Amhara. The two ethnic groups have lived together for many years and they have several things in common that bind them. One of the factors that bind them is inter-marriage and the market. The Afar inhabitants in Uwa and Aura Woredas rely for their markets on other Woredas in Afar region, and on markets in Amhara region since both Aura and Uwa Woredas have no significant markets within their territories.

Therefore, the Afar access markets found in the Amhara Region and in its other Woredas like Chifra, Kalawan, and others. Chifra Town has a weekly market that is largely attended by the Afar. Some years ago, the Amhara purchase cattle, sheep, goats etc., from the Afar while the latter purchase cereals from the former. In addition to their interaction on markets, members of both ethnic groups have established individual friendship over the years. These friendships have different names in the different ethnic groups. ‘Wodaje’ and ‘Wodajetu’ are the names used for individual friendship among the Amhara and the Afar respectively. The friendship is based on mutual assistance. In many cases the Afar keep or tend cattle belonging to the Amhara for some days, while the Afar use the milk from the cattle during the period the animals are under their

custody. The Amhara in turn provide the Afar with cereals when they take back the cattle. Individual friends are also invited to each other's festivals.

However, this situation has been suddenly reversed, and they entered into conflict particularly after the Afar and the neighbouring Amhara who were previously administered within the same unit of administration for more than a century are spilt into two independent regions along ethnic lines in 1991. Since then, the Afar and Amhara have entered into several violent conflicts because of various factors. The bone of contention that took place between the Afar and the Amhara revolved around the issue of control over, and access to resources. Getachew (2001c) claims that resource-driven conflicts between the Afar and the Amhara included competing tenure claims over land, pasture, and water resources. On the political frontier, the decentralized framework of the current federal arrangement has established regional governments. The established Regions have autonomous rights to elect a state legislature, set up state administration, and make their own development plans.

According to the new course, intervention by other regions and the Federal Government in a region's internal affairs is very minimal. Some of the regional boundaries along the different ethnic groups are not clearly delineated. A case in point is the boundary among the Afar, Tigray and Amahara. Such unclear delineation is a fertile ground for conflict to occur among people. In addition, decentralization made a group that may use the resources found in another region to be accountable to the regional government where the resource is found. For instance, the Amahara using resources in the Afar region will be accountable to the Afar Regional Government. Similarly the Afar using resources found in the Amhara Region will be accountable to the Amhara Regional Governments.

This condition will complicate the mode and manner of resource use and accountability, and acts as a breeding ground for conflict in the long run. As a result, there had been number of ethnic based conflicts in the project area that mobilized members of both ethnic groups during the last two decades. Since the beginning of the irrigation project and their settlement, however, the mobility of project beneficiaries to border areas in search of pasture seems to decline. As a result,

conflicts between the Afar and the Amhara seem to subside especially since the last two years even though there have been some conflicts emerged intermittently.

Chapter Four

4. Lessons Learned, Challenges and Recommendation

4.1. Lessons Learned

Holistic approach to pastoralist needs: the project has an innovative framework of ensuring food security by filling short term food gaps with food for work and engaging communities for long term social and economic transition. The broad set of activities like relief, food for work, interventions of irrigation and provision of practical skill trainings in demonstration sites are gearing the community to adapt the newly introduced farming activities and long term food security.

Social transformation: The project has played a great role in transforming the target community from pastoral way of life to sedentary agriculture on voluntary basis. Currently, there is high interest among the target community to involve in farming activities using the irrigation scheme, and there is a change from communal land tenure system to private land owning system among the target community. In other words, there is a high demand to own a cultivable land privately among the target community especially since the last few years. As a result, some beneficiaries of the project are able to own relatively larger area of farming land than what has been allocated to each household by Woreda Joint Committee in 2005 and 2007, by grabbing from the near-by communal land in the last few years. In addition, young individuals who got married and performed their own households in the last few years are consistently requesting their respective K'ebeles to allocate them a plot of land from communal holdings. Nevertheless, as far as the land allocation to each household is carried out by mutual agreement of all inhabitants of the area, and the request of young households for a plot of land has been considered, there would not be any worry for the emergence of conflicts over arable land.

Collaboration with government and other partners: the project has developed strong partnership with key stakeholders including the regional government. As a result of this strong partnership, the project was able to secure continuous funding, expansion of project activities (both geographically and programmatically) and able to get high reputation from the community. It is rare to secure funding from governments to fill funding gaps which this project has achieved to be funded by the regional government.

Community partnership: during the project evaluation it is observed that high level of community ownership and involvement is ensured by this project. As it is further confirmed by most of the community members, the project is part of their life. The project is also found to be highly regarded in every respect by every member of the community including all stakeholders within the target Woredas and throughout the Afar region.

Narrowing the food gap and contributing to food security: the joint operation of food for work and the integrated activities of the irrigation project focusing on development objectives can have a significant impact on the food security of the targeted community.

Integration of activities: the irrigation project tried to integrate crop production with livestock production including forage development and animal health. Livestock development is not possible without addressing all these elements concurrently. The local market demonstrates good possibilities and high demand for crop and animal products.

Innovation, learning and adaptation: the project is correctly progressing with introduction of new components, learning and adoption models. The demonstration sites and community capacity building components including trainings have brought many pastoralists to voluntarily engage in farming venture. In fact, needless to say that agriculture is a risky business in arid and semi-arid areas where there is no sustainable irrigation scheme. However, having direct link with research institutions such as Sirink'a and others enabled the project to introduce improved high yield varieties of cereals, vegetables, fruits, species of grasses and fodder plants to the target community and to increase productivity at per hectare. This in turn has contributed to have high productivity at each household level, and lifted up the credibility of SSD intervention.

Access to market: crop marketing is one of the many factors influencing small-scale irrigation farming. It is a major indicator and determinant of the level of development. Projects have been known to collapse due to frustration in marketing with farmers giving up farming due to market losses (Blank et al.2000:101). According to Manguzu and Zang (1996), smallholder schemes are haunted by marketing problems. On the other hand, Scoones (2001) stated that easy access to market could provide a major drive to farmers to intensify agricultural production and investment. During the first production year, SSD provided its vehicles to beneficiaries to transport and sell their farm products at Chifra and other markets within the zone. Since then, Isuzu vehicles and businessmen started to come up to the project area to provide the transportation service, and to buy farm products from the project beneficiaries. Except very few informants who sale their crops to fellow villagers, most of them sell their agricultural crops to businessmen who buy locally and resale elsewhere. As a result, there is no market problem for their production at the existing time. Furthermore, the asphalt road currently under construction and crossing through the neighbouring Woredas and connecting the highway to Djibouti is expected to open further access to market outlets.

Provision of social services: the development of water points, health facilities and other social services in project areas have been a key factor in liberating women from travelling long distance to fetch water and to have better access to medication and treatment.

Emerging land tenure system: By using both modern and traditional institutions (led by the Balabat, clan leaders, elders of the community, Woreda and K'ebele officials), the project was able to implement its key activities effectively, and to handle the problems that might be emerged as a result of grabbing land from communal holdings.

Emerging institutions: The high demand for farming land together with irrigation activities would affect the natural environment and resulted in deforestation of forest lands and massive erosion. In this connection, the fragile nature of soil and overflowing of both Aura and Uwa rivers during the rainy season would have a great chance of breaking the irrigation canals and creates huge sedimentation in the area. To mitigate such problems in a sustainable way, SSD

established Water Users Associations having their own by-laws and savings account at each Woreda, enabled the beneficiaries to raise money after per harvest season in addition to allocating some money, which will be used for the maintenance of the irrigation canals in the long run.

Conflict management: the project ensured the presence of conflict resolution mechanisms in place in all phases of the project intervention.

Balanced investment: the project has worked for balanced investment on infrastructure development and social, economic and cultural aspects.

4.2. Challenging Issues:

Change of climate: ever changing weather condition could be a cause for the emergence of drought in the area and would adversely affect the progress of the project activities.

Remoteness and harsh environment: although is part of the project design, the remoteness and harshness of the environment has multiple implications over the project implementation. Staff turnover in partners' office, extreme temperature during peak seasons, lesser incentive to attract skilled staff, can be cited as some of the challenges caused by the remoteness and harshness of the environment.

Weak Labour Supply and availability: availability of skilled labour in the project area is precarious, which demands the project to mobilize from other parts of the country.

4.3. Recommendations

- Strengthen local institutions and build the capacity of the beneficiaries of the irrigation project and the overall community of the target area through the proper provision of training on-farm water management and agronomic practices so that they can efficiently use the resources and achieve the production potential that the irrigation scheme could provide. In addition, further enhancing the capacity of the community in terms of knowledge, attitude and practice is needed towards sedentarization, irrigation farming, and coping strategies in order to ensure the sustainability of the project activities. In fact,

enhancing the role and capacity of local institutions which is viable strategy has been effectively implemented by the project at the existing time. It is also inline with the national government policy since capacity building is seen as a critical component of the country's poverty reduction strategy. Therefore, government institutions and NGOs should engage pro-actively in local institutions and respect their roles in decision-making over resource use and other areas affecting their daily lives.

- Ensuring the overall food security and economic impact of the irrigation scheme, appropriate and cost effective irrigation technology (infrastructure) should be adopted for optimising the use of available land and water resources.
- Any future food security project that would be implemented in the area should put high priority on expanding the irrigation scheme which is highly profitable and provides household income on a sustainable basis and encourages long-term food security. Projects or programs should also make sure that women share from the benefits of these investments by encouraging the redistribution of land (whose value is vastly increased by irrigation) to women. This would empower women to actively play a vital role and make decisions at household and societal levels, and to reduce their vulnerability.
- One of the goals of future food security projects should be to help families increase the amount of their financial savings as a buffer against food security risks which may arise. Therefore, linkages between the target population and existing financial institutions need to be developed to meet people's savings and credit needs.
- Increasing the utilization of newly introduced food varieties such as moringa, cassava, sweet potatoes, and vegetables like carrot, cabbage, red root, swiss chard and others should be strengthened. The introduction of such new variety crops and vegetables to the area was found to be so crucial in improving the nutrition of the target community; however, the approach should be further backed by trainings of food preparation to make them easily adapted by the community. Moreover, such crops should be a part of the strategy of

ensuring food security in an area like Aura and Uwa where the inhabitants' in the past had no cash income from agriculture.

- Broad multiplication of improved varieties of fruit seedlings in the nurseries of the project is necessary which is in high demand among the community. However, the multiplication of fruit seedlings in the project nurseries needs to be gradually transferred to private nurseries of model farmers. Incentives need to help the nurseries of model farmers to develop and to provide the fruit seedlings which the community demands.
- Expansion of demonstration sites and components should be strengthened – and linked to the extension program. It is wise to consider using model framers and their farms for multiplication of grasses and fodder plant. In this connection, some of the farmers having a plot of land will be able to expand the multiplication process provided with technical assistance. This reduces the transport and labour cost to move the seedlings, and creates alternative income for households and motivates farmers to plant trees on their own plot of land.
- Expansion of the benefit of the project to other communities is necessary by making further investment on irrigation infrastructure. Hence, strengthen the capacity of relevant government institutions in order to secure available funds from international donors and be able to effectively construct additional irrigation schemes in the area, and efficiently utilise to build the resilience of the community.
- Enhancing the existing forage development. The project intervention to introduce various types of grasses and fodder plants by providing their seeds and cuttings to individual farmers of the community was found to be a successful initiative and should be further expanded.
- Efforts are needed to expand access to market outlets for agriculture productions even though there is no significant problem in this regard at the existing time. On top of that, marketing and post-harvest processing of some crops should be included as key elements in future food security projects or other programs.

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- Periodic maintenance of the irrigation canals, effective works of environmental rehabilitation, water shade management and construction of soil and water conservation structures seem to be relevant throughout catchments and banks of both rivers including areas of up streams and down streams of Aura and Uwa rivers.
 - The study recommends that there should be a way to provide a plot of land for young adults who got married recently and those who are not yet benefited from the irrigation scheme. Young adults should not wait to inherit their parents' irrigation plots. Instead, responsible authorities should expand the irrigation schemes the demand for irrigation plots has already increased in the study area.
 - Strengthening Woreda's Joint Committees and local peace building structures whose mandate should include managing land issues and identifying underlying causes of conflict and violence and possible solutions. The success of the community based peace initiatives stems from the committees' ownership of the entire conflict management process.
 - Intra-ethnic and inter-ethnic dialogue and/or mediation should be promoted before eruption of violence. Regular meetings should be held whose aim would be to identify potential areas of conflict and to pre-empt conflicts that might be emerged between different groups, clans and communities. Community elders and traditional leaders like the Balabat should be facilitated to understand, analyse conflicts and come up with joint action plans for necessary intervention to curb the conflicts.
 - Conduct community sensitization and awareness campaigns on conflict and peace building. All awareness creation tools and medium should be used as widely as possible so as to shade more light on the severity of conflicts, emergent conflict dynamics, destruction wrecked on society by conflicts and the need to uphold and embrace peace within the society.

- The project initiatives will be more successful if the current linkage with research and development institutions like Sirinka and others is further strengthened, and the community members should be able to use the improved varieties of crops continuously.
- Conduct further research in order to find out specific problems of the intervention area by designing a more targeted strategy which would tackle these problems step by step.

Case Stories

Case: 1. (Successful in using the Irrigation Schemes and Escaped from Poverty)

Name: Umer Ali

Marital status: Married

Family Size: Eight (two wives and 5 children)

Age: 32

Religion: Muslim

K'ebele: Hidda

I married my first wife when I was very young through arranged marriage by my parents. I soon formed my independent home and received one lactating cow, one heifer and three goats from my parents as a gift. My stock started to grow and the number of my cattle reached up to fifteen in 2001 without including the number of goats I owned during that time. However, due to the drought of 2002 and 2003 I lost most of my livestock and left with only two cattle and three goats. I also finished up my all other assets except my children. After the Aura integrated irrigation project had been started, one hectare irrigable land was allocated to three people. Since then, I started to cultivate my plot of land, and the number of my stock has started to increase very rapidly due to various reasons. The first reason is that I started to plant various crops through irrigation and became aware of collecting and preserving crop residue, and feeding it to my animals during the dry season as a result of continuous training provided to us in the demonstration site by SSD. In addition to this, I started to feed my animals by planting various types of grasses and fodder plants in my own plot of land using the irrigation scheme.

Presently, I own one hectare of land by grabbing from a communal land and adding on my previously allocated land. I have five cows, two oxen, twelve goats and one donkey. The amount of milk I get from my cows has also increased due to the improvement of their feed. Above all, my annual crop yield has increased by three fold due to effective training provided to us on agronomy and animal husbandry by SSD. I was also sent to a place named Debretabor in Amhara Region, and trained on soil and water conservation for 15 days. In 2009 I produced 110 quintals of maize through irrigation. From this amount of production, I sold 55 quintals of maize with a price of 500 Birr each for traders. By the income I obtained from the sell of maize, I constructed a corrugated iron house within Hidda village. In general, my household income and daily nutrition have improved since I started to involve in farming and growing crops.

Case: 2. (Recently Escaped from Poverty)

Name: Yasin Awol

Marital status: Married

Family Size: Three

Age: 27

Religion: Muslim

K'ebele: Lekura

I was born in the neighbouring Kebele and moved to the current Lekura Kebele in 1986 together with my parents. As compared to the previous situation, the existing condition is totally different in many respects. The occurrence of frequent drought, erratic rainfall and lack of adequate pasture gradually eroded our previous confidence of depending on only pastoral way of life. After the intervention of SSD in 2005, 0.3 hectare of land was given to me by Aura Woreda Administration. Since then, I started to involve in various activities of food for work, and gradually adopted cultivating the land by hoe and oxen. I also started planting cereal crops, vegetables and fruits using irrigation.

In 2008, I produced 50 quintals of onion, and sold it at Kalawan and Chifra towns. In the same year, I was able to produce 21 quintals of maize, 44 quintals of sorghum and 30 quintals of pepper. In 2009, I produced 75 quintals of maize and 7 quintals of vegetables (cabbage and tomato). By the income I obtained from the sell of cereal crops and vegetables, I bought two cows and two oxen with a price of 2300 and 2000 respectively. I also able to save 4000 Ethiopian Birr and to pay school fees of my children. Currently, I am cultivating my land by my own oxen, and able to provide various types of food stuffs to my family. Accordingly, the nutritional status of my family has improved significantly, and I constructed a new house which is bigger and better than my previous house in terms of quality. I became successful due to my personal commitment, hardworking and effective trainings provided to me by SSD.

Case: 3. (Model farmer within his Kebele and farming with a camel)

Name: Abbu Humad

Marital status: Married

Family Size: Seventeen

Age: 60

Religion: Muslim

Kebele: Badule

A few years ago, I was totally a pastoralist who depends on only livestock for my livelihood. Accordingly, I never touched the soil throughout my life. Nevertheless, I started cultivating the land few years before the intervention of SSD, and planted the local variety of maize in a small plot of land near the Uwa River. From this plot of land, I produced certain amount of maize for some years by using the traditional irrigation (river diversion) mechanism. After the irrigation project of SSD has been started, SSD established a demonstration site which could be a training place for most of us living in the area. Besides that, SSD introduced various vegetables and fruits such as onion, pepper, cabbage, red beet, papaya, banana, mango and avocado to our area, and distributed their seeds and seedlings to us by multiplying them within its demonstration sites.

Furthermore, SSD trained us how to cook and eat these vegetables, and how these food stuffs are essential to our health and wellbeing. Since the last three years, however, I started to use the modern system of irrigation with the technical advice given from the SSD project, and earn my income from agriculture. Currently, I have 40 trees of banana and 31 trees of papaya, which are bearing fruits. I also obtained 100 cuttings of improved cassava from SSD and planted them in my irrigable land. In 2009, I produced maize and various vegetables enough to the consumption of my family. I also involved in the activities of food for work such as road construction, soil terracing, and planting tree seedlings. By the money I obtained from the sale of crops and food for work, I bought clothes for my self and my children. He further explained that he is earning 50 Birr per week on average from the sale of vegetables and fruits planted in his irrigable land.

References

- Afrint. (2003). Ethiopian Agriculture: Macro and Micro perspective. Addis Ababa. Unpublished Report.
- Alemayehu Lirensu, (2001). Food Security and Rural Vulnerability in Ethiopia. A Development Perspective International Conference of Contemporary Development Issues in Ethiopia, August 16-18 2001.
- Ayalew Gebre, 1997 “ Conflict Over Land Use: Pastoralism, Commercial and State Agriculture, the case of Afar”in Fukui, K. *et al.* (eds.), Ethiopia in Broader Perspective”, *Papers of the 13th International Conference of Ethiopian Studies*, Kyoto.
- Ayalew Gebre, (2001a), Pastoralism Under Pressure: Land Alienation and Pastoral Transformation Among the Karrayu of Eastern Ethiopia, 1941 to the Present, Shaker Publishing BV, Maastricht.
- Birhanu G/Medihin and Peden, D. 2003. Policies and Institutions to Enhance the Impact of Irrigation Development in Mixed crop-Livestock System. In: McCornic P.G; kamara, A. B and Girma Tadesse (eds.) Integrated Water and Land Management Research and Capacity Building Priorities for Ethiopia. Proceedings of a MoWR/EEARO/IWMI/ILRI International Workshop Held at ILRI, Addis Ababa 2-4 December 2002, Ethiopia.
- Brass, P. (1985), *Ethnic Groups and the State*, Croom Helm, London
- Cantor, LM. (1967). A World Geography of Irrigation. Robert Cunningham and Sons Ltd., Alva, Great Britain.
- Degefa Tolossa, (2002). Household seasonal food insecurity in Oromia zone, Ethiopia: Causes. Social Science Research Report No. 26. Addis Ababa: OSSREA.
- Delgado, C. Roregrant, M; Stienfild, H.; ethui, S; Courbois, A. 1999, Livestock to 2020. The next food evolution. Food and Agriculture and Environment Discussion Paper 28. IFPRI, FAO and ILRI, Washington, DC, USA.
- Devereux, S. (2000). Food Insecurity in Ethiopia: A Discussion Paper for Department for International Development (DFID). Institute of Development Studies, Sussex.

- Edralin, J. (2000), "Regional Development and Human Insecurity", A Paper presented at the 6th African Training Program, UNCRD.
- Esman, M.J. (1990), "Political and Psychological Factors in Ethnic Conflict", in Montville, J. V. (ed.), *Conflict and Peacemaking in Multiethnic Societies*, Lexington Books, Lexington.
- FAO (2002): Food and Agriculture Organizations, Rome.
- FAO (1997): Implications of Economic Policy for Food Security. Prepared for the Agricultural Policy Support Service, Policies Support Division, FAO and GTZ, Rome..
- Federal Democratic Republic of Ethiopia (FDRE) (1995), the Constitution of the Federal Democratic Republic of Ethiopia, Addis Ababa.
- Federal Democratic Republic of Ethiopia (FDRE); 1996. Food Security strategy. Addis Ababa
- Flintan, F. and Imeru Tamrat (2002), "Spilling Blood Over Water? Ecological Conflicts in Ethiopia" (unpublished).
- Food and Agriculture Organization (FAO) 1986. Ethiopian Highlands Reclamation and Study. Final Report, Rome:FAO.
- Galtung, J. (1996), *Peace by Peaceful Means: Peace and Conflict, Development and Civilization*, Sage Publications, London.
- Getachew Kassa (2001a), "Resource Conflicts Among the Afar of North-East Ethiopia", in Sali, M.A. Mohammed, Ton Dietz, Abdel Ghaffar A.M. (eds.), *African Pastoralism: Conflict, Institutions and Government*, Pluto Press, London.
- Getachew Kassa (2001b), "An Overview of the Root Causes of Competition and Conflict Between the Afar and Issa pastoralists of North-Eastern Ethiopia: The Case of Zone 3 and Shinille Zone", (unpublished).
- Getachew Kassa (2001c), "A Note on the Inter-Ethnic Resource competition and Conflicts and their Management in North-East Ethiopia from Historical Perspective" (unpublished).
- Ghacha, A. (2003). Performance Assessment of the Beni Amir Irrigation System, Morocco. Wageningen University Irrigation and Water-Engineering Group. Wageningen.

Hardin, R. (1995), *One for All: The Logic of Group Conflict*, Princeton University Press, Princeton.

International Livestock Centre for Africa (ILCA) in collaboration with the Water Resources Development Authority (WRDA), 1990, Report of the Low –level Aerial sample Survey.

IWMI (International water Management Institute). (2004). Water Harvesting and small-Scale Irrigation in Ethiopia. Consultative workshop: 19th October, 2004. Addis Ababa Ethiopia.

Jeong, Ho-Won (2000), *Peace and Conflict Studies: An Introduction*, Ashgate Publishing Co., Aldershot.

Macrae, J. and A. Zwi (1994), *War and Hunger: Rethinking International Responses to Complex Emergencies*, Zed Books, London.

Manzungu, E. and Zaag, Pieter.Vander. (1996). The Practice of Smallholder Irrigation. Case Studies from Zimbabwe. University of Zimbabwe Publication, Harare.

Mariam, J.L. and Keller, J. (1978). Farm Irrigation System Evaluation: A Guide for Management. Agriculture and Irrigation Engineering Department, Utah State University Logan, USA.

Markakis, J. (1974), *Ethiopia: Anatomy of A Traditional Polity*, Oxford University Press, Oxford.

Markakis, J. (1987), *National and Class Conflict in the Horn of Africa*, Cambridge University Press, Cambridge.

Markakis, J. (1993), “Ethnicity and Conflict with Reference to Ethiopia and Sudan”, in *Proceedings of the International Conference on the Role of Social Science in Conflict Resolutions*, Helsinki.

Markakis, J. (1998), *Resource Conflict in the Horn of Africa*, Sage Publications, London and New Delhi.

Mateos, Mekiso (2003). Water and the Environment in Ethiopia. In MacCornick. P. G.; Kamara, A.B. and Girma, Tadesse (eds). In: McCornic P.G; kamara, A. B and Girma Tadesse (eds.) *Integrated Water and Land Management Research and Capacity Building*

- Priorities for Ethiopia. Proceedings of a MoWR/EEARO/IWMI/ILRI International Workshop Held at ILRI, Addis Ababa 2-4 December 2002, Ethiopia.
- Maxwell, S., M. Smith. 1992. Household food Security: A Conceptual Review-part I. in household food security: Concepts, indicators, measurements – A technical review. United Nations Children’s Fund – International Fund for Agricultural Development.
- Maxwell, S., and T. R. Frankenberger. 1992. Household Food Security: Concepts, indicators measurements- a technical review. United Nations Children’s Fund- International Fund for Agriculture Development.
- Melaku A.1997. What is Food Security and Famine and Hunger? Internet journal for African Studies 2.
- Melisa *et al.* (1997), “Challenges to Community Based Sustainable Development: Dynamics, Entitlements and Institutions” *IDS Bulletin*, V.28, No.4
- Merera Gudina (2002), *Ethiopia: Competing Nationalisms and the Quest for Democracy*, Shaker Publishing BV, Maastricht.
- Merry, D; Gulilat Birhanu, Paulos Dubale and Peden, D. (2003). In McCornic P.G; kamara, A. B and Girma Tadesse (eds.) Integrated Water and Land Management Research and Capacity Building Priorities for Ethiopia. Proceedings of a MoWR/EEARO/IWMI/ILRI International Workshop Held at ILRI, Addis Ababa 2-4 December 2002, Ethiopia.
- Mesfin Araya (1993), “A Review of the Addis Ababa May 1993 Constitutional Symposium”, *Ethiopian Review* (September).
- Mesfin Wolde Mariam. 1991. An Overview of the Ethiopian Rainwater Harvesting Association (EHRA). Paper presented at the Founding Conference of the Ethiopian Rainwater Harvesting Association (ERHA). Addis Ababa.
- Mesfin Wolde-Mariam 1984. Rural Vulnerability to Famine in Ethiopia (1958-1977). New Delhi: Vikas Publishing House.

- Miall, H., Oliver Ramsbotham and Tom Woodhouse (1999), *Contemporary Conflict Resolution*, Polity Press, Cambridge (UK.)
- MoH (Ministry of Agriculture) (1993). *Strategies for Small-Scale Irrigation Development*, Irrigation Development Department, MOA. Addis Ababa.
- Ministry of Economic Development and Cooperation (MEDaC). 1999. *Survey of the Ethiopian Economy: Review of the Post-Reform Developments (1992/93—1997/98)*. MEDaC, Addis Ababa.
- MoWR (Ministry of Water Resources) (1999). *The Federal Democratic Republic of Ethiopia. Water Resources Management Policy*, Addis Ababa.
- Mintesnot, Behailu and Mitiku, Haile (2003). *Water harvesting in Northern Ethiopia. Environmental Health and Socio-economic Impacts*. In: McCornic P.G; kamara, A. B and Girma Tadesse (eds.) *Integrated Water and Land Management Research and Capacity Building Priorities for Ethiopia. Proceedings of a MoWR/EEARO/IWMI/ILRI International Workshop Held at ILRI, Addis Ababa 2-4 December 2002*, Ethiopia.
- Mitchell, C.R. (1981), *The Structure of International Conflict*, City University Press, London.
- Mohammed Hassen (1990), *The Oromo of Ethiopia: A History, 1570-1860*, Cambridge University Press, Cambridge.
- Mulat, D.; Fantu, G. and Tadele F. 2004 *Agriculture Development in Ethiopia: Are there alternatives of food aid?* Addis Ababa. Unpublished Report.
- Oquaye, M. (2000), "Culture, Conflict and Traditional Authority: A Ghanaian Perspective", in Jinadu, L.A. (ed.), *The Political Economy of Peace and Security in Africa: Ethnocultural and Economic Perspectives*, Print Source Ltd., Harare.
- Peden, D; Grma, Tadesse and Mulugeta Mammo. (2003). *Improving Water Productivity of Livestock: An Opportunity for Poverty Reduction*. In: McCornic P.G; kamara, A. B and Girma Tadesse (eds.) *Integrated Water and Land Management Research and Capacity Building Priorities for Ethiopia. Proceedings of a MoWR/EEARO/IWMI/ILRI International Workshop Held at ILRI, Addis Ababa 2-4 December 2002*, Ethiopia.

- Regassa Bayissa (1993), "Labour Migration to the Commercial Farms of the Upper Awash Valley (1950s-1990)", M.A. Thesis, Addis Ababa University (unpublished)
- Regeher, E. (1993), "War After the Cold War: Shaping a Canadian Response", *Ploughshares Working Paper* 93 (3), Waterloo, Ontario.
- Robinson, C. 2003. Nothing to fall back on: Why Ethiopians are still short of food and cash. A Christian Aid Report, Christian Aid.
- Rogers, K.S. (1999), "Sowing the Seeds of Cooperation in Environmentally Induced Conflicts", in Suliman, M. (ed.), *Ecology, Politics and Violent Conflict*, Zed Books, London and New York.
- Ronen, D. (1998), "There must be a Just Resolution of Conflict", *Peace and Conflict Studies*, Vol. 5, no. 1, pp. 8-25.
- Rosegrant, M. W. and Ringler C. (1998), Impact of Food Security and Rural Development of transforming Water and Agriculture, *Water Policy* 1 (96), 567-586
- Rupesinghe, K. (1998), *Civil Wars, Civil Peace: An Introduction to Conflict Resolution*, Pluto Press, London.
- Saad, M. B. 2000. Food Security for the Food Insecure: New challenges and renewed commitments. Commission for Sustainable Development (CSD) NGO Women's Caucus Position Paper for CSD-8, 2000
- Said Ali (1994), "Pastoralism and State Policies in Mid-Awash Valley: The case of the Afar, Ethiopia", *African Arid Lands Working Paper Series*, No. 1/94.
- Saideman, S. (1995), "Is Pandora's Box Half Empty or Half Full? The Limited Virulence of Secessionism and Domestic Sources of Disintegration", *IGCC Policy Paper*, No. 18
- Sen, A. 1981. Poverty and famines: An essay on entitlement and deprivation. Oxford: Clarendon Press.
- Seyoum Gebre Selassie, Yacob Arsano, Getachew Kassa, Ahmed Hassan (1999), "The Afar-Issa Conflict Over Territorial Issues", Institute of Development Research, Addis Ababa University (unpublished).

- Support for Sustainable Development (2004), Baseline Survey, Hida, Alibadeh Mesgid, and Ley Korra Kebeles, Aura woreda, SSD, Addis Ababa – Produced by Yohannes Habtu.
- Support for Sustainable Development (undated), Organizational Profile, Addis Ababa
- Support for Sustainable Development (2003), Aura Small Scale Irrigation Project Environmental Impact Assessment Report, SSD, Addis Ababa
- Support for Sustainable Development (2008), Progress Report for the year 2008 and Plan for the year 2009, SSD, Addis Ababa
- Support for Sustainable Development (2008), Brief Report on Alesebula Small Scale Irrigation project Inauguration and Handing over of Aura and Visit to Adelela (the New Project Site), SSD, Addis Ababa
- Stedman, S. (1997), “Spoiler Problem in Peace Processes”, *International Security*, Vol. 22, no. 2, pp. 553.
- Steinberg, S. (1981), *The Ethnic Myth: Race, Ethnicity, and Class in America*, Atheneum, New York.
- Suliman, M. (1999), “The Rationality and Irrationality of Violence in Sub-Saharan Africa” in Suliman M. (ed.), *Ecology, Politics and Violent Conflict*, Zed Books, London and New York
- Teshale Tibebe (1995), *The Making of Modern Ethiopia: 1896-1974*, The Red Sea Press, Inc., Lawrenceville, NJ.
- Tolk, J.A. and Howell, T. A. (2001); Water Use Efficiencies of Grain, Sorghum Grown in three High Plains Soils, United States Department of Agriculture, Agriculture Research Service, Tehran
- UNDP (2000), Afar pastoralists face consequences of poor rains. Downloaded from http://www.africa.upenn.edu/eue_web/Afar0905.htm
- UNEP (United Nation Environment Programme), (1992), *World Environment 1972-1992*, UNEP, Nairobi
- Woldeab, Teshome (2003). Irrigation Practices, State Interventions and Farmers’ life-Worlds in Drought-Prone Tigray, Ethiopia. Wageningen, The Netherlands.

-
- World Bank. (2003). Memorandum of the President of the International Development Association to the Executive Directors on a Country Assistance Strategy for the Federal Democratic Republic of Ethiopia, March 24, 2003.
- World Bank, (1986). Poverty and Hunger: Issues and Options for food Security in Developing Countries. A World Bank Policy Study, Washington D.C
- World Book, Inc. (1992). The World Book of Encyclopaedia
- Yacob Arsano (1999), The predicament of the Ethiopian Pastoralists: Shrinking Resources and Tenure Insecurity” in Meteku Haile *et al* (eds) Proceedings of the national workshop on challenges and opportunities for Research and Development in Pastoral and Agro Pastoral areas of Ethiopia.
- Young, C. (1993), *The Rising Tide of Cultural Pluralism: The Nation State at Bay*, University of Wisconsin Press, Madison.
- Zewdie, Abate. (1994). Water Resource Development in Ethiopia, An Evaluation of Present Experience and Future Planning Concepts, Management Method for Analysing a Key Resource in Nation’s Development. Middle East Policy Series Vol.13

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Annex One: List of People Contacted from SSD, Line Offices and the Community**1. SSD Ethiopia**

1. Gebreyes Haile General Manager of SSD
2. Berhanu Wodajo Deputy Manager of SSD
2. Elizabeth Milton Program Coordinator of SSD
4. Kassahun Assefa, Senior Program Manager/ Construction
3. Deribe Getachew Coordinator of SSD Afar Project
4. Getinet Molla Agro-ecology Forman for SSD Afar Project
5. Fekadu Belay Agro-forestry Forman for SSD Afar Project
6. Getahun Fekadu, Construction Coordinator

2. Line Offices

1. Embibelew Bogale Development Agent, Uwa woreda Badule Kebele
2. Mehari Birhane Development Agent Kebele Hida Woreda Aura
3. Endiris Humada, Head for Aura Woreda Agriculture and Rural Development Office
4. Habtamu Lalore, Natural Resource Expert, Aura Agriculture & Rural Development Office
5. Demelash Deboch, Animal Husbandry Expert, Aura Agriculture & Rural Development Office
6. Tesfaye Birhanu, Natural Resource Expert, Aura Agriculture & Rural Development Office

3. PARTICIPANTS OF FOCUS GROUP DISCUSSIONS

<u>No.</u>	<u>Name</u>	<u>K'ebele</u>	<u>Age</u>	<u>Sex</u>
1.	Alaa Ali	1 st Badule	39	Female
2.	Mohammed Abdu	1 st Badule	30	Male
3.	Datu Sahali	1 st Badule	42	Female
4.	Amina Abal	1 st Badule	24	Female
5.	Abu Mohammed	1 st Badule	26	Male
6.	Said Dawud	1 st Badule	26	Male
7.	Zahira Mohammed	2 nd Badule	18	Female
8.	Amina Ali	2 nd Badule	46	Female
9.	Homali Meanu	2 nd Badule	60	Male
10.	Mahirama Mohamed	2 nd Badule	40	Female
11.	Amina Mohammed	2 nd Badule	36	Female
12.	Nora Kadir	1 st Badule	16	Female
13.	Ali Humad	1 st Badule	16	Male
14.	Mohammed Hayo	1 st Badule	18	Male
15.	Dawud Woire	1 st Badule	25	Male
16.	Mohammed Ali	Lekora	34	Male
17.	Misra Abo	Lekora	27	Female
18.	Abo humad	Lekora	32	Male
19.	Saile Ali	1 st Badule	37	Male
20.	Mohammed Ali	2 nd Badule	35	Male
21.	Adem Ebrahim	Segantole	18	Male
22.	Ayisha Mohammed	Segantole	21	Female

23.	Homali Moie	2 nd Badule	36	Female
24.	Ali Mohammed	Segantole	26	Male
25.	Abdo Ali	Hida	42	Male
26.	Semira Adem	Segantole	29	Female
27.	Hassen Rabo	Segantole	42	Male
28.	Mohammed Umer	Hida	37	Male
29.	Seid Ali	Hida	18	Male
30.	Abdu Ali	Hida	16	Male
31.	Marima Seid	Hida	20	Female
32.	Mohammed Ali	Hida	27	Male
33.	Adem ebrahim	Hida	38	Male
34.	Halima Mohammed	Hida	16	Female
35.	Jamila Awol	Segantole	17	Female

4. PARTICIPANTS OF IN-DEPTH INTERVIEWES

<u>No.</u>	<u>Name</u>	<u>K'ebele</u>	<u>Age</u>	<u>Sex</u>
1.	Hunde Abdu	Hida	40	Male
2.	Kalifa Ahimed	Hida	45	Male
3.	Bore Elema	Sagantole	36	Female
4.	Abu Humad	Sagantole	47	Male
5.	Yasin Awol	Lekura	27	Male
6.	Umer Ali	1 st Hida	32	Male
7.	Alimira Abdo	1 st Badule	30	Male
8.	Halima Ahimed	Lekora	25	Female
9.	Mengasha Addis	1 st Hida	35	Male

10.	Abdo Mohammed	1 st Hida	37	Male
11.	Asiya Mohammed	Lekora	26	Female
12.	Marim Duala	Lekora	28	Female

Annex two A Guideline for Focus Group Discussions

Focus Groups Discussion is a tool for collecting qualitative data. A moderator will follow a predetermined guide to direct a discussion with from 5 to 10 people with the purpose of collecting in depth qualitative information regarding a group's perceptions, attitudes, and experiences on a defined topic. Participants should be typical of the intended population.

Introduction

Good morning/ afternoon (as appropriate). My name is -----and with me is my colleague Mr/Ms/Mrs-----

I wish to welcome you all to this focus group discussion meeting. It is my pleasure to request each one of you to introduce yourself (introductions are completed).

Thank you for sparing your precious time to come and attend this discussion. Please feel free to participate.

In this discussion, all answers or opinions are correct and shall be recorded in writing. I hope you do not mind if my colleague takes down notes and to tape recorder during the discussion. We are doing this so that we store the information for report writing and future reference. I am sure we are ready to start now.

What are the most important life changes you have observed in the last few years? (Probe: livestock, irrigation, market, climate, living style, etc.

How major decisions are made in this community? (Probe for land and water related issues, natural resources, household assets. (Probe for role of women in decision making process and perception of the community towards women)

What is your perception towards farming in general and using the irrigation scheme in particular? (Probe by comparing farming/sedentary life with pastoralism; beneficiaries with non-

beneficiaries of the project, including knowledge and skill gained through trainings and demonstrations.

How often conflicts emerge in your community? What are their causes? What are the conflict management mechanisms?

What are the major improvements in the lives of the community as a result of the irrigation schemes? Probe: diversification, assets owned, income gained and savings, improvement in food security at a household level, perception towards relief, adoption of farming, market, number and productivity of livestock, availability of fodder and pasture.

Whom do you consider as a hero in your community? Probe: ascription vs achievement. Food security; sending children to school, etc.

What other benefits you gained in the last few years as a result of this project? (Probe for infrastructure, social services and others)

Annex Three: In-Depth Interview Guideline for Local Authorities and Project Staff

1. How many clans are found in this community? (Probe: populations statistics, social services, *interrelation, influence in the life of the community and benefits infrastructure*)
2. What was your role in the project implementation process?
3. What mechanisms were in place to implement the irrigation project in relation to land tenure, labor employment? Discuss on the processes of land allocation, distribution, relations with Balabats and traditional leaders as well as roles of government offices in unskilled labor employment.
4. What have been the major challenges facing land allocation and the implementation of the project activities so far and in the long run?
5. What is your perception towards the outcomes of sedentarization using the irrigation scheme?
6. What are the major improvements in the lives of community as a result of the irrigation schemes? Probe: diversification, assets owned, income gained and savings, improvement on food security at a household level, perception to relief, adoption of farming, market, number and productivity of livestock, availability of fodder and pasture.
7. How do you see the working relations among government offices, *NGOs and especially with SDD*?
8. What kind of benefits have gained in your area in the last few years as a result of this project? (Probe: benefits gained in terms of infrastructure, social services and others).
9. What impacts are resulted and good lessons are learned from this irrigation project of SSD?
10. How do the government offices and experts benefited from the project?
11. How do you see the sustainability of the project outputs and what is planned by the responsible body to render the necessary support to the community to assure sustainability of outputs?

Annex Four: In-Depth Interviews Guideline for Community Members

1. How many clans are found in your community? (Probe for lineage and clan relations and interdependence)
2. How did you start to use the irrigation scheme?
3. What is your perception towards farming (using the irrigation scheme)? Probe: compare farming/sedentary life vs pastoralism; perception of non-beneficiary vs beneficiary people towards irrigation schemes, concerning trainings and demonstrations.
4. Do you think that there is a change in working culture among the Afar community of the project area? If yes, (probe for perception to farming, daily labor, employment, and other non pastoral activities). Probe again for underlying causes for the change in livelihood).
5. What are the major improvements in your life as a result of the irrigation schemes? (Probe for diversification of crops, vegetables, fruits, assets owned, income gained and savings, improvement on food security at a household level, perception to relief, adoption of farming, market, number and productivity of livestock, availability of fodder and pasture.
6. What are the most important life changes you have observed in the last few years? (Probe in relation to livestock, irrigation, market, climate, living style, etc.)
7. What are the changes in the price of livestock and farm products? (Probe for changes in varieties of crops, vegetables, fruits, and their prices? (Probe for access to markets)
8. Whom do you consider as a hero in this community? Probe: ascription vs achievement. Food security; sending children to school, etc.
9. What other benefits you gained in the last few years as a result of this project? (Probe: infrastructure, social services and others)

Annex Five: In-Depth Interview Guideline for Local Authorities and Project Staff

1. How many clans are found in this community? (Probe: populations statistics, social services, *interrelation, influence in the life of the community and benefits infrastructure*)
2. What was your role in the project implementation process?
3. What mechanisms were in place to implement the irrigation project in relation to land tenure, labor employment? Discuss on the processes of land allocation, distribution, relations with Balabats and traditional leaders as well as roles of government offices in unskilled labor employment.
4. What have been the major challenges facing land allocation and the implementation of the project activities so far and in the long run?
5. What is your perception towards the outcomes of sedentarization using the irrigation scheme?
6. What are the major improvements in the lives of community as a result of the irrigation schemes? Probe: diversification, assets owned, income gained and savings, improvement on food security at a household level, perception to relief, adoption of farming, market, number and productivity of livestock, availability of fodder and pasture.
7. How do you see the working relations among government offices, *NGOs and especially with SDD*?
8. What kind of benefits have gained in your area in the last few years as a result of this project? (Probe: benefits gained in terms of infrastructure, social services and others).
9. What impacts are resulted and good lessons are learned from this irrigation project of SSD?
10. How do the government offices and experts benefited from the project?
11. How do you see the sustainability of the project outputs and what is planned by the responsible body to render the necessary support to the community to assure sustainability of outputs?

Annex Six SSD Afar Study: Checklist/Main Points for Consideration

1. Document the overall activities implemented by SSD in its integrated development project based on irrigated agriculture: SOURCE: SSD management and staff interviews, review reports critically.

2. Document the **contribution of project activities to improving the food security** status of the targeted communities. SOURCE: SSD management and staff interviews, review reports critically. Retrospective questions: Do you eat better? Consumption of own vegetables? Use of sales income to improve diet, etc. Focus Group Discussions, key informant interviews, small-scale survey (SSS): full-pastoralists non-beneficiaries opinion of project, beneficiary opinion of the project, interest of non-beneficiaries to join this or similar project. Demand and expectation of local community for the project.

3. Determine **changes in income and household welfare** attributable to project interventions. See if the project has concentrated on introducing new varieties of fruit and vegetables demanded by and linked to the market. New food security crops not previously know: are women trained in their preparation, processing and utilization. Effectiveness of training in new crops and training women in their preparation as food sources for the family and demonstration sites for introducing new crops and technologies?

Determination of income change has to be made ex-post (baseline survey lacks solid information).

Means of measurement:

Asset accumulation: permanent structure for house? Material of house, floor of **house**, roof of house, size of house, bicycles, motorcycles, other equipment, wheelbarrows, watering cans, pumps?

Household welfare: Beds, windows, floor space per family member, etc.

Retrospective interviews: Elders and adult participants/non-participants (short guidelines)

Animal herd: Numbers, animal quality, milk and butter production, income, product sales, animal sales, less distress selling of animals, etc.

Savings: Banks, microfinance institutions (MFIs), SACCOs, cash-savings, etc.

Education indicators: % of school age kids who are in school, literacy indicators

Land tenure, access to land and access to pasture: Individual plots, titles for irrigated land? Impact on communal land and access of livestock to water and dry-season pasture?

4. Marketing: Assessment of market linkages

5. Research and Extension: Assessment of linkages with research and extension institutions.

6. Changes in gender roles, decision-making within the family and the community and other aspects of changes occurring over the course of the project. Women's role in irrigated agriculture and income derived from irrigated crop production to be analyzed. (FGD women, individual interviews with women, discussions with leaders - men/women)

7. Obtain the **view of** the community concerning the gradual **movement** from the pastoralist way of life which prevailed in the past **to agro-pastoralism and** eventually to a more **sedentary way of life** based on irrigated agriculture (case studies, FGD, non-participant interviews, survey question on attitude)

8. **Attitude** of community **toward** the **developmental approach** taken **and** to the **specific interventions** and other activities of the project (case studies, FGD, non-participant interviews, survey question attitude)

9. **Design** the **strategies to** further **enhance** the effectiveness of the SSD's project.

10. **Visit and Debrief with** Woreda and regional Agriculture and Rural Development **Offices**, Disaster Prevention and Preparedness Commission, Bureau of Water Resources, Regional Council, etc.