Norwegian Church Aid

(NCA)

Impact Assessment of NCA/Partners Projects Implemented in Amhara, Tigray and Oromia Regions of Ethiopia

January, 2011

Addis Ababa

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Acknowledgments

Designing and implementing this assessment has been intense and very participatory. It was clear from the beginning that this assessment was an opportunity to draw lessons and design subsequent innovative and participatory projects. In each step of the process, from the inception report to the final details of the report, there has been good collaboration from NCA staffs and Staffs of its implementing partners at Armachiho, Rama, Messanu, Dehana and Medda Wolabu. With sincere gratitude, the assessment team would like to acknowledge all individuals, communities, organizations and institutions, who have contributed to the impact assessment.

Sincere thanks goes to NCA staffs: Ato Gutema Gezemu, Ato Dawit kebede and W/ro Tirsit Zewge for providing information about the projects and allowing us to access all relevant documents of the five projects. Their cooperation in arranging logistics for the field assessment also helped us accomplish the assignment on schedule. Similar thanks goes to the driver Mesfin Abebe for his unreserved efforts in driving us to all the woredas and villages visited, which goes from Rama in the northern tip of the country to Medda Wolabu- near to the south east corner of the country.

The field assessment was only possible through joint efforts. Various individuals have actively supported the assessment. At the risk of not naming all of them, the authors would like to thank, especially: EECMY/DASSC staffs -Teklay, Lema and Zelalem from Armachiho project; Hagezom and Berhane from Rama project; Yebicha Belayneh from the phased out Medda Wolabu project; REST staffs- G/Hiwot, Haftay, Kahisu, Girmay and Kahisay from Messanu project and Ato Getachew from REST HEAD office; and EOC/DICAC former Dehana IRDP staffs: Kifle Worku and Solomon Mebratu for their warm welcome, hospitality, cooperativeness and support during the field assessment.

Sincere thanks goes to the government staffs from offices of Rural development, Water resources, Health and Education in the projects woredas who where cooperative in providing us the required information. Similar thanks goes to the community members who gave us their time and respond to the interviews by enumerators or participate in discussions facilitated by the consultants. Their rationale judgments about the changes brought about by the projects helped us to understand the project contribution.

Last but not least, particular appreciation has to be given to enumerators and translators who were supporting us in interviewing households and translating discussions held with the members of the community.

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Acronyms

ADF	Austrian Development Fund
ASKTC	Adults Skill Training Center
ESDP	Education Sector Development Program
EECMY-DASSC	Ethiopian Evangelical Church of Mekane Yesus -Development and Social Service Commission
EOC-DICAC	Ethiopian Orthodox Church –Development & Inter Church Aid Commission
FGD	Focus Group Discussion
HDW	Hand Dug Well
HTP	Harmful Traditional Practice
NCA	Norwegian Church Aid
NCA-E	Norwegian Church Aid-Ethiopia
ORDA	Organization for Rehabilitation and Development in Amhara
OVC	Orphan and Vulnerable Children
PASDEP	Plan for Accelerated and Sustained Development to Eradicate Poverty
PLWHA	People Living with the Virus
REST	Relief Society of Tigray
SCN	Save the Children Norway
SPD	Spring Development
SDPRP	Sustainable Development and Poverty Reduction Program
UNICEF	United Nations Children Fund
VCT	Voluntary Counseling and Testing
WFP	World Food Program
WUA	Water Users Association

EXECUTIVE SUMMARY

Norwegian Church Aid has/had been implementing projects related to: emergency relief aid and disaster preparedness, food security, safe water supply & sanitation, women development, gender-based violence, HIV/AIDS and climate change. It has/had been implementing these projects in Amhara, Tigray and Oromia regional states of Ethiopia since 1993; in partnership with the Ethiopian Evangelical Church Mekane Yesus Development and Social Services Commission (EECMY-DASSC), Ethiopian Orthodox Church - Development and Interchurch AID Commission (EOC-DICAC) and Relief Society of Tigray (REST).

The projects areas are situated in those parts of the country where there had been armed struggle. Consequently basic infrastructures had hardly existed. These areas are frequently affected by recurrent droughts, which require supports in terms of interventions that increase food availability, access and utilization. And most of the target areas are found in extremely degraded areas where farming had been practiced for many centuries. These areas have poor natural resource base and poor potential for agricultural development, which needs systematic interventions that can rehabilitate the natural resource base and at the same time increase agricultural production.

So as to bring about change on the wider and complex context, a number of multi-phased projects have/had been implemented in five project areas that are situated in different parts of the country. In formulating the goal and purpose, planning of those projects considered a wider view of the projects' context. Monitoring and evaluation that focuses mostly on the outputs – i.e. the performance of the projects was also conducted. Meanwhile there are no concrete evidences on the contribution of the projects towards the goal and purposes. “To what extent have these projects contributed to the goal and purposes?” was, therefore, the starting point to initiate and conduct this impact assessment. Because, it is important not only to ask, "Are we doing things right?" but also, "Are we doing the right things?" as this gives lessons for future similar interventions.

This impact assessment has, therefore, been carried out to assess the impact of Norwegian Church AID-Ethiopia/partners integrated rural development/integrated food security/ integrated agricultural development projects and document outcomes, best practices and lessons learned to use it in the upcoming strategic period. Norwegian Church AID-Ethiopia will integrate the findings of the impact assessment in its Country Strategy Plan (2011-2015) and apply lessons drawn in designing subsequent phases of the projects.

The projects implemented so far in the five target areas were designed to bring measurable changes on the given context. Meanwhile, a concrete baseline data that shows the context before implementation of the multi-phased projects was not available. Hence the change in the context was determined by subjective judgments of the target beneficiaries and other stakeholders on “before” and “after” situations in relation to the various sectors of interventions of the projects. For this purpose, impact hypothesis was developed. Impact hypothesis was built by developing generic goal and purposes that encompasses the goals and purposes of the multi-phased projects implemented by different partners in different parts of the country. It was developed visualizing impact chains – utilization, effect, benefit/drawback and impact of various interventions implemented in the target

areas by different partners of Norwegian Church AID. Then relevant impact indicators were selected and used for measuring intended or unintended changes indicated in the impact hypothesis.

Data collection has been carried out from October 16, 2010 to November 15, 2010 by travelling to all the five project sites (Armachiho, Rama, Messanu, Dehana and Medda Wolabu). Three professional (the consultant team) and 15 enumerators involved in data collection. The analysis tries to summarize main changes attributable to the projects implemented at each site in terms of the three dimensions of sustainability, i.e., ecological, economical and social dimensions by rating changes from zero "no change" to 4 'very good change".

Armachiho Muti-phased project

Implementation of multi-phased project for the last two decades in Armachiho has, in general, contributed to improve people's access to social services (health, education, safe water, etc); the natural resources base, and food security. The design of these multi-phased projects was dynamic which tries to address priority needs of the target groups at different times. The shift from kebele based approach to a watershed approach has laid good foundation for sustainable natural resources management and agricultural development.

Further land degradation in the target watershed has been moderately controlled, and land capability has been improving. Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure site and along treated gullies. Gaps in this regard are observed on farmlands and gullies where eucalyptus trees are planted, as eucalyptus has drawbacks on the ecology and bio-diversity. Dramatic shift from production of barley and wheat to triticale has also drawbacks related to loss of local crop cultivars.

Integrating apple multiplication and demonstration site with schools has supported proper management of the center and enhanced knowledge transfer. As a result, many farmers have adopted the technology, and yet many other farmers are interested to grow apples. The efforts to intercrop garlic in apple farms, use hop as a live fence to apple farms and keep bees around apple farms, is also innovative idea that enhances biological pest control, diversifies incomes and maximize benefits from a small plot of land. What is left in this regard is water harvesting facilities, which would have made the farm a more profitable permaculture.

Training farmers on forage development, shoat rearing, and beekeeping has contributed to increase productivity of milk, honey and shorten months of maturity of shoat kids. All these interventions have contributed to improve food security of the target households. Provision of shoat has contributed to empower poor and voiceless women to be seen active in front of others. Non-farm income generating activities (tailoring, weaving and pottery) were, however, totally unsuccessful. Lessons should be drawn on the need to conduct technical, financial, socio-cultural, market and institutional feasibility of the businesses, before investing in these activities.

Supports in creating access to safe water supply and sanitation facilities has contributed to improve health, reduce women work load and increase labor productivity of the target households.

Construction of health posts and schools has contributed to improve access for health and education services to the target communities.

Institutional dimension of sustainability was not strong for most of the projects interventions. There was no responsible institution (community structures like watershed association) which can sustainably manage and decide on equitable sharing of the benefits in the target watersheds. The beneficiaries of farm income generating activities (shoat & beekeeping) were not organized in a way that they can share knowledge and experiences, including market information. Saving schemes that would have strengthen financial capital of the households also lack in all phases of the projects.

Rama multi-phased project

Further land degradation in the target watershed has been highly controlled, and land capability has been improving. Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure sites. Limitations in this regard are lack of community structure that will be responsible for sustainable management of the project outputs through mobilizing the community and carrying out timely maintenances of physical structures, including protecting closure sites.

Introduction of motor pump irrigation and construction of Nefeha diversion has increased crop production. The multi-phased project was innovative in introducing fruit crops that well adapt to the climatic conditions of the target area, and provide economical and ecological benefits to the inhabitants. Fruits and vegetables introduced by the project give better yield. Besides introduction of high yielding crop types, building knowledge and skill of farmers on irrigation agronomy has contributed to increase production and productivity of crops. Increase in production and productivity of crops has remarkably improved food security of the beneficiary households, and enabled them to create household assets which have strengthened their resiliency to shocks. Limitations in this regard are lack of skill on motor pumps maintenance and bed making for tomato crops.

Training farmers on forage development, shoat rearing, and beekeeping, including bull service provision has contributed to increase productivity of milk and honey. These interventions have contributed to improve food security of the target households. Shoats, especially contributed to diversify incomes for poor women headed households. Provision of shoat has contributed to empower poor women. Provision of bull service coupled with training farmers on forage development has increased productivity of milk from Barka breed cows. And the introduction of modern beehives has remarkably increased honey yield per hive. Limitation in this regard is lack of group saving systems that would have helped the beneficiaries mobilize savings for future scale up of these activities and transforming their well-being.

Supports in creating access to safe water supply and sanitation facilities has contributed to improve health, reduce women work load and increase labor productivity of the target households. Similarly, awareness raising on gender has good contribution to bring attitudinal changes of the community towards gender equality and prevention of HIV and HTP. Supports given in terms of renovation and construction of health facilities, including material provisions has contributed to improve access for

health services to the target communities. Similarly, supports given in terms of construction and furnishing schools contributed to create child friendly schools.

Messanu multi-phased projects

Integrated efforts of watershed treatment such as area closure at the upper slopes of the catchment with hillside terraces & deep trenches; and rehabilitation of gullies within the watersheds has prevented land degradation and improved land capability. Soil erosion at farmlands downstream prevented. The hydrology at downstream improved thereby enhancing irrigation practices at farms on lower slopes. Besides its long-term advantages of rehabilitating the environment and increasing productivity, participation of the community members in watershed treatment through cash-for-work has increased their income, and thereby their access to food.

Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure sites. And the communities have developed good knowledge on the benefits of timber and non-timber products that can be taped from closure sites.

The multi-phased project was innovative in introducing fruit trees that well adapt to the climatic conditions of the target area and provide economical and ecological benefits to the inhabitants. Fruits and vegetables give better yield and have good market value. As a result of integrated catchment treatment activities that reduced soil erosion and increased soil moisture; and also as a result of good extension services in providing farmers with farm inputs and technical advices, the productivity of rain fed crops has increased.

Increase in production and productivity of crops has increased availability and access to food for the target households. Associated to feeding fruits and vegetables, dietary habits (nutrition) of the target households improved. Moreover, increase in production and productivity of crops has enabled them to create household assets which have strengthened their resiliency to shocks. Limitations in this regard are poor quality of recently introduced motor pumps, lack of skill on motor pumps maintenance and lack of skill on bed making for tomato crops. In addition, water shortage during the driest period and flood damage during the rainy season are affecting irrigated farms at Addis Alem diversion.

Training farmers on dairy development, shoat rearing, beekeeping and poultry, including pettry trade has contributed to increase productivity of milk, honey and egg. Dairy development has remarkably increased income of the households, enabling them to generate ETB 1000.00 to ETB 7000.00 per month. The contribution of the cooperative in increasing milk supply to the surrounding towns like Wukiro and Mekelle, including those towns in the neighboring region (Afar Region) is also magnificent. Limitation in this regard is market problem for the dairy cooperative, especially during fasting seasons.

Shoats and poultry contributed to diversify incomes for poor women headed households. The introduction of modern beehives has remarkably increased honey yield per hive. Provision of loan for petty trade has also contributed to empower poor and voiceless women to be seen active in front of others. All these interventions have contributed to improve food security of the target households.

Meanwhile, women engaged in shoat rearing were not organized in groups, and group saving system that would have helped the beneficiaries mobilize savings for future scale up of these activities was not started.

Supports in creating access to safe water supply and sanitation facilities has contributed to improve health, reduce women/men work load and increase labor productivity of the target households. Increased accesses to water have led to improved hygiene practice of the people. Limitation in this regard is linkage of some of the underground tankers, which may be associated to quality of construction.

The community has good awareness on HIV prevention, including care and support for PLWHA and OVCs. They have established an innovative and transparent community-based PLWHA and OVC care and support system. Changes in attitude of the community are observed in favor of VCT services, HTP eradication, and gender equality.

Dehana Multi-phased project

Soil erosion in the target kebeles has reduced. Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure site at Tela watershed. Limitations in this regard are lack of community structure that will be responsible for sustainable management of the project outputs through mobilizing the community and carrying out timely maintenances of physical structures, including protecting the closure site. The other limitation is that, except in Tela watershed, natural resources management activities were not implemented following the watershed approach.

Supports given in terms of constructing guide canal, provision of vegetable seeds and drip system has contributed to increase vegetable production in the target kebeles. As a result, availability and access to food increased for the target households. As a result of integrated efforts of soil and water conservation activities and provision of grain seeds (teff, wheat and chick pea); productivity of rain fed crops has also increased.

Training farmers on forage development, shoat rearing, beekeeping and petty trade has contributed to increase productivity of honey and enhance quick maturity of shoats. Shoats, have contributed to diversify incomes for poor women headed households. Women engaged in petty trade have also been able to feed their families, educate their children, construct house, and buy heifer after they goat technical and financial support from the project. Limitation in this regard is lack of group saving systems for those engaged in beekeeping and shoat raring. This would have helped the beneficiaries mobilize savings for future scale up of their business and transformation in their well-being.

Supports given in creating access to safe water supply and sanitation has contributed to improve health, reduce women work load and increase labor productivity of the target households. Similarly, awareness raising on HTP has contributed to reduce HTPs such as FGM and early marriage. Supports given in terms of construction of clinic and school have also contributed to improve the community's' access for health and education services.

Key lessons learned

Apart from bringing productivity benefits in the target watersheds, re-vegetation in the upper slopes generally comprising common pool forest and grazing land – together with trenches, hillside terraces, and simple contour bunds will increase the percolation of rainfall, thereby raising water tables in the valley bottoms and lower slopes. This can allow the extraction of more pumped water, making agriculture more reliable, and possibly encouraging production of high value crops like fruits and vegetables. Integrated watershed development allows poor people (landless people) to benefit from short-term employment opportunities during construction of gully rehabilitation and other related structures, and provide sustainable livelihoods options such as beekeeping at closure sites, fattening small ruminants through cut–and-carry feeding practices, etc.; which tend to proportionate the benefits that people get from watershed rehabilitation activities.

Watershed-based livelihoods development interventions assisted vulnerable people to use the natural resources at their disposal most effectively to survive shocks and stresses, and thereby thrive and move on to sustainable and rewarding livelihoods which can sustainably use the natural resources base, increase incomes, improve food security and enhance their well-being. It promotes capital assets of individuals, households and communities, i.e. (i) human capital (knowledge, skill and capability to work or adapt to changing situations); (ii) social capital (networks and connection, relationships of trust and mutual understanding, shared values and behaviors, common rules, mechanisms for participation in decision making, leadership, etc.); (iii) natural capital (land and produce, water, trees and forest products, bio-diversity); (iv) physical capital (* infrastructure-such as access roads, shelter, water supply & sanitation facilities, energy and communication, and * tools & technology- such as: tools and equipment for production, seed, fertilizer and pesticides); and (v) financial capital (savings/stocks, credit and wages).

Enhancing capital assets of the households has helped target beneficiaries cope up with or adapt to the causes of vulnerability (shocks), and engage in livelihood strategies that can lead them to sustainable livelihoods outcomes (more income, reduced vulnerability, improved food security, increased well-being and more sustainable use of natural resources); which in turn will enhance their capital assets. It enables households which are differently affected by the causes of vulnerability to respond differently to such causes of vulnerability through enhancing their capital asset that most constrained them.

I. INRODUCTION

1.1 History of the Project and Object of the Assessment

Norwegian Church Aid has/had been implementing projects related to: emergency relief aid and rehabilitation, food security, safe water supply & sanitation, women development, gender-based violence, HIV/AIDS and climate change. It has/had been implementing these projects in Amhara, Tigray and Oromia regional states of Ethiopia since 1993; in partnership with the Ethiopian Evangelical Church Mekane Yesus Development and Social Services Commission (EECMY-DASSC), Ethiopian Orthodox Church - Development and Interchurch AID Commission (EOC-DICAC) and Relief Society of Tigray (REST).

In formulating the goal and purpose, planning of those projects considered a wider view of the projects' context. Concrete results and activities were then defined to fulfill the purpose and contribute to the goal. Monitoring and evaluation that focuses mostly on the outputs – i.e. the performance of the projects was also conducted. Meanwhile there are no concrete evidences on the effectiveness of the projects towards meeting the goal and purpose of the projects. "To what extent has these projects achieved the purpose and contribute to the goal?" was, therefore, the starting point to initiate and conduct the impact assessment. This is because it is important not only to ask, *"Are we doing things right?"* but also, *"Are we doing the right things?"*, as this gives lessons for future similar interventions.

This impact assessment has, therefore, been carried out to assess the impact of NCA-E integrated rural development/integrated food security/ integrated agricultural development projects and document outcomes, best practices and lessons learned to use it in the upcoming strategic period. Norwegian Church AID-Ethiopia will integrate the findings of the impact assessment in its Country Strategy Plan (2011-2015), and apply lessons drown in designing subsequent phases of the projects. List of projects where the impact assessment was carried out are:

1) Armachiho food security project implemented in partnership with Development and Social Service Commission of the Ethiopian Evangelical Church of Mekane Yesus (EECMY–DASSC) in Amhara Regional State, North Gondar Zone, Tach Armachiho woreda, Lay Armachiho woreda and Sabyia-Sayina PA of Gondar town;
2) Rama integrated agricultural and rural development project implemented in partnership with EECMY–DASSC in Tigray Regional State, Central Zone, Merebleh woreda;
3) Messanu and its surrounding integrated agricultural development program implemented in partnership with Relief Society of Tigray (REST) in Tigray Regional State, Eastern Zone, Wukiro woreda;
4) Dehana integrated rural development project implemented in partnership with the Development and Inter -Church Aid Commission of the Ethiopian Orthodox Church (EOC-DICAC) in Amhara Regional State, Wag Himra zone, Dehana woreda; and
5) Medda Welabu community development project implemented in partnership with EECMY-DASSC in Oromia Regional State, Bale Zone, Medda Welabu woreda.

1.2 Purpose of the Assessment

The overall objective of the assessment is to inform the donor and other stakeholders on the effectiveness of different projects implemented by NCA and its partners over the last two decades, and generate lessons that can improve the implementation of ongoing and future projects. The assessment mainly focused on:

- Assessment of vulnerability situations and reasons that lead to the projects interventions;
- Assessment of projects effectiveness;
- Indentifying projects best practices;
- Indentifying current gaps; and
- Drawing lessons learned.

1.3 Team Participated in the Assessment

The assessment team consists of three well experienced and competent professionals. The team consists of: (i) Impact assessment, monitoring and evaluation specialist (M.Sc. in Agricultural Economics); (ii) Livelihoods and Gender Specialist (M.A in Development Studies) and (iii) Program/Project Development Specialist (M.Sc. in Agricultural Economics). The team members have very good experience in conducting evaluations for a number of similar projects.

Data collectors for the quantitative survey were university degree holders, with very good experience in similar assignments. A total of 15 enumerators involved in data collection. Project staffs involved in translating focus group discussions held with the communities.

II. THEORETICAL CONCEPTS ON IMPACT ASSESSMENT

Every development project exists within a specific context, i.e. its bio-physical, socio-cultural, economic, institutional and political milieu or environment. The context comprises several levels, from the micro-level (local level) to the macro level (policy, economy, etc.), and includes different stakeholders. Changes in the context are the result of the influence of many internal and external factors (see Figure 1). Internal factors include power constellations and social mechanisms of learning, adaptation, rejection, etc. External factors, such as the national and international economy and different policies also initiate changes in the context.

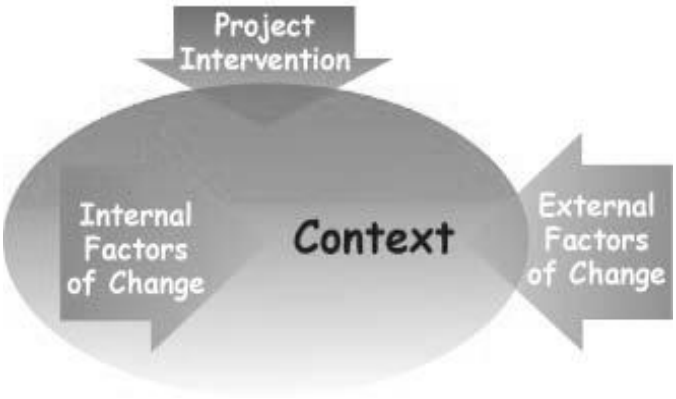

Figure 1 Factors contributing to changes in the project context

A development project can be considered as another external factor that is specifically designed to trigger changes in specific sectors (e.g. agriculture, education, infrastructure, etc.). In a wider sense, the overall objective (goal) of a project is the ultimate change desired in a context, e.g. poverty alleviation, sustainable resource management, empowerment of the local population, etc. A change - mid to long-term implication a project has on the context and its population, be it intended (planned) or unintended, is its impact. Therefore, "impact" is often related to the effectiveness of a project, i.e. its success in contributing to its goal. Certainly, a project will always intend positive impacts, but there may also be negative impacts. Besides, stakeholders may not consider an impact totally positive or negative.

The term "impact" covers a wide range of implications, which can be seen as an impact chain of overlapping links (see Figure 2). The utilization of project outputs already implies the idea of a broad impact (e.g. adaptation of a new crop production system with greater area coverage). As a consequence of utilization, initial effects (outcomes, direct impacts) can be observed (e.g. crop yield increases, soil erosion decreases, etc.). These effects may imply both benefits and drawbacks (e.g. increased crop yield must be marketable to increase household income). This can stimulate a learning process, people's attitudes and perceptions can change, and further (indirect) impacts may be triggered (e.g. local people gain self-confidence and further explore their potential). In the end, at least some of the impacts should relate to the overall goals of development projects (e.g. empowerment of local people, poverty alleviation, etc.).

Figure 2 Impact chain

The goal cannot be reached by a project alone, but a project should make a relevant contribution to the goal. The impact chain (utilization, effect, benefit / drawback, impact) needs time to develop, time during which the number of actors and their interactions increases. This makes it more and more difficult to attribute a change to a single factor or project. This is called the "attribution gap" (see Figure 3). Even with costly investigations, a project can only narrow, but not close this gap (Karl Herweg and Kurt Steiner, 2002). Realistically, a project can only establish and show **plausible relations** between its actions and changes in the context (Ibd).

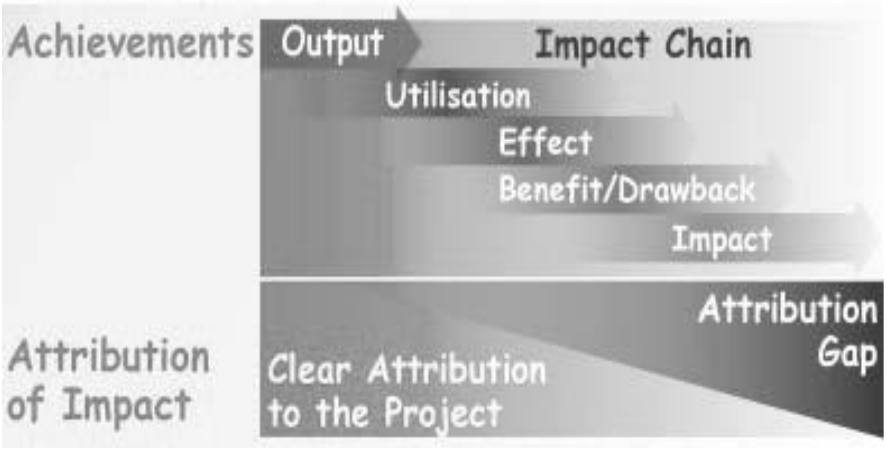

Figure 3 Attribution gap

A project context is highly complex, and in order to make planning, monitoring and evaluation manageable, this complexity needs to be simplified. For this purpose, the components of a context and their interactions are symbolized by simple and measurable quantities known as **indicators**. Principally, project cycle management applies indicators in two ways: output (performance) indicators and impact indicators. *Output (performance) indicators* help to monitor and evaluate a project's efficiency. They are used to determine whether planned activities or expected results were achieved within a given time and budget. *Impact indicators* are used to monitor and assess a project's effectiveness. They describe whether the outputs of a project had further implications, intended or unintended, positive or negative, on the context and its population. A single indicator can describe neither the performance nor the impact of a project sufficiently. Therefore impact indicators need to cover all important aspects of the context and should be manageable given the means and capacity of a project.

III. METHODOLOGY

The assessment has been conducted following five main steps: (i) Analysis of the context; (ii) Formulation of impact hypothesis; (iii) Selection and measuring of impact indicators; (iv) Analysis of changes observed; and (v) Presentation of the findings.

3.1 Context Analysis

The projects areas are situated in those parts of the country where there had been armed struggle. Consequently basic infrastructures had hardly existed. These areas are frequently affected by recurrent droughts, which require supports in terms of interventions that increase food availability, access and utilization. And most of the target areas (especially Rama, Messanu and Dehana) are found in extremely degraded areas where farming had been practiced for many centuries. These areas have poor natural resource base and poor potential for agricultural development, which needs systematic interventions that can rehabilitate the natural resource base and at the same time increase agricultural production.

The context is wider and complex which rewinds around a set of problems rather than one core problem. Analysis of the context (see a flow chart Figure 4) shows the most important aspects or elements in the projects context and their inter-linkage. So as to bring about change on the wider and complex context, a number of multi-phased projects have/had been implemented in five project areas that are situated in different parts of the country. The context which had been given high priority, especially during the first phases of the projects, was related to lack of facilities for social services and emergency relief. And the context which had been given high priority during the middle phases of the projects was related to food insecurity. During the late phases of the projects, the context which has been given high priority is related to gender responsiveness and market oriented production.

The projects implemented so far in the five target areas were designed to bring change on the given context, and they have brought about changes in the context. Major areas of interventions of these projects were: Emergency relief, Natural resources management, Agricultural development (rain fed & irrigated agriculture); Livestock development; Non-farm income generation activities, Safe water supply, Education, Health, Access roads, and Gender/HTP/HIV. Those interventions were in line with the countries overarching development goal of poverty eradiation and country strategies like: (i) Poverty Reduction and Sustainable Development (PRSDP); (ii) Educational Sector Development Program(ESDP); (iii) Plan for Accelerated Growth to Eradicate Poverty (PASDEP) and others.

Most of NCA/Partners were related to the three pillar of **food security** which the country's poverty reduction and sustainable development program adopted, such as: (i) increasing the availability of food through domestic (own) production; (ii) ensuring access to food for food deficit households; and (iii) strengthening emergency response capabilities. Increasing availability can be though conservation based agriculture and irrigation development. The strategy gives priorities for researching and supplying appropriate crop and livestock production inputs and technologies for moisture deficit areas, i.e., short cycle livestock like poultry, sheep and goats as well as development

of drought tolerant, short cycle and relatively high yielding varieties that fit to the farmers' requirements.

For ensuring access to food (for purchasing food from the market), households need sufficient income that can cover at least their minimum food and non-food requirements. However, many households in the drought prone and moisture deficit areas lack sufficient income to meet their basic needs. The country's poverty reduction and sustainable development strategy has indicated food security measures aimed at addressing demand side problems within the framework of the Rural Development Policies and Strategies. Demand side measures like off-farm income generating activities would help supplement own production for a considerable number of farmers. Initiating public employment generation schemes (CFW and FFW) would also help in addressing demand side problems besides it contribution to soil conservation, construction of roads, small-scale irrigation, water supply and sanitation that will in turn contribute to increase food production, stabilize food prices in rural areas and improve health conditions.

The country's plan for accelerated growth to eradicate poverty has two underlying principles that guide program implementation: (i) reliance to the extent possible on helping farmers use their own resources to overcome food insecurity, and (ii) a shift away from reliance on food aid. The key interventions designed to attain household food security are: (i) building household assets through on-farm activities; (ii) a Safety Net Program, which helps bridge food gaps while building community assets; and (iii) introducing non-farm activities. NCA/partners projects interventions were, therefore, in line with the two underlying food security principles of the country's plan for accelerated growth to eradicate poverty.

Under the same strategy, **conservation and management of natural resources** calls for the integrated development and utilization of the resource bases (land, soil, water and forest) to enable the transition to improved livelihoods, and to protect these resources for future generations. Major activities in the areas of natural resource management include, among others, sustainable land use and forests development, soil and water conservation, and water management for irrigation development, which interventions of NCA/partners projects have direct links.
NCA/partners projects were also in line with the country's strategy for providing **water supply** services. Supplying adequate and clean water to the population improves many of the economic and social dimensions of poverty. It improves the health of the population with concomitant advances in the quality of life. Moreover, it releases the labor (particularly that of women and female children) used to carry water, which in turn could be used elsewhere, mainly in education for girls.

NCA/partners interventions on **education** were in line with the country's educational policy focuses on increasing access to educational opportunities with enhanced equity, quality and relevance. The interventions were mainly supporting the multi-year Educational Sector Development Program (ESDP) that stared in 1997/98 with the long-term goal of achieving universal primary education by the year 2015. Sustainable investment in basic education services focused on increasing enrolment and retention of girls through expediting the implementation of ESDP.

HIV/AIDS is another source of vulnerability with serious impact on the effort being made to enhance growth and poverty reduction. Accordingly, NCA/partners have tried to address the problem through mainstreaming HIV/AIDS in interventions in various sectors of the economy, as indicated in the country's HIV/AIDS prevention and control policy. The link between HIV/AIDS and Poverty is made clear by various studies that HIV/AIDS worsens poverty situation both at the individual, household and community levels as well as at the level of the national economy. On the other hand,

poverty increases people's vulnerability to HIV infection. The increase in morbidity and mortality rates as a result of the spread of HIV/AIDS leads to decreased use of time for production purpose and consequently to decreased production and productivity.

In almost any country, women and men have different access to critical economic resources and varying power to make choices that affect their lives, as a consequence of the state of **gender relations** that exists in a given society. The direct result of this is seen in the unequal roles and responsibilities of women and men. Core dimension of poverty (opportunity, capability, security/risk, and dis/empowerment) differ along gender lines, and function to heighten the vulnerability of women. For these reasons, NCA/partners have been focusing on the inclusion of gender in any effort to alleviate poverty. Such interventions were in line with the key objectives of the National Policy on Ethiopian Women to facilitating conditions conducive to the speeding of equality between men and women so that women can participate in the political, social and economic life of their country on equal terms with men and ensuring that their right to own property and other human rights are respected and that they are not excluded from the enjoyment of the fruits of their labor and from performing public functions and being decision makers.

NCA/partners interventions were also in line with the focus of PRSDP to combat **Harmful Traditional Practices (HTPs)** through increasing public awareness on harmful practices such as early child marriage, FGM, abduction etc., that hinder the health, education and overall livelihood of girls and women. NCA/partners interventions have supported broad consultations (communities, elders, church) on traditional taboos and practices that limit the development of women's capability, their public participation and their ability to access livelihood resources.

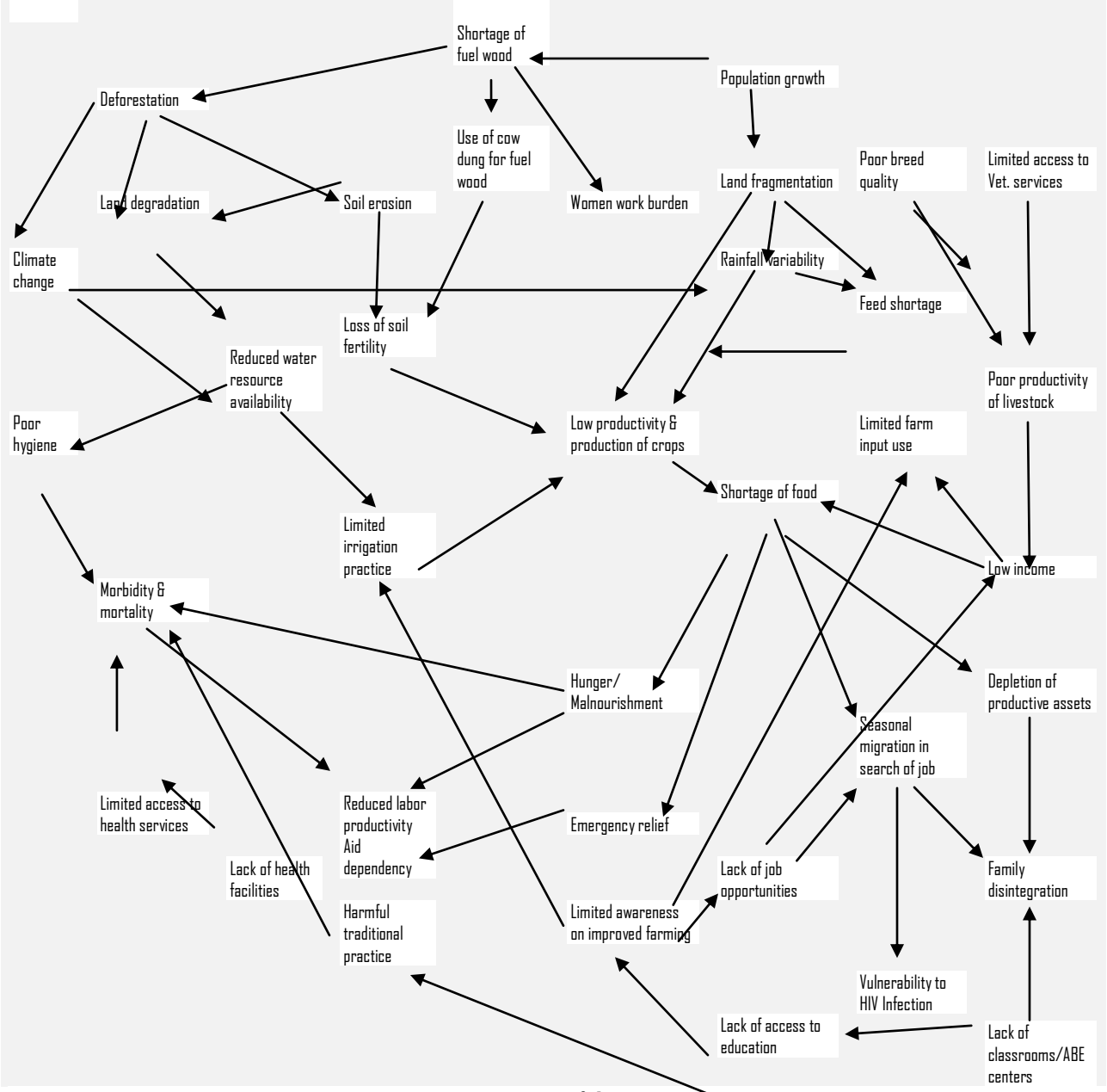

Figure 4 Context of the projects

A concrete baseline data that shows the context before implementation of the multi-phased projects was not available. Hence change in the context was determined by subjective judgments of the target beneficiaries and other stakeholders on "before" and "after" situations in relation to the various sectors of interventions of the projects. It is clear that, between before and after situations, there might be various internal induced and external induced changes that may contribute to changes in the context. Hence this assessment focuses on the most likely plausible indictors that show the contribution of the projects to changes in the context.

3.2 Impact Hypothesis

The projects implemented by each partner have multiple phases that have multiple goal and objectives related to the prevailing context at each phases of the project. Similarly projects implemented by different partners at different places have multiple goals and objectives related to each project sites specific context. But in general terms, those projects implemented at different phases as well as at different places have similar goal and objectives that mainly focused on three thematic areas: (i) rehabilitation of the natural resources base; (ii) improvement in food security; and (iii) enhancing people's well-being such as improving access to safe water, health services, education services and awareness raising on gender, HIV and HTP.

Hence the impact hypothesis was built by developing generic goals and objectives that encompasses the goals and objectives of the multi-phased projects implemented by different partners in different parts of the country. The impact hypothesis was developed visualizing impact chains – utilization, effect, benefit/drawback and impact. Intended impacts such as: (i) the effects of the results of the interventions on the target groups; (ii) associated benefits of the target groups from effects; and (iii) wider implication of the benefits on the target groups were hypothesized in one column. And unintended impacts such as: (i) unintended effects of the results of the interventions on the target groups; (ii) associated drawbacks of unintended effects on the target groups; and (iii) wider implications of the drawbacks on the target groups were hypothesized in another column. Assessment of impacts was, therefore, carried out for each project site based on the generic impact hypothesis and possible impact indicators given in Table 1, with some minor modifications applicable to each project site.

Table 1 Impact hypothesis formulated and possible impact indicators for the projects

Projects Goal: Natural resource base in the target areas rehabilitated and food security and general well-being of the target communities improved.
Projects Propose 1: Natural resources in the target areas rehabilitated through ecologically sound, economically viable and socially accepted natural resources management practices.
<u>Result Indicators:</u> *Improved land capability and land use, improvement in the hydrology of the area, bio-diversity replenishment, knowledge & skill on natural resources management, household/ community assets created and replicability of natural resources management practices.*
Projects Purpose 2: Food security of the target communities improved through improving availability, access and utilization of food in the target communities by promoting crop production that can adapt to climatic changes, livestock development and income generating activities, including emergency relief supports.
<u>Result indicators:</u> *reduced months of food shortage, reduced seasonal migration practice, increase in crop production and productivity, improved skill in irrigation management, adaptability to climate change, improved skill in livestock management and forage development, improved productivity of livestock, household asset creation, improved knowledge and skill on IGA, increase in household income.*
Project Purpose 3: Improved well-being of the target communities through increasing access to safe water supply, health services, education and awareness raising on gender, HIV and HTP.
<u>Result indicators:</u> *households daily water consumption, use of contraceptives, availability and utilization of pit latrines, hand washing practices, solid and liquid waste disposal practices, school attendance of children, child morbidity, labor productivity, knowledge and skill on proper management of water facilities, knowledge, attitude*

and practice on HIV and HTP.		
Stakeholders	**Positive (intended) Impacts**	**Negative or no Impacts**
Community	As a result of physical conservation structures reinforced with plantations, land use and land capability of watersheds improved and bio-diversity replenished (effect); treated gullies able to grow forage and perennial trees (benefit); and integrated soil & water conservation measures enhanced the general hydrology in the watersheds (impact).	Delineation of marginal lands (literary used as a communal grazing land) for closure sites (effect) may limit the size of grazing land (drawback); which may urge the community to adopt an intensive type of livestock management practice (impact).
Men farmers	Involvement in soil and water conservation activities increases the knowledge and skill of farmers (effect); and participation through cash-for-work or safety net benefit them to generate income for meeting food demands of their families or purchase farm inputs and livestock (benefit); better understanding of the importance of soil and water conservation structures and good skill on construction of conservation structures enabled them to conduct timely maintenance of structures and thereby sustain the results (impact).	
Women farmers	Women involvement in implementation of soil and water conservation measures increased their participation in productive activities (effect); and participation through cash-for-work or safety net helps increase women own capital (benefit); which in turn increases women financial independence (impact).	
Landless youth	Closure sites at higher slopes of the watersheds have improved land capability and land use practice (effect); landless youth got access to land and bee fodder for practicing beekeeping within closure sites (Benefit); this has created better opportunities for equitable benefit sharing among the inhabitants of the watersheds (impact).	
Government staffs	Implementation of natural resources management practices increased involvement of government staffs (effect); government staffs acquired better knowledge and skill during the process of implementation of natural resources management practices (benefit); they are attracted by the results observed in rehabilitating the environment and need to scale up best practices in their woredas (impact).	
Community	Provision of emergency relief supports during times of drought increased the communities' access to food (effect); this has enabled communities to cope up with hunger and malnutrition (benefit); and has saved the lives of many people in the target areas (impact).	Provision of emergency relief support during times of drought (effect), may limit own efforts of the community to cope up the problem (drawback), and may develop dependency syndrome (impact)
Men farmers	Introduction of new crop types that can adopt to climatic changes and that have good market values, including practicing irrigation increased productivity and production of crops (effect), this has increased food availability and income of the households	The introduction of some types of new cultivars in the target areas (effect) dominated the cropping system and

	(benefit); and farmers able to create household assets like better houses, livestock, etc., (impact).	affected local cultivars (drawback), which may lead to loss of bio-diversity (impact).
Women farmers	Provision of women with shoats and poultry or startup capital for other IGAs, including skill development enhanced their participation in productive activities (effect), and this increased their income (benefit), which led to greater financial independence of women (impact).	
Landless youth	Participation of landless youth in cash for-work, beekeeping or other IGAs created employment opportunity to them (effect), and enabled them to generate income important to address food demands of their family and create re-investable assets (benefit), which will eventually help them evade seasonal migration in search of job opportunities (impact), which reduced their vulnerability to HIV/AIDS (impact).	
Government staffs	Introduction of new crop types that adapt to climatic changes or that have good market values got appreciation of the government staffs (effect), the government staffs are aware of the techniques of production (benefit), and they are trying to scale up production of these crop types (impact).	
Community	Community members get trained on operation and maintenance of water supply facilities (effect), they able to collect cash for operation and maintenance of water facilities (benefit), this has ensured sustainable services of the water facilities (impact). Community members became aware of prevalence and dissemination of HIV/AIDS, harmful effects of traditional practices like FGM and early marriage (effects), and developed attitudes in favor HIV prevention and attitudes against HTPs (benefit), which most of them practiced in their day-to-day life (impact).	
Households	Households became aware of heath impacts of poor sanitation practices (effect), and prepare and utilize pit latrines and waste disposal pits (benefit), which has enabled them to live in neat and healthy environment (impact).	
Women & girls	Construction of safe water supply facilities (effect), enabled women & girls to fetch water from accessible sites located at reasonably near distances (benefit), which as a result has reduced work burden on women and girls school absenteeism (impact). Access to safe water at reasonable distances and with short queue (effect) enabled households to get adequate water for keeping their hygiene neat (benefit), and eventually improved their health, especially child morbidity (impact), which in turn enhances labor productivity of parents (impact).	
Women & men	Awareness on family planning (effect), enabled them to use contraceptive measures (benefit) and thereby build a manageable family size given the resources they have (impact)	
Children	As a result of construction of school blocks and establishment of ABE centers (effect), children able to get access to education in their localities (benefit), this eventually has raised the rate of	

	enrollment of children (impact).	
Government staffs	Besides construction of health posts, trainings given to the government staffs enhanced their knowledge on birth attendance and VCT service provision (effect), and enabled them deliver quality services to the community (benefit) that will help reduce maternal mortality and HIV prevalence (Impact).	

3.3 Impact Indicators

Relevant impact indicators were selected and used for measuring intended or unintended changes indicated in the impact hypothesis. Those indicators are:

- Land capability and land use
- Hydrology of treated catchments
- Bio-diversity
- Adaptation to climate change
- Household assets created
- Community assets created
- Months of food shortage
- Crop productivity
- Cropping intensity (irrigation)
- Productivity of livestock
- Household income
- Knowledge and skill of farmers
- Daily water consumption of HHs
- Availability & utilization of sanitation facilities by HHs
- Hand washing practices
- School attendance of children
- Child morbidity
- KAP on HIV & HTP
- Use of contraceptives

Due to lack of baseline data that shows the magnitude of those indicators before the projects intervention, judgments of the respondents on the "before" and "after" situations were used to measure indicators. Household income was used to measure very significant changes brought about by few of the interventions which have been implemented during the past one or two years which farmers have fresh memories in the minds. Such indicators were measured through conducting household interviews, focus group discussions, key informants interviews and observation during the field visit by making use of checklists developed for the purpose.

3.4 Data Collection and Analysis (Measuring and Analyzing indicators)

Data collection has been carried out from October 16, 2010 to November 15, 2010 by travelling to all the five project sites (Armachiho, Rama, Messanu, Dehana and Medda Wolabu). Three professionals (the consultant team) and 15 enumerators involved in data collection. While the enumerators conduct household interviews to collect quantitative data, the consultant team collects qualitative information through conducting focus group discussions, key informants interviews and observation, including information gathering from secondary sources. The enumerators involved were from backgrounds related to rural development and most of them were Bachelor Degree holders. Moreover they were well trained on how to approach the respondents and fill the questionnaires. Both the questionnaire and checklist for qualitative data collection were pre-tested and amended as applicable.

Data collected using quantitative survey was coded, encoded in computer software – Statistical Package for Social Scientists (SPSS), and the findings were analyzed using it. Data collected through qualitative survey was summarized content-by-content and supported by pictures as practical

evidences. The analysis tries to show impacts of projects implemented in each project site so as to draw specific lessons pertinent to each specific location. The analysis also tries to summarize main changes attributable to the projects implemented at each site in terms of the three dimensions of sustainability, i.e., ecological, economical and social dimensions by rating changes from zero (no change) to four (very good change). Table 2 below indicates rating of the changes in the variables (impact indicators) that has been used to measure changes across all project sites.

Table 2 Rating impact indicators (following the three dimensions of sustainability)

4 = Very good change	3= Good change	2=Moderate change	1=Slight change	0=No change
I. Ecological impact indicators				
i) Controlled land degradation and improved land capability				
More than 75% of HHs constructed bunds on their farmlands Gully erosion totally controlled, and farmlands at lower slopes totally saved	About 50-75% of the HHs constructed bunds on their farmlands Gully erosion highly controlled, and most of the farmlands at lower slopes saved	About 25-50% the HHS constructed bunds on their farm lands Gully erosion moderately controlled, and run off damage on farmlands at lower slopes reduced	Less than 25% of the HHs constructed bunds on their farm lands Gully erosion slightly controlled, and run off damage on farmlands at lower slopes slightly reduced	No change
The hydrology in the target watersheds enhanced, and irrigation intensified along treated gullies and at down stream Gullies totally changed to potential productive lands	The hydrology in the target watersheds improved and farmers started to use irrigation along treated gullies and at down stream Gullies highly changed to potential productive lands	The hydrology in the target watersheds improved and farmers started to use irrigation along treated gullies Gullies moderately changed to potential productive lands	No considerable improvement in the hydrology Gullies are still treats for further land degradation	
ii) Increase in vegetation cover and biodiversity replenishment				
Plantation practiced on closure sites, on bunds, along gullies and around homesteads More than 75% of the HHs plant shrubs/grasses on bunds The upper catchment totally closed and covered with vegetation	Plantation practiced applying at least three of the strategies About 50-75% of the HHs plant shrubs/grasses on bunds Area at the upper catchment closured and vegetations started to rejuvenate	Plantation practiced applying at least two of the strategies About 25-50% of the HHs plant shrubs/grasses on bunds Area closure started at the upper catchment	Plantation practiced applying at least one of the strategies Less than 25% of the HHs plant shrubs/grasses on bunds No area closure in the catchment	No change
II. Economic impact indicators				
i) Increase in production and productivity of crops				
More than 75% increase in productivity	About 50-75% increase in productivity of grains	About 25-50% increase in productivity of grains	Less than 25% increase in productivity of grains	No change

of grains				
Irrigation enabled them to ensure food security, create HH assets, improve the micro-climate; good institution and reliable marketing system developed for all types of crops	Irrigation enabled them to ensure food security, create household assets, improve the micro-climate, and good institution developed to sustain results	Irrigation enabled them to ensure food security and create household assets	Irrigation enabled them to improve food security	
> ETB 40,000 income from High value crop production in 2010	ETB 20,000-30,000 from High value crop production in 2010	ETB 10,000-20,000 from High value crop production in 2010	< ETB 10,000 Income from High value crop production in 2010	No change
ii) Increase in production and productivity of livestock				
More than 75% increase in productivity of honey	About 50-75% increase in productivity of honey	About 25-50% increase in productivity of honey	Less than 25% increase in productivity of honey	No change
More than 75% increase in productivity of milk	About 50-75% increase in productivity of milk	About 25-50% increase in productivity of milk	Less than 25% increase in productivity of milk	
More than 75% increase in productivity of egg	About 50-75% increase in productivity of egg	About 25-50% increase in productivity of egg	Less than 25% increase in productivity of egg	
More than 75% improvement in maturity date of shoat kids	About 50-75% improvement in maturity date of shoat kids	About 25-50% improvement in maturity date of shoat kids	Less than 25% improvement in maturity date of shoat kids	
III. Social impact indicators				
i) Improvement in peoples well-being				
More than 75% increase in daily water consumption of households	About 50-75% increase in daily water consumption of households	About 25-50% increase in daily water consumption of households	Less than 25% increase in daily water consumption of households	No change
More than 75% increase in HHs who use all types of sanitation facilities	About 50-75% increase in HHs who use all types of sanitation facilities	About 25-50% increase in HHs who use all types of sanitation facilities	Less than 25% increase in HHs who use all types of sanitation facilities	
More than 75% increase in HHs who wash their hands during critical times	About 50-75% increase in HHs who wash their hands during critical times	About 25-50% increase in HHs who wash their hands during critical times	Less than 25% increase in HHs who wash their hands during critical times	
ii) Attitude on gender equality				
More than 75% of the HHs developed attitudes in favor of gender equality	About 50-75% of the HHs developed attitudes in favor of gender equality	About 25-50% of the HHs developed attitudes in favor of gender equality	Less than 25% of the HHs developed attitudes in favor of gender equality	No change

3.5 Presentation of the Findings

The findings of the assessment were presented using both graphic and tabular forms as applicable. Changes observed in the variables (indicators) on each project context are presented using spider diagram.

IV. ASSESSMENT FINDINGS

NAC/Partners projects have in general contributed to improve food security of the target households in terms of increasing availability, access and utilization. Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996). This widely accepted definition points to the following dimensions of food security: (i) **Food availability**-availability of sufficient quantities of food of appropriate quality, supplied through domestic production and/ or imports (including food aid); (ii) **Food accessibility**- access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet; and (iii) **Utilization**-Utilization of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met.

NCA/partners projects have in general contributed to increase food availability through increasing production and productivity of crop and livestock and enhancing environmental sustainability, which is a basis for a continuous improvement of production and productivity. Use of irrigation, application of improved farm inputs and building knowledge and skill of farmers on crop production and livestock management have contributed to increase in production and productivity of crops and livestock. Access to food was enhanced through increasing farmers' income and involving them in cash or food for work activities such as: soil and water conservation activities, access roads and water supply facilities, including emergency relief supports during times of severe drought. Utilization of food was enhanced through creating access to safe water and sanitation, improved hygiene, improved health care services and improved knowledge and skill on feeding different types of fruits and vegetables as well as livestock products.

Improvement in food security has positively influenced the reciprocal relationship between HIV/AIDS and food security. HIV/AIDS is a determining factor of food insecurity as well as a consequence of food and nutrition insecurity. Food insecurity and poverty fuel the HIV epidemic, as people are driven to adopt risky strategies in order to survive. The break-up of households due to labor migration in times of food insecurity as well as the exchange of sex for money or food during crises increase vulnerability, with women and children particularly exposed. In addition, poverty-induced malnutrition is likely to lead to an earlier onset of AIDS, due to an increased susceptibility to opportunistic infections. Thus, food security interventions of NCA/partners have contributed to reducing HIV and AIDS.

Increased access to water supply and sanitation services has: reduced women work load, reduced children school absenteeism, and improved health conditions of the families. Coupled with increased access to education (construction &renovation of schools), improved access to water and sanitation services has increased children, especially girls' school enrollment. Moreover, reduction in harm full traditional practices such as: FGM, early marriage, etc. have good contribution to address problems

of gender inequality. Reduction in early marriage has increased girls' school enrolment, and educated women will have better information and efforts to claim for their rights and enhance gender equality.

Reduction in women work burden and the time that women used to fetch water from far distances or to take care of children sick due to water and sanitation related diseases has enabled them to engage more in productive activities such as: irrigation, shoat rearing, poultry or petty trade, including participation in food/cash for work activities. This has helped women to generate their own income, which will in turn contribute to their financial independence. Associated to their involvement in farming or other income generating activities, men have started to recognize the role that women can play in the household and local economy, which is one step forward to address gender inequality.

The following sections give elaborations on the contributions of NCA/partners projects in improving food security, combating HIV and HTP, enhancing education, promoting gender equality, etc., at each intervention site.

4.1 Impacts of Armachiho Projects

4.1.1 A Retrospective overview of Armachiho projects

Armachiho woreda where the NCA/EECMY-DASSC project initially started implementation had been a big woreda which boarders to the Sudan and encompasses the present three woredas, namely: Lay Armachiho, Tach Armachiho and Tsegedie. Even during the reign of Majesty Haile Silassie, Armachiho had been a place where armed conflicts usually occur. During the socialist regime, it was a place for armed struggle between the then central government and opposing groups. Consequently, the woreda was deprived of social services such as health facilities, educational facilities, safe water and sanitation, etc. These services were very limited, especially in the lowland part of Armachiho (the current Tach Armachiho). Hence NCA/ EECMY-DASSC projects implemented from 1993-2000 GC mainly focused on development of these social infrastructures.

Right after the down fall of the socialist regime and replacement by the Ethiopia Peoples' Revolutionary Democratic Front (EPRDF), the project started interventions in Armachiho area. Associated to high prevalence of malaria, the first priority of the target communities at that time was health service provision. Towards this the project had constructed four health posts and trained health workers who were teaching the community on malaria prevention, symptoms of malaria and treatment, including training of traditional birth attendants.

The second priority of the community was access to education. At Sanja Masero (capital of the current Tach Armachiho woreda), students were attending school under the tree. To alleviate the problem, the project had established seven Alternative Basic Education Centers (ABEs) and constructed five primary schools and one kindergarten in and around Sanja Masero town.

The third priority to the community was access to safe water. People were fetching water from unprotected sources; children were suffering from water born diseases. To reduce the problem, one hand dug well and two springs had been constructed by the project.

The project was dynamic in adjusting its focus towards the most pressing needs of the community. Looking at the higher focus given by the government in building social infrastructures, especially health and education facilities; it shifted its focus to capacity building of the communities on natural resources management, irrigation development, modern bee keeping, and lowland rice production. These activities were designed to improve food security of the community in an environmentally friendly way. Despite the existence of very suitable agro-ecology and perennial river (Sanja River) with ample discharge and much irrigable land; Irrigation was not totally known by the community. Farmers were practicing rain fed production through shifting cultivation, which had led to continuous deforestation of forest lands. The project was, therefore, trying to: (i) delineate and keep forest areas by assigning paid guards selected from the communities; (ii) introduce irrigation using motor pumps; and (iii) introduce modern beekeeping. The intention was to maximize benefits from non-timber products (beekeeping) of the protected forests lands and reduce deforestation by increasing cropping intensity of available farmlands through promoting irrigation.

New types of evergreen trees like *'Nym'* ((Azabirachta indica) were introduced to Sanja Masero to serve as sheds and improve the micro-climate. Ground nut and new types of fruit trees such as mango, avocado and guava were also introduced by establishing one hectare fruit and vegetables production nursery site. The project had also conducted lowland rice adaptability trail, which was latter demonstrated on farmers' fields and disseminated by Dryland Coordination Group (DCG). In addition, the project was trying to rehabilitate X-soldiers in Till Dingay town (capital of the current Lay Armachiho woreda) by training them on tailoring and providing sewing machine.

After the spilt of Armachiho into Lay Armachiho and Tach Armachiho, the project concentrated on lay Armachiho, where vulnerability associated rainfall variability and natural resources deterioration is high. Given the limited resource (600,000.00 Norwegian kroner per year), it was not possible to operate in two woredas where their capitals are situated 60 kms far apart. The project then identified four vulnerable kebeles, namely: Demie, Kerker, Chira Ambezo and Sabia-Sayna kebeles and started implementing food security project. The main components were agriculture, natural resources management, income generating activities, and WASH, including cross-cutting activities such as HIV, HTP and gender. Major activities implemented were soil & water conservation activities, construction of water supply facilities, introduction of highland fruit (apple) and triticale, safe water supply, improved beekeeping, and income generating activities like pottery and weaving.

During the latest phase of the project, focus was given to integrated food security that focused on selected watersheds from Kerker, Chira Ambezo and Sabia-Sinyna kebeles. Demie kebele, which is relatively better off, was taken out from the program. The project tried to concentrate its efforts on selected watersheds for a better impact. The main focus during this phase was on rehabilitation of gullies, provision of shoats and improved beehives to poor households living in those watersheds, and expansion of highland fruit and triticale production, including construction of water supplies facilities in the target kebeles.

4.1.2 Other actors involved in the project area

Other non-governmental organizations that were operational in the target area were: (i) Save the Children Norway (SCN) in construction of schools and eradiation of harm full traditional practices; (ii) SOS on promoting honey marketing; and (iii) Austrian Development Fund (ADF) in diary development. While SCN and ADF are phased-out projects, SOS project is still operational. NCA/EECMY-DASSC projects have no duplications with the efforts by other actors; rather the projects were complementary to the efforts exerted by other actors. Once SCN started construction of schools, NCA/EECMY-DASSC shifted its focus to other components. An effort of NCA/EECMY-DASSC on improving beekeeping is complementary to honey marketing activity that has been promoted by SOS. Similarly, the effort of NCA/EECMY-DASSC on forage development integrated with gully rehabilitation activities is complementary to dairy development interventions of ADF.

In general, assessment of the impacts of Armachiho projects has focused on those achievements that are manly associated to the utilization of the projects resources and collaborative efforts of the government staffs. As a result, achievements elaborated in the following sections are mostly attributed to the projects.

4.1.3 Assessment of the projects effectiveness

Projects effectiveness was measured based on the impact hypothesis developed for three objectives, namely: (i) Natural resources in the target areas rehabilitated through ecologically sound, economically viable and socially accepted natural resources management practices; (ii) Food security of the target communities improved through improving availability, access and utilization of food in the target communities by promoting crop production that can adapt to climatic changes, livestock development and income generating activities; and (iii) Improved well-being of the target communities through increased access to safe water supply, health services and education services, including awareness raising of the communities on gender, HIV and HTP.

4.1.3.1 Natural resources management

i) Preventing land degradation and improving land capability

Gully rehabilitation prevented further land degradation and improved the land capability where by the community able to produce forage and fuel wood along the gullies. Gabion check-dams constructed in the gullies within Fana watershed filled with sediments and created access road (foot-path) where people and pack animals can easily cross the gullies. Check dams constructed within gullies in Fana watershed and Markibign watershed increased water retention and percolation, which has resulted in perennial flow of intermittent streams and their by irrigation practice along treated gullies. Moreover, check-dams reduced the velocity of runoff and saved farmlands at lower slopes. In general, land degradation in Fana and Markibign watersheds reduced, and gullies changed to potential productive lands, which grows grasses, shrubs and trees important for forage and fuel wood.

Figure 5 Rehabilitated gully in Fana Watershed of Kerker kebele, lay Armachiho woreda

Participation of the community members in gully rehabilitation through cash-for-work increased their income and enabled them to purchase food, shoats, etc., which has increased their access to food and strengthens their resiliency to shocks. Participation in cash-for-work activities has especially increased women's own income, which has to some extent increased their financial independence. The communities well understood the benefits of gully rehabilitation, and have developed good skill on gully treatment.

ii) Increased in vegetation cover and bio-diversity replenishment

The vegetation cover, especially in the three watersheds is increasing from year-to-year as the farmers are planting woodlots, forage trees and shrubs and perennial crops like fruit trees and hop around their homesteads, along gullies and along bunds. The project support in terms of tree nurseries and fruit multiplication and demonstration centers has contributed to increase the vegetation cover in the target watersheds. Result of the household survey indicated that 31.37% of the households in the target watersheds constructed soil and water conservation structures on their farmlands, of which 43.75% have planted forage species. In addition, 21.57 % of the households in the target watersheds have woodlots for fuel wood and to generate cash income, 3.92% has fruit trees and 23.53% has hop planted for cash income generation.

Besides plantations by individuals, about five hectare communal land at the upper ridge of Fana watershed is closed from livestock interaction. The closure area and plantations have created better condition for the revival of flora and fauna in the target watershed. Moreover, introduction of new tree species such as 'Nym' (Azabirachta indica) and Poplus (Celtis africana) including different crop types such as: apple, mango, guava, papaya, banana, ground nut and lowland rice have increased biodiversity in the project area. Meanwhile, eucalyptus plantation in treated gullies (Markibign watershed) and on farmlands (Shanko Mesk watershed) is not friendly to the environment for it affects the hydrology and bio-diversity.

4.1.3.2 Food security

i) Increased production and productivity of crops

a) Triticale

The contribution of the project in increasing crop production and productivity was more visible, especially in relation to the introduction of triticale, lowland rice, and horticultural crops. Introduction of triticale- a hybrid of oat and barley which can grow on degraded lands and better cope up with rainfall variability- has increased crop productivity of farmers in lay Armachiho woreda, especially Chira Ambezo Kebele. Triticale adapts climatic changes for it is tolerant to moisture stress or excess of moisture caused by rainfall variability.

In Chira Ambezo Kebele, long years of continuous cultivation coupled with soil erosion has been affecting land capability, where by productivity of the commonly grown crops like; wheat, barley, faba bean and filled pea has been reducing from time-to-time. This coupled with rainfall variability has been affecting productivity of the local crop varieties, thereby affecting food security of farmers. As a copping strategy to the situation, the project has introduced triticale seed to the farmers. Except the need for more labor and skill for food preparation, farmers found triticale important to ensure their food security. On average, triticale gives 13.3 qts/ha, while wheat and barley gives 11.6 qt/ha and 12 qt/ha respectively. Triticale production has been highly replicating, and currently triticale is the dominant crop in Chira Ambezo and the surrounding Kebeles. This in fact has unintended impact on loss of the local cultivars.

Figure 6 Triticale farm in Markibign watershed of Chira Ambezo kebele

Farmers have developed good knowledge of triticale production on poor fertile soils through increasing frequency of ploughing and application of fertilizer and compost, including good skill on utilizing it for food and local drinks. Besides increasing food availability in the households, triticale production has enabled farmers to create productive assets like farm oxen and cow that can further improve food security of the households.

b) Lowland rice

Lowland rice was initially introduced to Tach Armachiho woreda by the project. On its one hectare fenced trail site, the project had been conducting adaptability trails on different verities of sorghum, sesame, lowland pulses and lowland rice. Looking at its success in adopting the area, another NCA supported organization called Dryland Coordination Group (DCG) in collaboration with research centers conducted on-farm demonstrations and distributed rice seeds to the farmers, including provision of machine for pulping rice. The contribution of NCA/EECMY-DASSC in this regard was meaning full. *Not only should those who completed the building, but those who put the corner stone should be acknowledged.*

Lowland rice is more productive and has high market value than its substitutes (sorghum and finger millet). Using fertilizer, a quarter of hectare can produce either 8 qt of sorghum or 4 qt of finger millet. Such a quarter of hectare can produce 20 qt lowland rice, by increasing productivity more 150%. During the time of impact assessment, farm-get prices were 3 ETB/kg for sorghum, 4.50 ETB/kg for finger millet and 6 ETB/kg for rice. Hence many farmers in Tach Armachiho are producing lowland rice. During 2010 crop season, farmers in Tach Armachiho woreda produced lowland rice on 336 hectares of land (Source: Tach Armachiho Woreda Office of Agriculture and Rural Development, October 2010.) And lowland rice producing farmers have got machine for pulping rice.

Lowland rice production has visible contributions in increasing food availability and access to the farmers around Fill Wuha kebele. Farmers' knowledge and skill on production of rice has increased, and production of rice has replicated though traditional seed exchange systems. Unintended impact

of lowland rice production is the need for three times weeding, which compared to other crops needs more labor for weeding.

c) Apple

The other change is the introduction of apple fruit production. Apple has been introduced to the three watersheds of Lay Armachiho woreda by establishing apple propagation and demonstration site in a school compound. This was an intervention designed to promote market oriented production and diversify income sources for the households, which as a result can ensure food security and well-being of the families. From the very beginning, the establishment of apple propagation and demonstration center in a school compound was a wise decision for both good management and better dissemination of knowledge and skills on apple production. Students involved in the process, acquired knowledge and skill and convinced their families to produce apple and generate rewarding cash income.

Trainings and apple seedlings (cuttings) were given to 112 farming households in the three watersheds. And those households whose apple trees start to bear fruits able to generate, on average, ETB 356.30 in 2010 crop year.

The most significant change associated to apple production was observed in transforming the livelihoods of farmer Desalegn in Markibign watershed. He has created good market linkage to retailers at Gondar town, and able to sell apple fruits with attractive prices. In 2010 crop season alone, Desalegn was able to generate ETB 10, 500.00 from 17 apple trees. To further expand his apple farm, Desalegn has started propagation of apple seedlings (cuttings). Moreover, Desalegn has started beef fattening by establishing a joint beef fattening farm in partnership with his colleague from Gondar town. More income initiated him for a better work. And he has a plan to specialize in apple production and beef fattening, which are complementary enterprises.

Figure 7 Apple farms for Desalegn and a women in his neibourhood

In general, apple production has enabled farmers to generate cash income which helped them cover education expenses for their children. Feeding apple has also improved their dietary habit. Farmers have developed the skill on proper management of apple such as irrigation, pruning and propagation. Apple farms have also increased women participation in productive activities. And most of the farmers who have no apple trees showed high interest to plant apple trees. Meanwhile irrigating apple trees has increased women work burn in fetching water to irrigate apple trees, unless apple farms are integrated with household water harvesting facilities like surface run off harvesting structures or dug wells.

d) Lowland fruits and pulse

The project has introduced lowland fruits such as: guava, mango, papaya and banana, including ground nut and tomatoes by raising seedlings on its one hectare new crop verities trial and multiplication site. To demonstrate these crops on farmer's plot, the project had organized and

trained committed individuals from Sanja Masero town and land owners at the periphery of the town who have farmland at the side of Sanja River. The group with the support of the project (in terms of motor pump for irrigation, seedlings and trainings) has established a three hectares fruits and vegetable production demonstration site, and started production of guava, mango, papaya, banana, tomatoes and ground nut. One of the team members had opened a restaurant to add value to the vegetables produced in the demonstration site.

Figure 8 Fruits and vegetables demonstration site at the periphery of Sanja Masero town

Besides improving the livelihoods of the team members, the community in Sanja town has got access to fresh fruits and vegetables, which most of the local residents have never seen in their life. As a result of demonstration of pump irrigation, many farmers started to use pump irrigation. Irrigation practice in Tach Armachiho woreda which was started on 4 hectares with 2 motor pumps increased to 360 hectares (Source: Tach Armachiho Woreda Office of Agriculture and Rural Development, October 2010).

Unintended impact observed in relation to irrigation development was conflict among the group members who established the three hectares fruits and vegetables production demonstration site. Land owners forcefully sent away other members of the group and controlled all the benefits.

ii) Increased production and productivity of livestock

a) Beekeeping

Training farmers on improved beekeeping and provision of improved beehives helped target households generate income which enhances their access to food. The existence of honey marketing cooperative in Tikil Dingay (which has been organized by SOS) has created good market access for honey producers. The project provided improved hives to 81 households in lay Armachiho woreda.

Farmers who have been given improved beehives have improved their knowledge and skill on improved beekeeping, especially beekeeping using transitional hives. Those who have apple farmers are creating good integration with apple production to maximize benefits from the two complementary activities. As a result of introducing improved beekeeping practices by the project, productivity of honey per beehive increased from 7 kg to 9 kg from traditional hives. And newly introduced transitional and modern hives gives on average 21 kg and 17 kg per hive per year, respectively. Honey yield from modern hives is less than the yield from transitional hives may be because modern beehives need more skill than transitional hives.

b) Shoat raring

Shoats (sheep or goat) were provided to 145 poor households, especially women in lay Armachiho woreda. Shoats were provided after training them on proper management of livestock such as feeding, housing and health care, including different forage development strategies. These households have been developing forages and feeding their shoats, which as a result has improved

maturity of shoat kids. Associated to improved feeding and management, maturity of shoat kids for slaughter has been improved from 8 months to 6 months. For those who have cows, milk yield per cow/day increased from 1 liter to 2 liters.

As result of shoat rearing, poor households able to create better access to food and some of them able to create household assets such as construction of better houses and purchase of cows and heifers. The most significant change in this regard was empowerment of W/ro Gulte Chekol. W/ro Gulte Chekol was extremely poor women who have been living by selling local drinks. People were not willing to borrow her, because they suspect her repayment capacity. She was even excluded from invitations of villagers during different festivities because they feel that she has no capacity to provide a reciprocal benefit. In 2001, the project provided her 3 sheep through a revolving grant. She sold 4 sheep and currently she had 7 at home. With the money earned, she was able to cover education fees of her child attending at a college level. Moreover, she has ensured food security of her families, and able to construct house. Now, she looks active in front of others- build sense of self-confidence. The community gives value to her, and her interaction with the community remarkably improved - her voice is heard.

Figure 9 W/ro Gulte's sheep, Markibign watershed and a house for another famer in Fana watershed

c) *Non-farm income*

The project had supported women and landless poor households by training them in different non-farm income generating activities like: tailoring, weaving and pottery. The target groups were organized in sewing, weaving and pottery groups, and trainings and materials pertinent to each activity were given to the respective groups. Sewing group and pottery group were organized in Tikil Dingay town, while weaving groups were organized in Sabia Sayna kebele of lay Armachiho woreda, which has been recently delineated within Gondar town. Meanwhile, none of these activities were successful.

Sewing groups did not sustain as most of the group members resign from the group and went to other areas. The only person left from the group members is the chairperson, whose livelihood had been based on tailoring even before joining the group. Other members of the group were X-soldiers who lack patience to work on tailoring and lead their life. According to the response of the former chair person, the interest of most of the group members was to sell sewing machines and share it. Eventually, when all other group members resign from the group, the chair person handed over nine sewing machines to the Adults Skill Training Center in Tikil Dingay town.

Weaving group was not successful because of three reasons: (i) they did not have adequate technical skill to operate the weaving machine; (ii) the machine was obsolete which cannot produce competitive products; and (iii) low market demand for the products. The project staffs reported that pottery group demolished after the death of the group leader. There was no group member whom we can discuss. We were not in a position to get further information on the reasons for its failure.

4.1.3.3 Improvement in peoples well-being

a) Water supply and sanitation

A total of 35 water facilities (22 SPD, 11 HDW and 2 roof water harvesting schemes) were constructed in Tach Armachiho and Lay Armachiho woredas. These schemes contributed to raise safe water supply coverage in the two woredas. In lay Armachiho woreda, the project contributed to raise safe water supply coverage from 23% to 38%. In the three target watersheds of Lay Armachiho woreda where the project is still operational, safe water supply coverage has raised to 67%. As a result, daily water consumption of the households has increased, which led them to improve their hygiene practices. Water committee (3 male + 2 female) members manage operation and maintenance of water supply facilities. The beneficiary community of water schemes collects and save money for operation and maintenance of water supply facilities. For example, the beneficiaries of a hand dug well in Sabia Sayna kebele have saved ETB 1000.00 from water fee.

In collaboration with health extension workers, the project has contributed to improve hygiene and sanitation practice of the communities. It has also constructed one public toilet at the bus station of Till Dingay town. Survey result on hygiene and sanitation practice of the households (Table 3) showed that considerable changes are observed in hygiene and sanitation practice of the households.

Table 3 changes observed in relation to hygiene and sanitation practices of the households

Situations	After	Before
Daily water consumption per person (liters)	8.2	6.6
Minutes of walk to fetch water (per round trip)	15	19
Households who use Jerry can (plastic pot) for fetching water (%)	72.5	19.6
Households who use pit latrines (%)	78.4	11.8
HHs who have pit latrine with hand washing facility (%)	30	-
Hand washing practice of HHs before eating food (%)	98	86.3
Hand washing practice of HHs after cleaning children faeces (%)	72.5	37.3
Hand washing practice of HHs before meal preparation (%)	96	66.7
HHs who always disposes solid wastes on disposal pits (%)	66.7	5.9
HHs who always disposes liquid wastes in disposal pits (%)	35.3	5.9
Sample size (n)= 51 households (34 male +17 female)		

Source: Household survey, October 2010

Safe water supply, hygiene and sanitation services improved child morbidity and saved the time that would have been used for taking care of sick children, thereby improving labor productivity. Reduction in minutes of walk for fetching water has reduced women workload and improved the

time that women can engage in productive activities. Provision of plastic pots to 157 women has also reduced the burden that women were facing while they were fetching water using clay pots.

b) Health

The project has contributed to create access to health services by constructing four health posts and training health personnel. Health posts had been providing services, especially in accessing malaria drugs to the community. Training health personnel has contributed to raise awareness of the community on malaria prevention and control, HIV prevention, and providing maternal health services. Improved health as a result of supports given by the project had contributed to increase labor productivity.

c) Education

The project had contributed to create access to education by constructing five primary schools and establishing seven Alternative Basic Education (ABE) centers. Before construction of schools both by the government and NGOs, students at Sanja Masero town were attending classes under trees. During that time, the support of the project in constructing school blocks was a visible change in improving children access to education. In addition, establishment of ABE centers has created opportunities for children to get education in their localities without compromising their engagement to support their families. Currently, the primary school in Tikil Dingay has grown to a comprehensive primary school, through supports by other actors (government & SCN). And ABE centers established by the project have grown to first cycle primary schools (satellite schools).

Figure 10 Trees where children were attending class and School constructed for them (Sanja Masero)

d) Awareness on gender, HIV and HTP

As a cross-cutting activity to other interventions, the projects were promoting gender equality. Focus group discussion with farmers indicated that women participation in the community like participation in soil and water conservation activities has been improved. Stereo typing gender roles has also decreased to some extent and men started to support their wives in household chores like child care, cleaning houses, fetching water, etc. But control over resources and benefits in the household are mainly done by men. Result of household survey (Table 4) showed households who have developed attitudes in favor of gender equality.

Table 4 changes observed in attitudes of households in relation to gender equality

Attitudes (% of HH who disagree on the idea)	After	Before
A husband has the right to discipline his wife	21.6	21.6
A man is the ruler of his home	21.6	15.7
A husband has the right to beat his wife if she does not accept his idea	27.5	19.6
A woman could be more productive if she work on household chores	27.5	19.6
Women can engage in farming activities, but they should not have control over the benefits	29.4	21.6

Sample size (n)= 51 households (34 male +17 female)

Source: Household survey, October 2010

In collaboration with health extension workers, the project has been contributing in awareness raising of the community on gender equality, HIV/AIDs and Harmful Traditional Practices (HTPs). As a result, the community has good awareness on HIV transmition and prevention methods. Most of them avoid using sharpen materials in common, and some of the couples went for VCT services before getting into marriage. Meanwhile supports given to OVC are limited. Only close relatives are providing supports to OVCs.

Awareness raising on HTP was mainly addressed by SCN. In collaboration with health extension workers and women affair offices, the project was trying to re-enforce attitudes of the community to avoid harmful traditional practices like female genital mutilation and early marriage. During focus group discussion with representatives of the community, we found that HTPs are already abandoned due to collaborative efforts of many actors, mainly SCN and government, with some contribution by NCA/EECMY-DASSC.

In general, the project has contributed to bring about positive changes in the context in terms of ecological, economical and social benefits. This is visualized using a "spider" or "amoeba" diagram (see Figure 11). For this purpose a rating of changes for each indicator is given as 4 "change is considered very good", 3 “change is considered good”, 2 “change is considered moderate”, 1 “slight change is observed’, and zero “no change in the context".

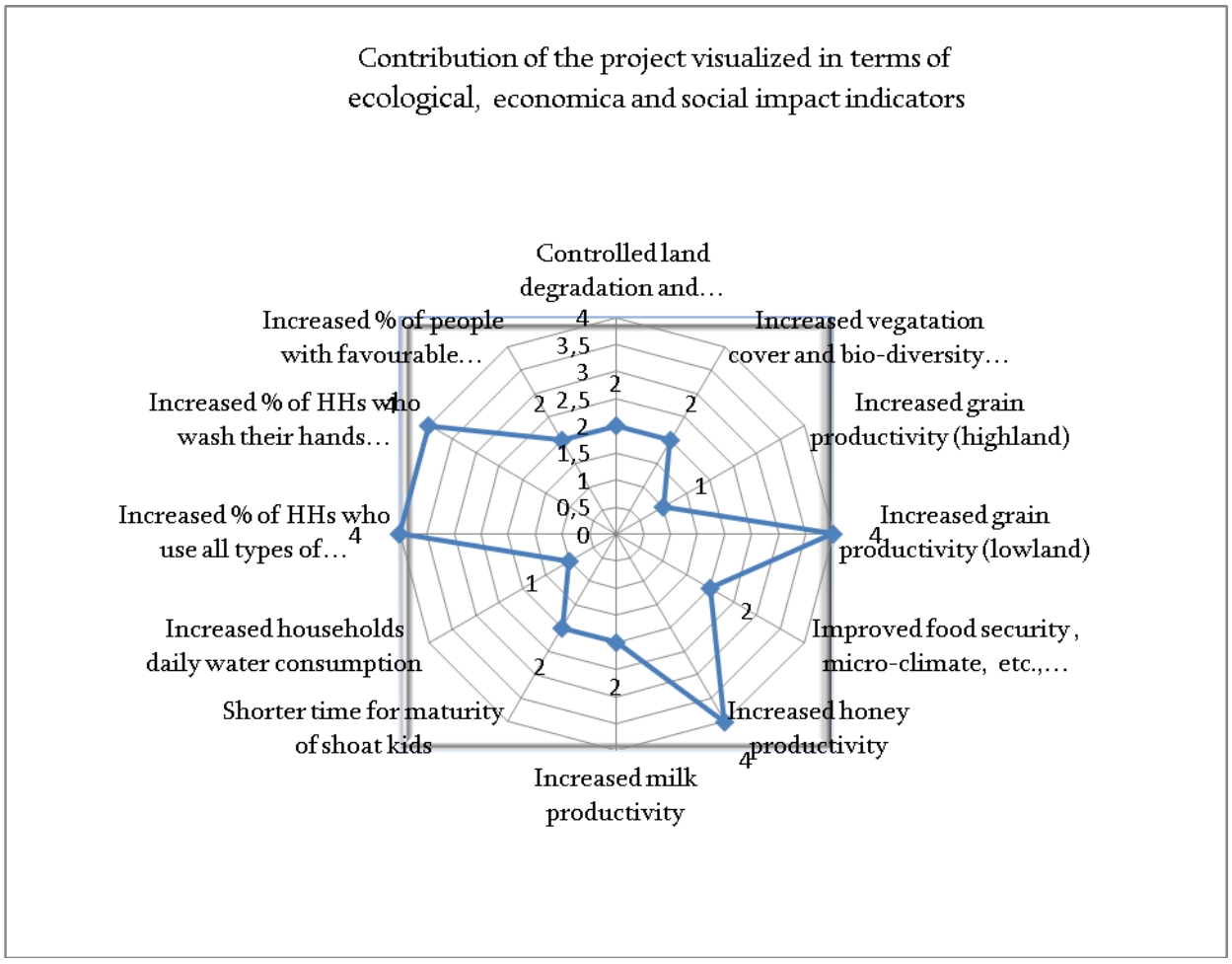

Figure 11 Visualizing changes in the projects context

4.1.4 Conclusion

Implementation of multi-phased projects for the last two decades in Armachiho has, in general, contributed to improve people's access to social services (health, education, safe water, etc); the natural resources base, and food security. The design of these multi-phased projects was dynamic which tries to address priority needs of the target groups at different times. Most of the interventions have been creating synergy with interventions by other actors. Strong collaboration with the government offices has helped to manage the projects with few staffs and thereby commit most of the projects funds to address the needs of the target people. The shift from kebele based approach to a watershed approach has laid good foundation for sustainable natural resources management and agricultural development.

Further land degradation in the target watershed has been moderately controlled, and land capability has been improving. Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure site and along treated gullies. Gaps in this regard are observed on farmlands and gullies where eucalyptus trees are planted, as eucalyptus has drawbacks on the ecology and bio-

diversity. Shift from production of barley and wheat to triticale has also drawbacks related to loss of local crop cultivars.

The multi-phased projects were innovative in introducing new crop types; fruit trees and forest trees that well adapt to the climatic conditions of the target area, and provide economical and ecological benefits to the inhabitants. The projects have introduced market oriented crop types such as highland and lowland fruits, lowland rice, and Poplus (new tree species) that can substitute eucalyptus in terms of economical importance, and is friendly to the environment.

Integrating apple multiplication and demonstration site with schools has supported proper management of the center and enhanced knowledge transfer. As a result, many farmers have adopted the technology, and yet many other farmers are interested to plant apples. The efforts to intercrop garlic in apple farms, use hop as a live fence to apple farms and keep bees around the farm, is also innovative idea that enhances biological pest control, diversifies incomes and maximize benefits from a small plot of land. What is left in this regard is water harvesting facilities, which would have made the farm a more profitable permaculture.

Permaculture has been described as 'integrated farming', 'ecological engineering', and 'cultivated ecology'. The word is a contraction not only of *permanent agriculture* but also of *permanent culture*, as cultures cannot survive without a sustainable food system base and land use ethic. Permaculture is about developing and utilizing ecological human habitats and food production systems. The aim is to achieve harmonious integration of human dwellings, micro-climate, annual and perennial plants, animals, soils and water into stable, productive communities. Permaculture doesn't look at these separate elements but, rather, looks at the synergy between the elements that make up the system as a whole (Bill Mollison and David Holmgren, 1978 cited by Steve Diver, 2002).

Besides introduction of new crop types, building knowledge and skill of farmers on composting, land preparation, and fertilizer application has contributed to improve productivity of crops. And the introduction of motor pump irrigation (from rivers) has increased crop production. But it should be noted that productivity of triticale is decreasing from time-to-time, which necessitates introduction of new generation of triticale (F1 generation).

Training farmers on forage development, shoat rearing, and beekeeping has contributed to increase productivity of milk, honey and shorten months of maturity of shoat kids. All these interventions have contributed to improve food security of the target households. Provision of shoat has contributed to empower poor and voiceless women to be seen active in front of others. Non-farm income generating activities (tailoring, weaving and pottery) were, however, totally unsuccessful. Lessons should be drawn on the need to conduct technological, financial, socio-cultural, market and institutional feasibility of the businesses, before investing in these activities.

Supports in creating access to safe water supply and sanitation facilities has contributed to improve health, reduce women work load and increase labor productivity of the target households. Provision of flour mills also contributed in reducing women work burden. Meanwhile awareness raising on gender has little contribution to bring attitudinal changes towards gender equality. Construction of

health posts and schools has contributed to improve access for health and education services to the target communities.

Institutional dimension of sustainability was not strong for most of the projects interventions. There was no responsible institution (community structures like water shed association) which can sustainably manage and decide on equitable sharing of the benefits in the target watersheds. The beneficiaries of farm income generating activities (shoat & beekeeping) were not organized in a way that they can share knowledge and experiences, including market information. Limitation in group formation, i.e., organizing people with different economical and psychological setup, has led to break down of Tailoring and irrigation groups. Saving schemes that would have strengthen financial capital of the households also lack in all phases of the projects.

4.1.5 Lessons learnt

From the experiences of the multi-phased projects which have been implemented for the last two decades, the following lessons were learnt.

- Application of the watershed approach is important to integrate efforts in selected watersheds and maximize impacts. It recognizes the interrelationships among land use, soil and water, including the linkages between uplands and downstream areas; and organizes land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources.
- Implementation of the watersheds should consider equitable sharing of the benefits to the inhabitants. It should allow poor people (landless people) to benefit from short-term employment opportunities during construction of gully rehabilitation and other related structures, and provide sustainable livelihoods options such as beekeeping at closure sites, fattening small ruminants through cut–and-carry feeding practices, etc.; which tend to proportionate the benefits that people get from watershed development interventions.
- Establishment of responsible community structure (institution) is vital to plan, implement and share equitably the benefits of watershed development interventions. In this regard, establishment of watershed development association, which is lead by a democratically elected watershed development committee, is advisable.
- Saving mobilization is important to strengthen resiliency of the households and create better financial capital for scale up of successful interventions. Especially, organizing women in saving groups can enhance their financial independence, decision making role, and eventually help them empower.
- In order to address the need for apple seedlings by many of the farmers, apple propagation should be considered as one business option for poor farmers. If poor farmers get organized, trained and provided with land and materials, they can address apple seedlings demand by farmers, and at the same time generate income.
- Apple-garlic-hop farm should be considered as one package, and be supplemented with beekeeping and water harvesting facilities. This can help households diversify as well as maximize income from a small plot of land.

- Introduction of new generation triticale (F1 generation) is important to enhance productivity of triticale. It should also be noted that, non-triticale production belt need to be formed as a genetic reserve for local cultivars of barley and wheat.
- Farmers need to engage in non-farm IGAs if and only if the technological, financial, socio-cultural, market and institutional feasibility of the IGAs is promising. Care should be given in organizing people that have common vision, similar economic status and psychological makeup in a group.
- Care should be taken in selecting sites for plantation of eucalyptus trees. Plantation of eucalyptus on farmlands and on gullies should not be encouraged. In gullies, substituting eucalyptus for Poplus should be encouraged for it has both economical and environmental benefits.

4.2 Rama Integrated Rural Development Projects

4.2.1 A Retrospective overview of Rama IRDPs

Merebleh woreda where NCA/EECMY-DASSC Rama Integrated Rural Development Project has been implemented since 1993 is located in the northern tip of the country bordering Eritrea. Major problems of the community were environmental degradation, food insecurity and poorly developed social infrastructures. In addition, the Ethio-Eritrea boarder conflict had caused human trauma and psychosocial unrest on the community. To address the problem, Rama IRDP had been operational in 10 kebeles of the woreda from 1993-2002. Starting from 2003, the project concentrated its efforts on three more needy kebeles that have relatively better potentials to address the needs of the community.

Rama IRDPs were mainly working on natural resources management, water resources development (irrigation and water supply), income diversification and awareness raising on family health, HIV/AIDS and gender mainstreaming. Since 1993, the projects rehabilitated 4850 hectare of land through: (i) construction of hillside traces and trenches on closure areas (upper catchment); and (ii) gully rehabilitation and construction of bunds at lower catchments (farmlands). A total of 193 km hillside terraces have been constructed on 470 hectares. Potable water supply that serves 39, 464 people in the target woreda has also been carried out through development of 5 springs, construction of 34 HDWs & 4 roof catchment, including rehabilitation of 1.5 kilometers pipeline for Rama town water supply.

In order to increase crop production and productivity, one river diversion irrigation scheme constructed, and 29 irrigation pumps provided through revolving grant. About 6,321 fruit seedlings and 400 kg vegetable seeds were distributed to the beneficiaries of irrigation. Poor women and unemployed youth were provided shoats, chickens and modern beehives with bee colonies to diversify their income and their by improve food security.

The multi-phased projects have also increased access to education through construction of one kindergarten, eight school blocks in three schools and rehabilitation of three school blocks in one school. One block building has also been constructed to increase access for VCT services for people living in rural kebeles. The communities got awareness on HIV and gender. Towards this, Gender

and Anti-HIV/AIDS clubs established in 20 schools, and supported with materials. Nutritional support was also given to 20 orphans. Community capacity building activities such as training and experience sharing tours were also given to 10, 699 persons in relation to the various activities implemented by the projects.

4.2.2 Others actors involved in the project area

Other non-governmental organizations that have been operational in the target area are: (i) Relief Society of Tigray (REST), (ii) German Technical Cooperation (GTZ), United Nations Children's Fund (UNICEF) and Ethiopian Orthodox Church Development and Interchurch Aid Commission (EOC-DICAC).

REST works on natural resources management, construction of check-dams for irrigation, drilling boreholes for irrigation, and expanding pump irrigation through installation of hydroelectric power transformer, including supporting farmers in providing improved verities of fruits and vegetables. GTZ works mainly on environmental rehabilitation through implementing integrated soil and water conservation activities. UNICEF and EOC-DICAC work on construction of safe water supply services. Efforts of these actors were not duplicated. They rather supplemented each other in scaling up irrigation in the target area and raising coverage of water supply in the woreda.

Assessment of the impacts of Rama integrated rural development projects has focused on those achievements that are manly associated to the utilization of the projects resources and collaborative efforts of the government staffs. As a result, achievements elaborated in the following sections are mostly attributed to the project.

4.2.3 Achievements of Rama integrated rural development projects

Projects effectiveness was measured based on the impact hypothesis developed for measuring the three objectives, namely: (i) Natural resources in the target areas rehabilitated through ecologically sound, economically viable and socially accepted natural resources management practices; (ii) Food security of the target communities improved through improving availability and access to food in the target communities by expanding irrigation and promoting income diversification; and (iii) Improved well-being of the target communities through access to safe water supply, health services, education and awareness raising on Gender, HIV and HTP.

4.2.3.1 Natural resources management

iii) Preventing land degradation and improving land capability

The communities well understood the benefits of gully rehabilitation, and have developed good skill on gully treatment and construction of other soil and water conservation structures like hillside terraces, trenches and bunds. Hillside terraces and trenches are constructed on closure sites. About 58% of the households in the treated watersheds constructed bunds on their farmlands. Participation of the community members in gully rehabilitation through cash-for-work increased their income,

which has increased their access to food. Participation in cash-for-work activities has, especially increased women's own income, and --to some extent increased their financial independence. Moreover, cash-for -work activities reduced seasonal migration of people in search of job opportunities.

Treatment of watersheds prevented land degradation and improved the land capability. Integrated efforts in rehabilitation of gullies in the watersheds using gabion check-dams, area closure at the upper slopes of the catchment, and construction of hillside terraces & deep trenches, has prevented land degradation and improved the land capability. Soil erosion at farmlands downstream prevented. The hydrology at downstream improved thereby enhancing irrigation practices at farms on lower slopes. Closure sites become good potential for bee forage as well as fodder for shoats and cattle through cut-and-carry practices.

Figure 12 Rehabilitated gully and treated watershed in Wodihazo Kebele

iv) Increased in vegetation cover and bio-diversity replenishment

Area closure enhanced rejuvenation of the vegetation cover, and enabled target communities to harvest forage through cut-and-carry practice. Increase in the vegetation cover at closure sites became habitat for wild animals like hyena, fox and birds like partridge and owl. The vegetation cover in the target watersheds has also increased as the farmers are planting woodlots around homesteads, forage shrubs on bunds and perennial crops like fruit trees on irrigation sites. Result of the household survey indicated that 58.3% of the households in the target watersheds constructed soil and water conservation structures on their farmlands, of which 56.25% have planted forage species on bunds. In addition, 33.3 % of the households in the target watersheds have woodlots for fuel wood and for market.

Figure 13 Area closure in Hamedo watershed

Different species of fruit trees like mango, banana, orange, guava, papaya, etc. have been introduced at irrigation sites. Besides the replenishment of fauna and flora; the vegetation cover at closure sites, bunds and homesteads, including fruit trees at irrigation sites has contributed to improve the micro-climate. Farmers sense the change in micro-climate.

Nursery established by the project and handed over to the government office of agriculture and rural development has been serving the communities in the woreda. The communities participated and decide on delineating closure sites. But there is limitation in taking the responsibility to sustainably manage the watershed. Community structure like watershed association, which would have ensured sustainability of the project outputs and enhanced equitable benefits sharing among the inhabitants of the watersheds, would have been established. Few individuals let their cattle to graze on closure sites. Commitment of the target beneficiaries to maintain conservation structures through free labor was also weak.

4.2.3.2 Food security

i) Increased production and productivity of crops

Increased production and productivity of crops was observed associated to the introduction and expansion of irrigation development in the target area. Before the project, irrigation practice was nil. But during 1993-1995, the project trained farmers on motor pump operation and introduced 10 motor pumps for irrigation through a revolving grant. In addition, the project provided fruit seedlings and vegetable seeds to these farmers. Looking at the success of piloted pump irrigation practices, farmers have expanded pump irrigation. Currently, pump irrigation scaled up to 36.6 ha that serves 162 target households. Including collaborative efforts by the government and other actors like REST, motor pumps in the woreda have reached to over 300.

In addition to motor pump irrigation, the project promoted gravity irrigation by diverting Nefeha River. More than 81 hectare land has been developed using Nafeha diversion. Double cropping is practiced on 40 hectare, while supplementary irrigation is practiced on 41 hectare. This has increased cropping intensity in the irrigated area to 150%. Nefeha irrigation scheme is managed by Water Users Association (WUA), which is led by a democratically elected representative - water committee. Water committee collects ETB 20.00 per month per hectare from the beneficiaries, for each month the beneficiaries use irrigation water.

Figure 14 Irrigation practice at Nefeha diversion, Medhin kebele

In general, irrigation in the target woreda is practiced on 2,618 hectares by using both surface water and underground water. Irrigation has contributed to increase production and productivity in two ways: (i) increase in cropping intensity; and (ii) productivity improvement. For those farmers who are producing twice a year the intensity has increased, thereby increasing crop production from a given area. Increase in productivity is associated to utilization of improved seed and fertilizer besides irrigation. Before practicing irrigation, rainfall variability was highly affecting crop productivity. But after practicing irrigation, farmers able to mitigate the effects of moisture stress on crop yields through applying supplementary irrigation.

Before farmers started to use irrigation, they were mainly producing sorghum, millet and teff which are less in productivity and marketability. And utilization of improved seeds and fertilizer was very limited because of uncertainties on moisture (rainfall) availability. But after they start irrigation, the productivity of these crops doubled associated to use of fertilizer and supplementary irrigation.

Moreover, moisture regulation through irrigation practice has enabled farmers to grow more productive and high value crop types such as fruits and vegetables. They have been producing fruits and vegetables that give high yields and can be sold with attractive prices. Banana, papaya, tomatoes and pepper are the main crops produced using irrigation. Other fruits like mango and citrus are also

introduced to the farmers. These fruits and vegetables have high yields and high market value. For example, farmers estimated their tomatoes production to be about 200 qt per hectare.

Banana producers have established banana marketing cooperative, and sell their produce to consumers at Adwa and Axum towns. Meanwhile, maturity of tomatoes at the same time (from most of the farms) has affected market prices of tomatoes. The effort to link producers to Axum University was not successful as the farmers produce was only a short season supply, which cannot meet demands of the university throughout the year. Adjustment of the cropping pattern and crop calendar would have reduced the problem.

Increase in production and productivity of crops has increased availability and access to food for the target households. Associated to feeding fruits and vegetables, dietary habits (nutrition) of the target households also improved. These households totally avoid seasonal migration in search of jobs opportunities, which they were practicing it whenever crops failed to give adequate yields. Furthermore, 12.5% of the irrigation beneficiary households able to create household assets such as: build houses in Rama town; buy jewelry for their wives, buy livestock like shoat and cattle. Irrigation beneficiaries have developed a sense of self- confidence and good vision to further transform their lives to a better well-being.

Irrigation has increased participation of women in production and marketing of fruits and vegetables. In the process, men have started to acknowledge the role that women can play in improving the household economy, which is one step forward for gender equality in the household. Unintended impact observed in this regard is that getting better income from irrigation led few male farmers to drink in the town. Introducing group saving systems would have reduced the problem.

As a result of the trainings given to them and practical exercises, farmers have developed good knowledge and skill on: irrigation water application (furrow irrigation and boarder irrigation), irrigation scheduling, pump operation, pruning of fruit trees and application of manure, compost and fertilizer. Limitations in this regard are lack of skills on pump maintenance and bed preparation for tomato crops. Training few capable people among the beneficiaries of motor pumps would have addressed the problem. Similarly, practical demonstration on how to support tomato crops using beds (be it from wood or rope) would have helped farmers avoid losses associated to ruin of tomatoes before harvest.

Other challenges of irrigation production are crop diseases that affect citrus and tomatoes. Farmers have tried to mitigate it by using both biological and chemical controlling measures. Traditional gold mining practices on the upper catchments of Kalay Rasu River reduced the discharge of the river (especially during the driest period), which consequently has reduced irrigation water for those households who pump out water from the river.

ii) Increased production and productivity of livestock

a) Beekeeping

Training farmers on improved beekeeping and provision of improved beehives helped target households generate income which enhances their access to food. The project trained households on improved beekeeping and provided them with improved beehives with bee colonies. The most significant change in this regard was observed in Wodihazo watershed, where a farmer- Ato Abay Tesfaye has specialized in beekeeping. He has 16 modern beehives. Besides better opportunities created for bee fodder on the closure site, he has developed be fodder on his own farmland. As a result, he was in a position to harvest up to 45 kg honey/per hive per year. Traditional beehives give 7-10 kg per hive per year. Given the current price of honey (ETB 120/kg), he has generated rewarding income from beekeeping. This has remarkably increased access to food for his families. Training given to farmers on beekeeping using modern beehives has also built farmers skill (created human capital) on modern beekeeping practice.

b) Shoat rearing

Shoats (sheep or goat) were provided to poor women headed households in target kebeles through revolving grants. These households were sending their kids to keep herds for better off families, and they were working as daily laborer in the farms of better off households, especially during weeding and harvesting. Due to lack of farm power they rented out their small plots of land to other farmers. In order to diversify income of poor women headed households, the project provided them with shoats. Shoats were provided after training women on proper management practices such as: feeding, housing and health care. As a result, they have been able to collect acacia pods and feed their shoats whenever grazing/browsing is not adequate.

In this regard, most significant changes were observed on the lives of W/ro Hiwot Gebre Amlak and W/ro Tsigie Giday. By rearing shoats given to them through the project, W/ro Hiwot has used 4 goats for her family consumption during religious festivities and 4 goats for market. She has paid her loan, and now she has 10 goats. Similarly, W/ro Tsigie has sold 5 sheep to repay her loan and full fill food demands of her family. She has now 7 sheep. So as to enhance sharing of experiences among them on management and marketing of shoats, these women are organized in a group. For the future, they have a plan to buy farm oxen and cultivate their land. In this regard, group saving would have been started to save money by installment.

Figure 15 Women engaged in shoat rearing in Maywoine kebele

In general, provision of shoats has enabled these households to improve food security of their families and their children able to attend school. Furthermore, their access to credit has increased for shoats can serve as collateral. All these better conditions helped them to develop sense of self-reliance, which eventually can lead them to empowerment.

c) Diary

Changes in this regard were observed associated to provision of bull service and training farmers on forage development. For those farmers who get bull services from Barka breeds and able to develop and feed forages like elephant grasses, milk productivity increased from 2 liters per cow per day to 4 liters per cow per day. This has contribution to increase the household's access to food by selling milk and milk products. Feeding milk has also a contribution to improve nutrition for the family.

4.2.3.3 Improvement in peoples well-being

a) Water supply and sanitation

A total of 43 water supply schemes (34 HDW, 5 SPD and 4 roof water harvesting schemes) were constructed by the project. These schemes contributed to raise safe water supply coverage in the woreda to 73.48%. As a result, daily water consumption of the households increased, which in turn led them to improve hygiene practices.

The project has contributed to improve hygiene and sanitation practice of the communities through providing awards (certificate) to model households who constructed and properly utilize sanitation facilities. Survey result on hygiene and sanitation practice of the households living in the target area (Table 5) showed that remarkable changes are observed in hygiene and sanitation practice of the households.

Table 5 changes observed in relation to hygiene and sanitation practices of the households

Situations	After	Before
Daily water consumption per person (liters)	11	6
Minutes of walk to fetch water (per round trip)	21	47
Households who use Jerry can for fetching water (%)	79.2	8.3
Households who use pit latrines (%)	91.6	0
HHs who have pit latrine with hand washing facility (%)	41.7	-
Hand washing practice of HHs before eating food (%)	100	1.9
Hand washing practice of HHs after cleaning child faeces (%)	100	83.3
Hand washing practice of HHs before meal preparation (%)	91.6	75
HHs who always disposes solid wastes on disposal pits (%)	83.3	0
HHs who always disposes liquid wastes in disposal pits (%)	83.3	0
Sample size (n)= 48 households (33 male + 15 female)		

Source: Household survey, October 2010

Safe water supply, hygiene and sanitation services improved child morbidity and saved the time that would have been used for taking care of sick children, thereby improving labor productivity. The two public toilets constructed in Rama town have also contributed to improve sanitation of Rama town. Similarly, a toilet constructed at Daffa primary school improved sanitation around the school. Reduction in minutes of walk for fetching water has reduced women workload and improved the time that women can engage in productive activities. Limitations in this regard were: water points are not fenced and maintenances are not taken timely. Consequently a considerable number of water

points, especially hand dug wells were not functional. Fencing water points with vegetation would have been done.

b) Health

The project has contributed to create access to health services through renovation and provision of materials to Rama health center. Construction of one block building for Semerte health post has, especially enabled the community to get access for VCT services in their localities. According to the response from the medical experts working in the health post, many (on average 250-350) people get VCT services in every year. As the area is close to the boarder of the country where both civilians and non-civilians are living in the neighborhoods, the potential for having multiple sexual partners is high. Hence creating better access to VCT services has good contribution for HIV prevention and control. Provision of motor cycle to the woreda health office has also contribution to improve outreach health services. Interventions in building or renovating health facilities and provision of motor cycle have, in general, contributed to improve heath of the target people and thereby improve labor productivity.

c) Education

Construction of class rooms and furnishing the class rooms for Rama primary school, Daffa primary school and construction of kindergarten at Rama town has generally improved children access to education. The most significant change is, however, observed associated to construction of one block classroom at Hamedo first cycle primary school, which has enabled children to attend classes in rooms. Before the project support, children were attending class under sheds. Thanks to the project, at least early aged children were able to attend class inside a room. Yet students of grade four are attending their class under the shed. Construction of one additional classroom before the project phase out would have been very meaningful humanitarian activity.

Figure 16 Children attending classes under the shed and the new school block (Hamedo kebele)

d) Awareness on gender, HIV and HTP

As a cross-cutting activity to other interventions, the project was promoting gender equality through training community members and promoting gender by using school gender and HIV/AIDS clubs. Survey conducted in this regard (Table 6) showed that most of the people have developed good attitudes towards gender equality.

Table 6 changes observed in attitudes of households in relation to gender equality

Attitudes (% of HH who disagree on the idea)	After	Before
A husband has the right to discipline his wife	77.1	2.1
A man is the ruler of his home	79.2	2.1
A husband has the right to beat his wife if she does not accept his idea	81.25	0

A woman could be more productive if she work on household chores	79.2	2.1
Women can engage in farming activities, but they should not have control over the benefits	77.1	2.1
Sample size (n)= 48 households (33 male + 15 female)		

Source: Household survey, October 2010

In collaboration with school clubs, the project has been contributing in awareness rising of the community on HIV/AIDs and Harmful Traditional Practices (HTPs). As a result, the community has good awareness on HIV transmition and prevention methods. Most of them avoid using sharpen materials in common, and many of the couples went for VCT services before getting into marriage. Meanwhile supports given to PLWHA and OVC by the community are limited. Only close relatives are providing supports to PLWHA and OVCs. Practices of early marriage and FGM highly reduced. About 33% of the households use contraceptives (mainly pills).

In general, the project has contributed to bring about positive changes in the context in terms of ecological, economical and social benefits. This is visualized using a "spider" or "amoeba" diagram (see Figure 17). For this purpose a rating of changes for each indicator is given as 4 "change is considered very good", 3 “change is considered good”, 2 “change is considered moderate, 1 “slight change is observed’, and zero “no change in the context".

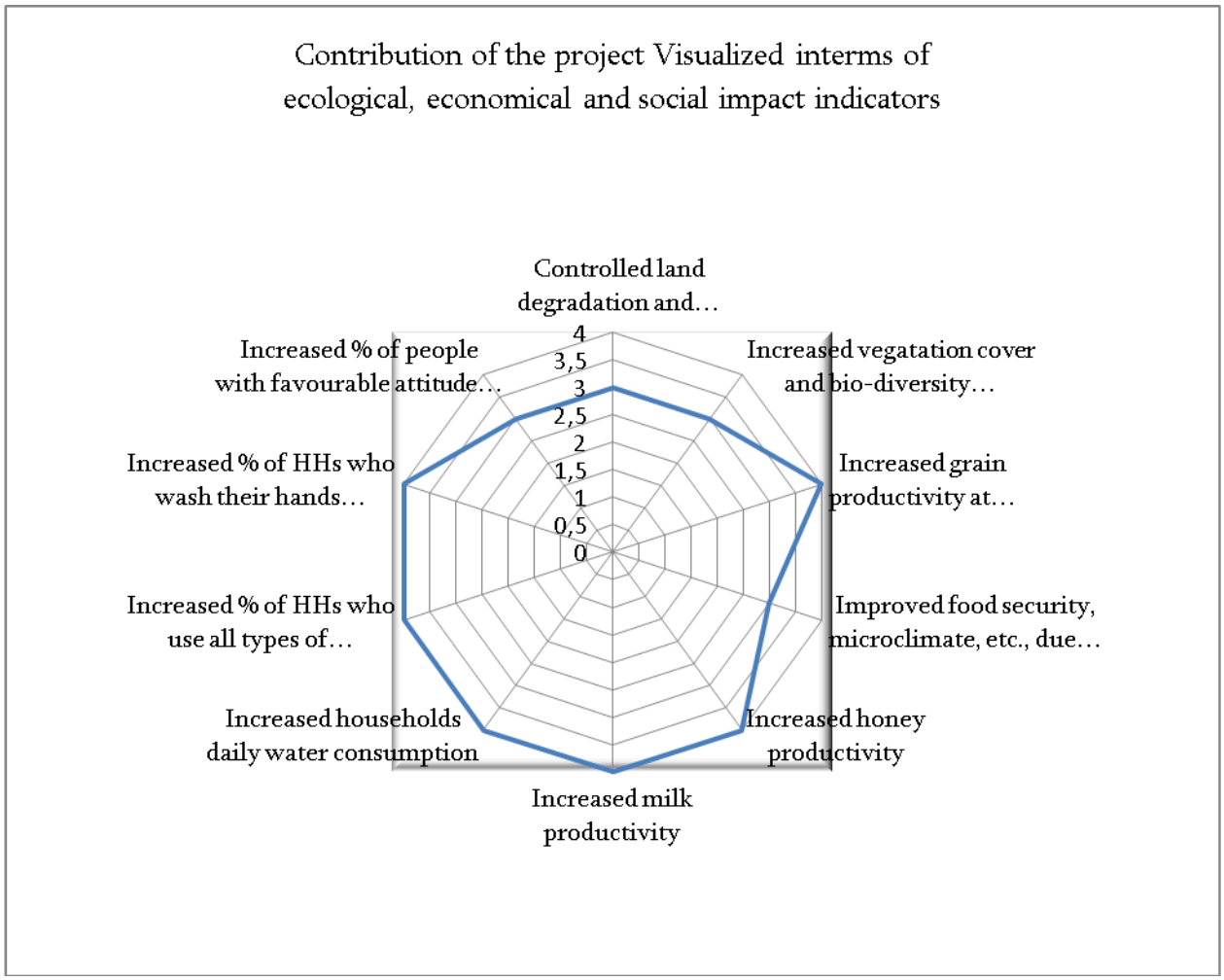

Figure 17 Visualizing changes in the projects context

4.2.4 Conclusion

Implementation of multi-phased projects for the last two decades in Merebleh woreda has, in general, contributed to improve: the natural resources base, food security and people's access to social services (health, education, safe water, etc). The multi-phased projects have tried to address priority needs of the target groups at different times. Most of the interventions have been creating synergy with interventions by other actors. Strong collaboration with the government offices has helped to manage the project with few staffs and thereby commit most of the project funds to address the needs of the target people. The shift from kebele based approach to a watershed approach has laid good foundation for sustainable natural resources management and agricultural development.

Further land degradation in the target watershed has been highly controlled, and land capability has been improving. Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure sites. Limitations in this regard are lack of community structure that will be responsible for sustainable management of the project outputs through mobilizing the community and carrying out timely maintenances of physical structures, including protecting closure sites.

Introduction motor pump irrigation and construction of Nefeha diversion has increased crop production. The multi-phased project was innovative in introducing new crop types; fruit trees and forest trees that well adapt to the climatic conditions of the target area and provide economical and ecological benefits to the inhabitants. The project has introduced market oriented crop types such as fruits and vegetables that give better yield and have good market value. Besides introduction of high yielding and marketable crop types, building knowledge and skill of farmers on irrigation agronomy has contributed to increase production and productivity of crops.

Increase in production and productivity of crops has remarkably improved food security of the beneficiary households, and enabled them to create household assets which have strengthened their resiliency to shocks. Limitations in this regard are lack of skill on motor pumps maintenance and bed making for tomato crops.

Training farmers on forage development, shoat rearing, and beekeeping, including bull service provision has contributed to increase productivity of milk and honey. These interventions have contributed to improve food security of the target households. Shoats, especially contributed to diversify incomes for poor women headed households. Provision of shoat has contributed to empower poor and voiceless women to be seen active in front of others.

Provision of bull service coupled with training farmers on forage development has increased productivity of milk from Barka breed cows. And the introduction of modern beehives has remarkably increased honey yield per hive. Limitation in this regard is lack of group saving systems that would have helped the beneficiaries mobilize savings for future scale up of these activities and transforming their well-being.

Supports in creating access to safe water supply and sanitation facilities has contributed to improve health, reduce women work load and increase labor productivity of the target households. Similarly, awareness raising activities have good contribution to bring attitudinal changes of the community towards gender equality and prevention of HIV and HTP. Supports given in terms of renovation and construction of health facilities, including material provisions has contributed to improve access for health services to the target communities. Similarly, supports given in terms of construction and furnishing schools contributed to create child friendly schools.

4.2.5 Lessons learnt

From the experiences of the multi-phased projects which have been implemented for the last two decades, the following lessons were learnt.

- Application of the watershed approach is important to integrate efforts in selected watersheds and maximize impacts. It recognizes the interrelationships among land use, soil and water, including the linkages between uplands and downstream areas; and organizes land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources.

- Implementation of the watersheds should further consider equitable sharing of the benefits to the inhabitants. It should allow poor people (landless people) to benefit from short-term employment opportunities during construction of gully rehabilitation and other related structures, and provide sustainable livelihoods options such as beekeeping at closure sites, fattening small ruminants through cut–and-carry feeding practices, etc.; which tend to proportionate the benefits that people get from watershed development interventions.
- Establishment of responsible community structure (institution) is vital to plan, implement and share equitably the benefits of watershed development interventions. In this regard, establishment of watershed development association, which is lead by a democratically elected watershed development committee, is advisable. The association needs to initiate the community to conduct timely maintenances of conservation structures and protect closure sites.
- Saving mobilization is important to strengthen resiliency of the households' and create better financial capital for scale up of successful interventions. Especially, organizing women in saving groups can enhance their financial independence, decision making role, and eventually help them empower.
- Practical training should be given to capable farmers who have irrigation motor pumps on motor pump operation and maintenance, so that they can able to maintain their motor pumps and give maintenances services to their neighborhoods through charging reasonable payments. Arranging practical training and experience sharing with farmers at Fogera woreda of Amhara region is advisable, as the farmers at Fogera are real practical experts in maintenance of motor pumps.
- Besides looking for different options of creating better market outlet for tomatoes produced using irrigation, adjusting the cropping pattern as well as the planting time will help regulate the amount of tomatoes produced and supplied to the market, and thereby mitigate price fluctuation. Introducing contract farming (farmers getting into contracts with hotels and restaurants in the towns) should also be promoted.
- Conducting on farm demonstration on production of tomatoes using beds can help to maximize yields from tomato production at Nefeha diversion irrigation scheme.
- Promoting group savings among the irrigation beneficiaries would help farmers save extra incomes instead of using it for drinking.
- Negotiations between upstream water users (traditional gold miners) and downstream water users (pump irrigation beneficiaries) of Kalay Rasu River would help arrange an agreed time for water use. For example, irrigation users can use it in the morning and evening while gold miners can use it in the other times.
- Construction of one additional room at Hamedo fist cycle primary school would help create child friendly school environment for the students who are attending classes under the shed.

4.3 Medda Wolabu Community Development Project (CDP)

4.3.1 A Retrospective overview of Medda Wolabu CDP

Medda Wolabu Community Development Project (CDP) had been implemented in Medda Wolabu woreda, Bale zone of Oromia region. The area receives bi-modal rainfall- 'Ganna' (main rainy season from March to May) and 'Hagaya' (short rain season from September to mid November). The average annual rainfall is about 700 mm, and average annual temperature ranges from 10 - 33 degree centigrade. Medda Wolabu is one of the drought prone districts of Bale zone, where occurrence of drought during the 1984/85 had caused human catastrophes.

Medda Wolabu CDP was a subsequent phase of Dollo Community Development Project that had been implemented by NCA, following the relief support of NCA that saved the lives of many people during the 1984/85 drought. Following the emergency relief support, NCA had been implementing a drought recovery program through construction of access roads, run off harvesting ponds and veterinary health posts, including provision of farm oxen, seeds (maize, teff, sorghum & chickpea) and farm implements.

NCA/EECMY-DASSC Medda Wolabu CDP had been implemented since 1993, so as to address problems of the community in relation to food security and social infrastructures. Occurrence of recurrent droughts has been affecting food security of the community, and social infrastructure such as water supply facilities, health facilities and schools were not easily accessible. The project had been operational in 5 kebeles of the woreda, namely: Mandhico, Gennale Melka Chira, Barisa, Hara Haji and Hara Kore.

Medda Wolabu CDPs were mainly working on: access road construction, irrigation development, introduction of high–value crops, saving and loan for women groups, potable water supply, health and education. In order to increase crop production and productivity, pump irrigation was introduced on 27 hectares of land by organizing farmers and providing them with two motor pumps, including fruit seedlings and vegetable seeds.

The multi-phased project had also been working on construction of shallow wells, ground cisterns and roof catchments. These projects have increased access to education through construction of school blocks for primary schools and promoting adult literacy. Efforts had also been exerted in improving health of the target community, through construction of health posts, and raising awareness of the community on hygiene and sanitation, HIV prevention and family planning.

4.3.2 Others actors involved in the project area

The presence of NCA in Medda Wolabu dates back to more than two decades. With the absence of project office, it was not an easy task to get adequate information on which organizations had been involved in the area since 1984/85. Hence, the assessment team could not look into how different actors were working, to draw lessons from the strengths or drawbacks of strong/weak collaboration and synergy among different actors.

Assessment of the impacts of Medda Wolabu Community Development Project was not limited to the impacts brought about by NCA/EECMY-DASSC partnership efforts. It rather has tried to assess

the impacts of all efforts of NCA since the time of emergency relief and recovery support. This is because the supports at earlier times have attributions to changes observed after the emergency recovery support. We also believed that NCA has accountability to report the changes that resources committed for emergency and recovery has brought about. Therefore, achievements of NCA and NCA/EECMY-DASSC efforts are elaborated in the following section.

4.3.3 Achievements of Medda Wolabu CDP

Projects effectiveness was measured based on the impact hypothesis developed for measuring the two objectives, namely: (i) food security of the target communities improved through improving availability and access to food in the target communities by emergency relief & recovery supports, introducing irrigation, introducing high-value crops, providing farm inputs (farm oxen, seeds and farm implements) and promoting income diversification; and (ii) improved well-being of the target communities through access to safe water supply, health services, education and awareness raising on Gender, HIV and family planning.

4.3.3.1 Food security

i) Increased access to food for drought affected people

Emergency relief supports have saved the lives of many people during the 1984/85 drought. Besides provision of food grain and oil, NCA had been providing therapeutic feeding to malnourished children. As a result, it saved the lives of many people. Survey result indicated that 28.8% of the households benefited from emergency relief interventions. During our discussion with the community groups in Mandhico keblele, one of the participants expressed the benefit in terms of saving his life. *"I was a child during the drought time. My parents told me that I had got therapeutic feeding. In fact, Allah knows what would have been happened. But I can imagine that had there been no therapeutic feeding support during the draught, I wouldn't have been here to discuss with you."* In addition, access roads constructed to transport relief food have been serving members of the community to get out reach health services, and for other purposes like selling sand.

ii) Emergency recovery impacts

People in the target area were nomadic pastoralists. Farming making use of oxen was introduced to the area after the drought situation that has caused for loss of their herds. For emergency recovery, NCA provided them farm oxen, grain seeds and farm implements. For example, Sheh Hussein from Madda kebele, had been provided with oxen, wheat and maize seeds and farm implements, which enabled him fulfill food demands of his family and construct three rooms house. After this program, nomadic pastoralist way of life has changed to agro-pastoralist way of life. The shift in their way of life has led to sedentary settlement of the people. As a result, villages where there was no even a single improved house (house with a roof made of corrugated iron sheet) have changed to small rural

towns. Stores constructed (4 stores) for seed grains are still serving the community to store safety net resources. Improved seeds of grains (early maturing varieties of teff, sorghum and chick pea) provided to them at different times has increased crop productivity, on average, from 11 qt per hectare to 15 qt per hectare.

iii) Increased production and productivity of crops

a) Introduction of irrigation

Increased production and productivity of crops was observed associated to the introduction of irrigation development in the target area. The project has introduced small-scale irrigation practice to Gennale Melka Chira kebele through training farmers on motor pump operation and providing them motor pumps. Before the project, irrigation practice was nil. But during 2004, the project trained farmers on motor pump operation and introduced 2 motor pumps for irrigation. In addition, the project provided fruit seedlings and vegetable seeds to the farmers. The beneficiary households (85 male & 18 female) have been organized in irrigation water users association known as "Dumme Irrigation Water Users Cooperative". They have been producing papaya, banana, mango, avocado, sugarcane and vegetables on 27 hectare by pumping out water from Gennale River. They produce vegetables 2-3 times a year. Increase in production and productivity of crops has increased availability and access to food for the target households.

As a result of increased income from irrigation production, the beneficiaries able to get adequate food for their families, construct houses from corrugated iron sheet, purchase livestock and engage in beef fattening business. Ato Aliye Ademu, for example, has been able to feed his family adequate food throughout the year, construct house, and increase the number of his cattle from 4 to 15. Associated to feeding fruits and vegetables, dietary habits (nutrition) of the target households also improved. Fruit trees and irrigation water has improved the micro-climate. Within the hot Gennale River Valley, the irrigation farm has created an apparent situation where evergreen vegetation (fruit trees) looks like a small heaven in the hot valley.

Figure 18 Irrigation practice at Gennale Kebele

Dumme Irrigation Water Users' Cooperative has been legally registered and got legal certificate. According to the response from the chairman of the cooperative, beneficiaries pay ETB 50.00 per year for a 0.25 hectare irrigated land, and they have saved ETB 60,000.00. The water fee is collected to cover costs for fuel and motor pump maintenance. During our visit, one of the pumps was not functional because farmers have no skill on motor pump maintenance. Training farmers on motor pump operation would have enabled them to immediately maintain and use it. Purchase of additional motor pumps and expansion of the farm would have also been more feasible, for there is ample water (Gennale River) and irrigable area.

Irrigation has increased participation of women in production and marketing of fruits and vegetables. In the process, men have started to acknowledge the role that women can play in improving the

household economy, which is one step forward for gender equality in the household. As a result of the trainings given to them and practical exercises, farmers have developed good knowledge and skill on: irrigation water application (furrow irrigation and boarder irrigation), irrigation scheduling, and pump operation, application of manure, compost and fertilizer. Irrigation beneficiaries have developed a sense of self- confidence and good vision to further transform their lives to a better well-being.

b) Introduction of sesame

The project was innovative in introducing sesame production to Hara Kore, Hara Haje and Berisa kebeles. Sesame is high-value crop as it is one of the major export crops of the nation. Agro-ecologically, the area is suitable for sesame production. As sesame needs a short season rain, the small annual rainfall in the area (about 700 mm) is adequate to produce it. Sesame production is found the most feasible business that gives high returns in a short season. Hence, every household in those kebeles is producing sesame, and sesame production has expanded to Mandhico and other kebeles. During our discussion with the communities at Hara Kore, they disclosed that every household is producing sesame. Even the youth who are living with their parents have started their own production. They expressed their feeling as, *"sesame production is considered as a religion; everybody is producing sesame"*.

As a result of sesame production, farmers have ensured their food security, able to create assets like houses and livestock. Haji Sulye expressed the change as follows. *"Initially I got 3 kg sesame seed, produced 2 qt sesame and sold it for ETB 2000.00. This has motivated me. In the second year, I produced more sesame and sold it for ETB 10,000.00. Using this money, I bought a pair of oxen and one camel and constructed house (good house from corrugated iron sheet). This year, I have sold sesame for ETB 45,000.00, and went to Suede for Haji Umra.*" Other households also witnessed that they have sold sesame, on average, for ETB 20,000.00 to 30,000.00, in this crop season alone. Unintended impact in this regard is deforestation associated to expansion of sesame production.

Figure 19 Discussion with community members at Hara Kore and Mandhico kebele

iii) Increased production and productivity of livestock

The project has introduced improved poultry breeds and forage seeds to the area. Though there are no visible changes in relation to forage production, the introduction of improved poultry breeds has increased egg productivity of chicken, on average, from 68 to 118 eggs/hen/year. Moreover, other interventions such as veterinary services and construction of ponds have contribution to increased production and productivity of livestock.

iv) Increased income of women

Increased income for women was observed associated to women saving and credit groups' established to strengthen resiliency of households during shocks. For its dual advantages of

empowering women and utilizing women's wisdom in creating household assets, this intervention has targeted only women. Women in the target kebeles organized in many small groups and formed saving and credit associations in each kebele. Each association has more than 70 members. They have got trainings on how to run functional saving and credit schemes, and provided with a startup capital which they can use it for revolving credit. They save ETB 2.00 -5.00 per month.

The associations have internal bylaws that guide them on membership criteria, saving frequency and amount, credit size, repayment period and interest rate. To get credit members have to save first. While loan repayment period varies from 8-12 months for different associations, the interest rate (9%) is uniform for all associations. Initially credit amount was 300.00 ETB, but increasing from time-to-time. For the association at Hara Kore, it reached ETB 1000.00. Women were using the credit mainly for buying goats. But, recently, they have started to engage in merchandizing and grain trade.

As a result of saving and credit, women able to increase access to food for their families, and created household assets that strengthen the households' vulnerability to shock. Tayba Hussen, from Mandhico kebele, for example, bought 4 goats buy taking credit (ETB 300.00). She sold matured kids and bought one bull. She sold the bull for ETB 3,500.00, and opened a shop. A friend of her also took credit (ETB 300.00) and bought 3 goats, which after years had become 10 goats. Buy selling 4 goat kids; she has been buying food grain for her families. Her children and other family members have been benefiting from goats milk. Women saving and credit association at Mandhico has also started to retail grain. During our visit they have stored 4 quintals sorghum and 3 quintals teff.

Women saving and credit associations in other kebeles are also getting similar benefits. A woman in Medda kebele for example bought 2 goats by taking credit (ETB 600.00), and her goats reached to seven. Her family has been benefiting from goats milk. Similarly, the chairwoman of a women saving and loan association at Hara Kore disclosed that, she bought 2 goats buy taking credit (ETB 400.00), and now she has 15 goats. Her family benefited from goats milk. And their association has recently provided a credit (ETB 1000.00 - 1400.00) to 26 women. For the future, they have a plan to collect outstanding loans and engage in assembling sesame and selling it at secondary or tertiary markets.

Women saving and credit groups in general have contributed to improve food security of the households. Moreover, these groups enhanced interaction among women and their awareness on gender equity, HIV prevention and family planning. Further supports by the government office (especially micro-enterprise development office) in identifying feasible business ideas that can be implemented by women either in group or individually are important to transform women to a better way of life. The associations should also increase their number of members and able to mobilize more savings.

4.3.4.1 Improvement in peoples well-being

a) Water supply and sanitation

The context in relation to water availability was the worst. The problem was not only lack of safe water; availability of water was also a challenge. People had to walk 10 - 20 kms to get water. To mitigate the problem, a total of 19 water facilities (8 ponds, 4 HDWs, 5 underground cisterns, 1 SPD, 1 borehole and 1 roof-water harvesting scheme) were constructed by the project. These facilities have been providing water to people and livestock. The four 4 HDWs have been serving 12000 people. And the spring had been serving people in Medda Kebele and other people from the neighboring woreda in Somali region. The roof catchment constructed at Mandhicho primary school has also been serving students.

Water committee elected to take care of HDWs. But ponds and underground cisterns are managed by elders. While ponds serve livestock, underground cisterns serve for the people, calves and sick/broken cattle. Limitation in this regard is observed at Madda kebele where the SPD is not maintained. The overflow water has created pond around the water point, which is even mixing with the pure water while people are collecting water. In fact this problem will get a solution in the near future as the woreda office of water resources has contracted out it to develop piped water supply that will serve for both the community and the museum which is under construction.

Availability of theses water facilities has improved daily water consumption in the households, and thereby their hygiene and sanitation practices. Survey result on water supply, hygiene and sanitation practice of the households living in the target area (Table 6) showed changes observed in hygiene and sanitation practice of the households.

Table 7 changes observed in hygiene and sanitation practices of the households

Situations	After	Before
Daily water consumption per person (liters)	4.3	2.6
Minutes of walk to fetch water (per round trip)	31	83
Households who use pit latrines (%)	65.4	0
HHs who have pit latrine with hand washing facility (%)	85.3	-
Hand washing practice of HHs before eating food (%)	92.3	30.77
Hand washing practice of HHs after cleaning child faeces (%)	88.5	19.2
Hand washing practice of HHs before meal preparation (%)	84.6	26.9
HHs who always disposes solid wastes on disposal pits (%)	63.5	34.6
HHs who always disposes liquid wastes in disposal pits (%)	71.2	26.9
Sample size (n)= 52 households (41 male + 11 female)		

Source: Household survey, November 2010

In order to promote hygiene, highly regarded (influential) people among the community trained on hygiene and sanitation. Moreover, the project supported in promoting hygiene through construction of two shower troughs (one for each sex) at Hara Kore hot spring. This has helped, to drain out water used by other people and fill the trough with fresh water. Safe water supply, hygiene and sanitation services improved child morbidity and saved the time that would have been used for taking care of sick children, thereby improving labor productivity. Reduction in minutes of walk for fetching water has reduced women workload and improved the time that women can engage in productive activities.

Availability of ponds has special impact on increasing crop production through creating access to water for farm oxen at easily accessible (near) sites. Looking at the benefits of Harabatu pond that was constructed through food-for-work, individuals at Medda kebele have constructed their own ponds.

b) Health

The project has contributed to create access to health services for both human and livestock through construction of health posts and veterinary posts. Before the project, people were going to traditional healers to get relief from their pains. Moreover construction of access roads to the target kebeles has enhanced outreach health services for both people and livestock. Trained paramedical (selected from the community) had also served the community in providing medicine during epidemics like malaria outbreak. Interventions on health, in general, have contributed to improve heath of the target people, and improve labor productivity.

c) Education

Construction of new school at Abasirba kebele, and additional class room construction to Medda and Odua Boji primary schools has generally improved children access to education, especially girls' school enrolment. Moreover, establishment of adult education centers in all the target kebeles and assignment of adult education facilitators through covering their honorarium payments has enabled most of the people to read and write Oromifa. During our discussion with members of the community, all most all men participants witnessed that they can read and write Oromifa. And adult education centers have now upgraded to first cycle primary schools where children are attending classes.

d) Awareness on gender equality and family planning

As a cross-cutting activity to other interventions, the projects had been raising awareness of the community on sanitation, preventive health and HIV/AIDS, including family planning. Survey conducted in this regard (Table 8) showed that a considerable percent of the people have developed good attitudes towards gender equality. Family planning, which was unthinkable even to discus on the issue, has got acceptance by 30.8% of the households, and now women are using contraceptives (pills and depot).

Table 8 changes observed in attitudes of households in relation to gender equality

Attitudes (% of HH who disagree on the idea)	After	Before
A husband has the right to discipline his wife	50	11.5
A man is the ruler of his home	17.3	6.7
A husband has the right to beat his wife if she does not accept his idea	57.8	6.7
A woman could be more productive if she work on household chores	51.9	6.7
Women can engage in farming activities, but they should not have control over the benefits	57.8	11.5
Sample size (n)= 52 households (41 male + 11 females)		

Source: Household survey, November 2010

In general, the project has contributed to bring about positive changes in the context in terms of ecological, economical and social benefits. This is visualized using a "spider" or "amoeba" diagram (see Figure 20). For this purpose a rating of changes for each indicator is given as 4 "change is considered very good", 3 “change is considered good”, 2 “change is considered moderate, 1 “slight change is observed’, and zero “no change in the context").

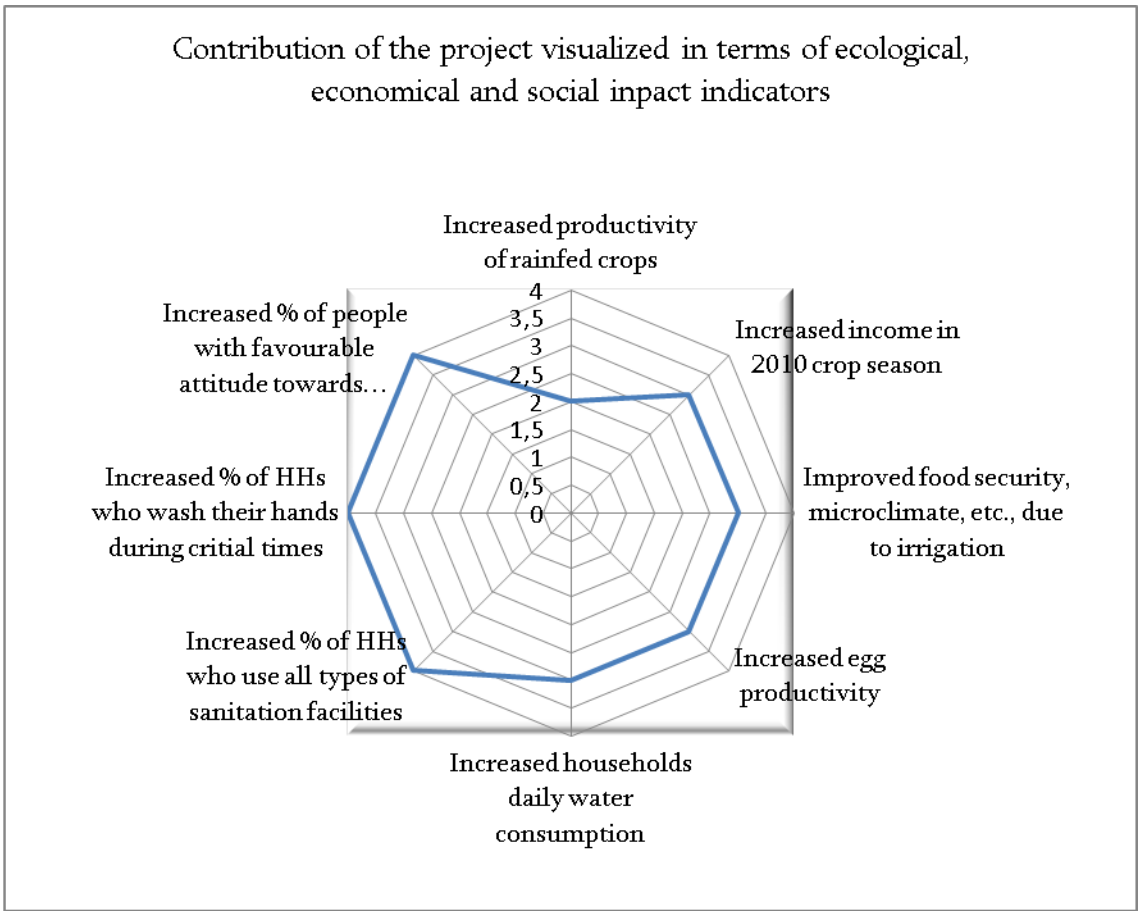

Figure 20 Visualization of changes in the project context

4.3.4 Conclusion

Implementation of a multi-phased project in Medda Wolabu woreda for more than two decades has, in general, contributed to improve: the micro-climate at irrigation site, food security and people’s access to social services (health, education, safe water, etc). In addition, emergency relief supports have saved the lives of many people. The multi-phased project has tried to address priority needs of the target groups at different times.

The multi-phased project was innovative in introducing new crop types; fruit trees and sesame that well adapt to the climatic conditions of the target area, and provide economical and ecological benefits to the inhabitants. The project has introduced market oriented crop types such as sesame, fruits and vegetables that give better yield and have good market value. Such newly introduced crops have remarkably increased production of crops and improved food security of the beneficiary

households, and enabled them to create household assets which have strengthened their resiliency to shocks. Early maturing varieties of sorghum, teff, maize that were given to the farmers had also increased productivity of crops, and their buy improved food security of farmers.

Women saving and credit groups in general have contributed to improve food security of the households. Moreover, these groups enhanced interaction among women and their awareness on gender equity, HIV prevention and family planning. Family planning, which was unthinkable even to discus on the issue, has got acceptance by 30.8% of the households, and now women are using contraceptives (pills and depot).

Water facilities have improved daily water consumption in the households, and thereby their hygiene and sanitation practices. Safe water supply, hygiene and sanitation services improved child morbidity and saved the time that would have been used for taking care of sick children, thereby improving labor productivity. Reduction in minutes of walk for fetching water has reduced women workload and improved the time that women can engage in productive activities as well as girls' school enrolment. Availability of ponds has special impact on increasing crop production through creating access to water for farm oxen at easily accessible (near) sites.

Construction of new schools, expansion of class rooms and establishment of adult education centers have contributed to raise literacy level of the community. Most of the adults able to read and write Oromifa and their children have got access to education at near distance. As a result, girls' school enrolment has increased.

4.3.5 Lessons learnt

From the experiences of the multi-phased project which have been implemented for the last two decades, the following lessons were learnt.

- Providing practical training on motor pump maintenance to capable farmers among the irrigation beneficiaries can enable them to maintain their motor pumps. Expanding their farm by either using additional pumps or constructing diversion structures can further increase their income and improve their living standards.
- Study, design and construction of diversion structures at Gennale River and other rivers in the target kebeles can enable the community to tap into the enormous surface water potential for irrigation, and thereby transform their well-being.
- Integration of fattening with irrigation production is a profitable venture where the households can provide feed and water from irrigation farms and fertilize their farm land using manure from beef kept for fattening.
- The introduction of sesame has proved that production of export oriented crop is the best option to bring about fast growth of the rural economy and transform farming households to modern farmers who can maximize benefits making use of their comparative and competitive advantages. Meanwhile, the woreda administration with participation of community representatives needs to delineate high potential areas for sesame production and protect other areas from deforestation.

- Supports by the woreda cooperatives development desk are vital to enable women saving groups engage in running profitable business that adds value to crop or livestock products of the area. Further supports by the government office (especially the woreda micro-enterprise development office) in identifying feasible business ideas that can be implemented by women either in group or individually are important to transform women to a better way of life. The number of members in each association should also grow to increase saving mobilization and create better capital for re-investment.

4.4 Messanu Integrated Agricultural Development Project (IADP)

4.4.1 Retrospective overview of Messanu IADP

Messanu Integrated Agricultural Development Project has been implemented since 1998, at Messanu and its surrounding kebeles, in Kilite Awlealo woreda of Tigray Regional State. Massanu IADPs have been implemented in four phases: 1998-2000; 2001-2003; 2004-2007; and 2008-2010. These projects have been implemented to address major problems of the community such as: land degradation, food insecurity and poorly developed social infrastructures.

Messanu IADPs were mainly working on natural resources management, water resources development (irrigation and water supply), income diversification and awareness raising on family health, HIV/AIDS and gender mainstreaming. Since 1998, the projects rehabilitated watersheds in Messanu, Agula, Kehen, Hadinet, Mahibre Woyni, Aynalem, Denua and Tsigereda kebeles through: (i) construction of hillside traces and trenches on closure areas (upper catchment); and (ii) gully rehabilitation and construction of bunds at lower catchments (farmlands). Integrated with the physical structures, closure areas at the upper catchments have been planted with different species of trees. And gully rehabilitation structures and bunds have been constructed at relatively lower slopes of the catchments.

In order to increase crop production and productivity, diversion irrigation scheme constructed, and irrigation pumps provided through a revolving grant. Fruit seedlings and vegetable seeds were also distributed to the beneficiaries of irrigation. Poor women and unemployed youth have been provided with shoats, chickens and modern beehives with bee colonies to diversify their income and their by improve food security. Those households who have the interest, capacity and experiences on dairy development were also provided with improved dairy breeds and accessed bull services.

The multi-phased project has also increased access to safe water supply through spring development, construction of hand dug wells, borehole, roof catchments and underground tankers. The project has also been working on raising awareness of the community on HIV/AIDs, gender mainstreaming, and family planning. Community-based supports have been promoted to provide care and support for PLWHA and OVCs. Capacity building of community members and project staff in relation to technologies and techniques introduced by the projects were also key components of the project.

4.4.2 Other actors involved in the project area

Other non-governmental organizations that have been operational in the target area are the Ethiopian Orthodox Church Development and Interchurch Aid Commission (EOC-DICAC) and Catholic Church. Meanwhile these NGOs operate in kebeles other than NCA/REST project kebeles. Hence the changes observed in the target kebeles are attributable to NCA/REST.

NCA/REST project has been well-integrated with the safety net program in accomplishing environmental rehabilitation works and other construction activities. Given the fact that environmental rehabilitation works such as construction of hillside terraces, deep trenches, micro-basins, check-dams, etc., needs high energy, and 69.9% of the people in the target woreda are chronically food insecure which needs incentives in the form of food or cash; integrating the donor resources with safety net resources has created synergy and laid down good foundation for natural resources development. Hence the impacts observed related to natural resources development are the synergetic effects of NCA/REST and safety net resources, whereby both actors have attributions. Meanwhile, other components of the projects are mainly attributable to collaborative efforts of NCA/REST project and relevant government offices.

4.4.3 Achievement of Messanu Integrated Agricultural Development Project

Projects effectiveness was measured based on the impact hypothesis developed for measuring the three objectives, namely: (i) Natural resources in the target areas rehabilitated through ecologically sound, economically viable and socially accepted natural resources management practices; (ii) Food security of the target communities improved through improving availability and access to food for the target communities; and (iii) General well-being of the target communities improved through access to safe water supply, health services and awareness raising on Gender, HIV and HTP.

4.4.3.1 Natural resources management

Participatory natural resource management by NCA/REST has ensured sustainability of natural resources development practices. Natural resources management practice has been implemented in a community-driven participatory approach. The communities with the local government bodies delineate closure sites, and report to the project to get supports for implementation of physical and biological conservation structures. Then physical conservation structures constructed during the dry season and plantations followed during the rainy season.

i) Preventing land degradation and improving land capability

Treatment of watersheds prevented land degradation and improved land capability. Integrated efforts of watershed treatment such as area closure at the upper slopes of the catchment with hillside terraces & deep trenches, and rehabilitation of gullies within the watersheds has prevented land degradation and improved land capability. Soil erosion at farmlands downstream prevented. The hydrology at downstream improved thereby enhancing irrigation practices at farms on lower slopes. Closure sites

become good potential for bee forage as well as fodder for shoats and cattle through cut-and-carry practices.

The communities well understood the benefits of gully rehabilitation and have developed good skill on gully treatment and construction of other soil and water conservation structures like hillside terraces, trenches and micro-basins on closure sites. The communities understood that deep trenches and hillside terraces constructed at upper slopes improve the hydrology at downstream, besides controlling soil erosion.

Figure 21 Soil and water conservation at Tsewnet watershed, Denua kebele

Participation of the community members in watershed treatment through cash-for-work increased their income, and thereby their access to food. Participation in cash-for-work activities has especially increased women's own income, and it has to some extent increased their financial independence. Moreover, cash for work activities reduced seasonal migration of people in search of job opportunities. Participatory soil and water conservation activities enhanced people's involvement during implementation as well as habits of the community to claim for their rights like requesting supports to rehabilitate watersheds.

ii) Increased in vegetation cover and bio-diversity replenishment

Area closure enhanced rejuvenation of the vegetation cover, and enabled target communities to harvest forage through cut-and-carry practice. Increased in the vegetation cover on closure sites became habitat for wild animals like hyena, fox and birds like partridge. The communities have developed good knowledge on the benefits of timber and non-timber products that can be taped from closure sites by looking successful beekeeping practices and sisal demonstration on closure sites. People in Tsementi watershed (Aynalem kebele), for example, have been benefiting from a 200 hectares closure sites in terms of bee fodder and grasses. Moreover, three hectares sisal plantation demonstration at Kehen kebele showed very good survival rate (95%), indicating that sisal plantation can be one way of improving the livelihoods of the beneficiary community. Jatropha plantation on a closure site at Tsigereda kebele has also showed promising survival rate.

Figure 22 Closure site at Tsementi watershed where beekeeping is practiced, Aynalem Kebele

Besides its contribution to replenishment of fauna and flora; the vegetation cover at closure sites and fruit trees at irrigation sites has contributed to improve the micro-climate. Despite limitations in survival rate, different species of forest trees that have been planted on closure sites such as: Acacia Saligna, Edu amaldulensis, Shinus molle, Acacia etbaica, Cupressu lusitanica, Melia azederch, Sesbania, leucaena, Acacia sahai and Gravillea robusta have contributed to increase bio-diversity. Different species of fruit trees like mango, banana, orange, guava, papaya and citrus that have been introduced at irrigation sites have also contributed to increase bio-diversity. Moreover, target communities have benefited from cash-for-work activities (ETB 2.00/ seedling) during plantations carried out on closure sites.

4.3.3.2 Food security

i) Increased production and productivity of crops

a) Irrigation development

Increased production and productivity of crops was observed associated to the introduction and expansion of irrigation development in the target area. Besides river diversion irrigation practices, using water lifting devices integrated with constructions of check-dams has improved food security of the beneficiary farmers. Messanu River diversion in Aynalem kebele has benefited 210 households (165 male & 45 female) to ensure food security and create household assets like: house from iron sheet and home utensils, including savings.

Limitations in this regard are water shortage during the driest period and flood damage during the rainy season. During the rainy season, high flood from the upper catchment has been loading sand and sediment on irrigated farmlands. According to the responses of the beneficiaries, shortage of water during the dry season and high flood during the rainy season are affecting their benefit from irrigation production. W/ro Woyni Hailu, for example, disclosed the situation: "*High flood during the rainy season has affected my fruit trees. Fruit yield is decreasing year-after-year. As an option to compensate losses, I have started selling sand deposited on my orchard".*

The development agent in Aynalem Kebele has also stressed that flood is affecting the irrigation farm. He recommended construction of dam at the upper catchment so that run off during the rainy season can be stored in the dam, to be used for irrigation during the dry season. This will have dual advantages of reducing flood problem and strengthening the river discharge during the dry season. Messanu project coordinator has disclosed that they have already indentified the problem and have started treating the upper catchment. Such efforts should be encouraged and facilitated until the problem gets lasting solution. Practical demonstration on how to support tomato crops using beds will also help farmers avoid losses associated to ruin of tomatoes before harvest.

Figure 23 Sand in W/ro Woyni's citrus farm and tomato production at Messanu diversion

The beneficiaries of Addis Alem diversion are organized in water users association, and each member has started to contribute ETB 60.00 per year for guards and operation and maintenance of the scheme. Currently, the association has about ETB 2,000.00. The association has employed three guards to keep irrigation facilities as well as crops by paying each guard ETB 250.00 per month. This shows that sustainability of the scheme has firm ground except the treats of external factors, especially flood damage.

Water lifting devices are well integrated to check-dams. While check-dams increase ground water recharge through increasing water retention and percolation, water lifting devices help to lift out water stored around check–dams or underground water. After construction of check-dams along intermittent or perennial streams, the project supported farmers to dig open wells through cash-for-

work and provided them with water lifting devices (treadle/motor pumps) through a revolving grant. As a result, farmers have been producing vegetables making use of water lifting devices.

Ato Hadigo Hiale in Aynalem kebele, for example, has been producing vegetables using motor pump. Initially, he took one motor pump through a revolving grant (to be paid in 5 years including a one-time interest rate of 12.5%) and produced vegetables. As a result, he constructed house (iron sheet roof) and he has two motor pumps to use for both irrigating his farm and renting (ETB 40.00 per hour).

Figure 24 Ato Hadigo Haile's onion farm, Aynalem kebele

Recently, farmers in Hadinet kebele have started planting high value fruit trees like apple through the support of the project. Ato Goitom Mezgebu, for example, has planted more than 20 apple seedlings, besides production of vegetables. Apple seedlings are in a good condition indicating that apple production can be one way of improving the livelihoods of farmers in the highlands of Kilite Awlealo Woreda and the neighboring woreda.

In general, irrigation has contributed to increase production and productivity in two ways: (i) increase in cropping intensity; and (ii) productivity improvement. For those farmers who are producing twice a year the intensity has increased, thereby increasing crop production per year. Increase in productivity was observed associated to utilization of improved seed and fertilizer, including supplementary irrigation. Before practicing irrigation, rainfall variability was highly affecting crop productivity. But after practicing irrigation, farmers able to mitigate the effects of moisture stress on crop yields through applying supplementary irrigation.

Moreover, moisture regulation through irrigation practice has enabled farmers to grow more productive and high value crop types such as fruits and vegetables. Farmers have been producing fruits and vegetables that give high yields and can be sold with attractive prices. Citrus, papaya, mango, banana, avocado, tomatoes, onion, garlic, pepper, head cabbage, lettuce, Swiss chard and potatoes are produced using irrigation, and highland fruit- apple is also introduced to the farmers. These fruits and vegetables have high yields and high market value.

Collaborative efforts of the project and government staffs in (i) introducing improved varieties of crops, fertilizer, compost and pesticides; and (ii) close extension supports in building knowledge and skill of farmers on maximizing benefits through proper combination of inputs have resulted in more than 50% increment in productivity of crops using supplementary irrigation and more than 100% increment in production of crops through full irrigation.

Increase in production and productivity of crops has increased availability and access to food for the target households. Associated to feeding fruits and vegetables, dietary habits (nutrition) of the target households improved. These households totally avoid seasonal migration in search of jobs opportunities, which they were practicing it whenever crops failed to give adequate yields. Irrigation

beneficiaries in general have developed a sense of self- confidence and good vision to further transform their lives to a better well-being.

Irrigation has increased participation of women in production and marketing of fruits and vegetables. In the process, men have started to acknowledge the role that women can play in improving the household economy, which is one step forward for gender equality in the household.

As a result of the trainings given to them and practical exercises, farmers have developed good knowledge and skill on irrigation water application, irrigation scheduling, pump operation and application of manure or compost to increase fertility and reduce salinity. Limitations in this regard are lack of skill on pump maintenance and poor quality motor pumps, including lack of skill on bed preparation for tomato crops. Training few capable people among the beneficiaries of motor pumps and provision of quality motor pump (Robin) would have addressed the problem. Similarly, practical demonstration on how to support tomato crops using beds (be it from wood or rope) would have helped farmers avoid losses associated to ruin of tomatoes before harvest.

b) Rain fed production

Many factors attribute to increase in productivity of rain fed crops. Watershed treatment controlled land degradation and soil erosion on farmlands. And integrated soil and water conservation activities at upper catchments increased sub-surface flow of water and improved soil moisture on farmlands at lower slopes. Moreover, improved extension services such as: supply of improved seeds, fertilizer, compost utilization, pest control, etc., contributed to increase productivity of farmlands. Increase in productivity of rain fed crops has increased food availability in the households, enabled them to cover education and health care expenses, increased their cash income, and enabled them to buy cattle and shoat, which further strengthen their resiliency to shocks.

Household survey in relation to productivity of rain fed crops (Table 9) showed that productivity of the major crops has remarkably increased. Farmers compared productivity of each crop from a given land before the project intervention and after the project intervention. Though the difference (the magnitude of change) seems a bit exaggerated, one can conclude that, by and large, the project has contributed to increase in productivity of rain fed crops.

Table 9 productivity improvement of rain fed crops after the project intervention (qt)

Crop type	After	Before	Difference
Teff	6	2	4
Sorghum	8	3	5
Maize	20	5	15
Wheat	7	3	4
Barely	7	2	5
Average	9.6	3	6.6
Sample size (n) = 50 households (33 male + 17 female)			

Source: Household survey, October 2010

c) High value crop promotion

Garlic is promoted as high-value crop. Its long shelf -life, less crop water requirement and less susceptibility to soil born diseases are the merits to select garlic among other vegetables. Garlic is produced in both irrigation and rain fed. In normal years, precipitation in the target area is adequate to grow garlic. It can also be produced using household water harvesting structures. Looking all these advantages, the project has provided garlic bulbs to 78 farmers at Kehen kebele through a revolving grant. Technical support was given to them on land preparation, spacing, urea top dressing, etc. As a result, good garlic crop is observed on farms. Farmers were so happy on the crop stand and expect to harvest, on average, 1kg from 1 m^{2-} area. Most of the households have planted garlic around their homesteads, and this has increased women participation in production activities. Given an attractive market price for garlic (ETB 45/kg), farmers will generate good income from their garlic produces.

Figure 25 Garlic farms at Makele-Adi village, Kehen kebele

ii) Increased production and productivity of livestock

a) Beekeeping

Training farmers on improved beekeeping and provision of improved beehives helped target households generate income and increase the number of their beehives. The project has organized and trained households on improved beekeeping and provided them with improved beehives (with bee colonies). Six beekeeping cooperatives that have 91 members (70 male & 21 female) have been organized and provided with modern beehives.

The most significant change in this regard was observed in Tsementi watershed, Aynalem kebele where a beekeeping cooperative that has established in 2007 with 16 modern beehives has increased its stock to 56 modern beehives. The cooperative keeps bees within the 200 hectares closures area, which is very good source of bee fodder. And they have one water harvesting structure that serves bees. Each member (including six members who resigned) due to different reasons, has got one modern beehive through a revolving grant. Currently the members are 10 (all men) and they have 56 modern beehives with bee colonies. In addition, they have recently split 20 colonies and raised the number modern hives to 76. Honey productivity per hives is, on average, 22 kilogram per year which has 120% increment from traditional hives.

All management including guarding is done by members and two of the members specialized on queen splitting. The members agreed to use the income for increasing stock size for at least the first five years. Since 2007, they have saved ETB 57,000.00 buy selling honey. In the future, they have a plan to engage in fattening and diversify their income sources. In general, beekeeping is laying good foundation to sustainably ensure food security of the target households.

b) Shoat rearing

In order to diversify income of poor women headed households, the project provided 101 women farmers in the target kebeles with 2-3 shoat worth of ETB 900.00. Initially shoats were provided without training farmers assuming that they have lifelong experience on shoat rearing. But later on,

training has been given to them on forage development and feeding concentrates. Consequently their knowledge and practice of forage development improved. All participants of the FGD disclosed that, after the training, they have planted forages, mainly cactus and feed their animals. Some of them have also started feeding concentrate feeds.

In this regard, the most significant change was observed on the life of W/ro Alganesh. In 2006, she has taken 3 goats through revolving grant, and the three goats gave birth to six goats. By selling matured kids, she has bought one cow. In general, provision of shoats has enabled target households to improve food security of their families. Furthermore, their access to credit has increased for shoats can serve as collateral. All these better conditions helped them to develop a sense of self-reliance, which eventually can lead them to empowerment.

So as to enhance sharing of experiences among them on management and marketing of shoats, these women would have been organized in a group. And group saving would have been started to save money by installment.

c) Diary development

Improved breeds of dairy (Barka breeds and Exotic breeds) cow and bull service was provided to more than 42 households, who have capacity and experience in managing cattle. These households have been given trainings on how to feed and manage their cows through improving pasture land and developing elephant grasses. As a result of the project support in terms of improving breed quality and increasing the knowledge and skill of farmers on forage development and management of dairy cows, milk yield per cow has improved. Household survey indicated that milk productivity per cow per day in the target area has increased, on average, from 1.5 litters to 5 litters.

The most significant change in this regard was observed at members of the Dairy Development Cooperative in Agula kebele. Agula Dairy Development Cooperative has been established in 2006 by 15 members (10 male and 5 female). Initially, the cooperative started milk production by 18 cows (12 Barka breed cows, 3 Holstein breed cows and 3 local breed cows). Then the project has brought improved breed cows from research institute and other potential sources and provided them to members of the cooperative though a revolving grant. The project has also trained the members on dairy cow development, including organizing in a cooperative for creating better conditions to sell milk and purchase feed.

Currently the members of the cooperative grow to 27 households (15 male & 12 female), and each member of the cooperative has 1-4 improved cows. Some of them keep indigenous breeds of cow besides the improved breeds for the milk from indigenous cows has better butter content than the milk from improved breeds. Members supply milk to the cooperative at ETB 5.50 per litter. And the cooperative sells raw milk for ETB 6.00 per litter, boiled milk for ETB 9.00 per litter, yogurt for ETB 9.00 per litter, butter for ETB 120.00 per kg, and the residue left after butter extraction at ETB 2.00 per litter.

The cooperative has a bylaw that enforces members to supply their milk produces, and the cooperative to buy milk supplied by members at the agreed prices. In order to control adulteration,

the cooperative use Lacto Density meter and check the quality of milk supplied by members. Members share profits in every month according to their bylaw. The cooperative has been working by renting milk shop for ETB 700.00 per month. In order to have its own milk shop, the cooperative is constructing a building at ETB 150,000.00.

The cooperative has created job opportunity for 6 workers (3 men & 3 men). These workers are: (i) manager for the cooperative (1 female); (ii) milk shop workers (2 females); and (iii) forage development (3 males). In addition, the cooperative has employed 3 males for keeping bees, which they have recently started for diversifying their income source. It pays these workers a monthly salary of ETB 250.00 to 600.00 per head.

As a result of improved management practice, even milk productivity of indigenous breeds increased from 1.5 liter to 2.5 liter per day per cow and lactating period increased from 5-6 months to 8 months. Productivity of improved cow is from 10-20 liters per day per cow. The range is very wide due to breed difference. Improved cows' lactating period is very long which goes to two months less the next delivery.

Associated to increase in production and productivity of milk, all the members of the cooperative have ensured their food security. Family members in these households able to improve their nutrition associated to feeding milk. Each member of the cooperative has at list three rooms house in Daero town and saved ETB 10,000.00 - 100,000.0 in its individual bank account. The cooperative has saved ETB 400,000.00 and invest on 34 modern beehives. By selling milk, each member earns a monthly income of ETB 1000.00 to 7,000.00.

The impacts observed in relation to the interventions on dairy development are very magnificent and beyond improving food security of the beneficiary households. It demonstrates the potential to transform food insecure rural farmers to modern farmers that can specialize in production of quality livestock products. Integrated with forage development and enhanced water availability in the watersheds, and through using concentrate feeds (by products of agro-processing industries) dairy development can be a rewarding business venture to transform the well-being of resource poor farmers in the target area. The contribution of the cooperative in increasing milk supply to the surrounding towns like Wukiro and Mekelle, including those towns in the neighboring region (Afar Region) is also magnificent.

Limitation observed in this regard is market problem. According the responses from the cooperative manager and the members, they sometimes (especially during fasting season) face market problem to sell their milk produces. And recently, swine production in Daero town has caused bad psychological repercussion on the customers of the milk shop. May be associated to groundless rumors, customers of the milk shop (especially those who came from Afar region) suspect as if the shop was selling swine milk; and reduced their consumption. Unless solutions are designed to get rid of such rumors, this could be a potential treat on marketing of milk produces.

d) Poultry

The project also organized, trained and provided women with chicken through a revolving grant. There are 10 poultry production groups each group having more than 10 members. Organizing in group helped them to share experiences and mobilize savings. Group members have opened saving accounts and they have been saving ETB 10.00-20.00 per month. For example, W/ro Edilit Amare from Sherfa village in Mahibere Woyni kebele has taken chicken on a revolving credit, and she has currently 20 chickens. Every week, she collects 20-30 eggs and sells it for ETB 1.25 per egg. Making use of income from selling eggs, she is saving ETB 20.00 per month. Group members also discuss on various issues including animal rearing, during their regular monthly meetings. Good feeding practice of chicken has increased egg productivity per hen, on average, from 113 to 141 per year. Provision of improved breeds of poultry including good mechanisms for getting chicken feed would have further increased egg yield per hen.

e) Petty trade

The project has also organized 10 women in a group and provided them a revolving grant (ETB 1000.00) for each to enable them start or expand petty trade such as retailing merchandize (kerosene, salt, etc.) and food grain. The group members have paid their loan, and able to feed their families by using income gained from petty trade. One of the group members has bought 3 goats in order to diversify her income. During the focus group discussion, the group members disclosed that engaging in petty trade has increased their income and moral as well. People give them more value than other poor women engaged in selling local drinks. Further capacity building activities in improving their entrepreneurial skill would help them grow their business.

4.4.4.3 Improvement in peoples well-being

a) Water supply and sanitation

A total of 48 water facilities (38 underground tankers, 5 HDW, 1 SPD, 1 borehole and 3 roof water harvesting schemes were constructed by the project. Underground tankers have been constructed in Tsewnet village of Denua kebele where access to any form of surface or sub-surface water is very limited. People in this village had been fetching water from Siluh River walking 6 hours per round trip. Efforts exerted to create access to potable water to the villagers by drilling 150 meters, 98 meters and 208 meters deep wells were not successful. Hence the only option to provide water for these people was harvesting surface run off. Towards this, the project has constructed 38 household level water harvesting schemes in Tsewnet village. Except few cracked tankers, many of them were functional.

These facilities have enabled to save men's work burden and time that would have been used for fetching water from very far distance. Some of them use it as income source by charging ETB 10.00 per month per ox for providing water to oxen. For example, a water vendor in the village- Ato Asefa G/Egziabher- has bought a pair of oxen through water vendor from his underground tanker. Looking its advantage, other 50 households in the village have constructed their own water tankers and requested technical and material supports for plastering these tankers. This makes that 88 households out of the 350 households living in Tsewnet village have their own underground water tankers.

Figure 26 Underground tankers in Teswnet village of Denua kebele

Though household underground water tankers are good options for increasing access to water for the residents of Tsewnet village, addressing all the households seems very costly. Providing it to some households and leaving others will also raise a question of equity. Looking better options of water supply such as construction of dam that can serve for both water supply and irrigation is advisable.

In general, construction of different types of water supply facilities has contributed to raise safe water supply coverage in the target area. As a result, daily water consumption of the households increased, which in turn led them to improve hygiene practices. Survey result on hygiene and sanitation practice of the households living in the target area (Table 10) showed that remarkable changes are observed in hygiene and sanitation practice of the households.

Table 10 changes observed in relation to hygiene and sanitation practices of the households

Situations	After	Before
Daily water consumption per person (liters)	11.4	5.4
Minutes of walk to fetch water (per round trip)	7	53
Households who use Jerry can for fetching water (%)	98	2
Households who use pit latrines (%)	98	2
HHs who have pit latrine with hand washing facility (%)	53	-
Hand washing practice of HHs before eating food (%)	88	38
Hand washing practice of HHs after cleaning child faeces (%)	82	52
Hand washing practice of HHs before meal preparation (%)	88	48
HHs who always disposes solid wastes on disposal pits (%)	88	10
HHs who always disposes liquid wastes in disposal pits (%)	82	16
Sample size (n)= 50 households (33 male +17 female)		

Source: Household survey, October 2010

Communal water supply facilities like HDWs are well managed by the community. Water committee that involves both men and women members manages water supply facilities. The committee collects monthly water charge of ETB 1.00 from all beneficiary households and save it for maintenance in case of damage. Most of the beneficiaries indicated that these water points are providing adequate

and quality water. Meanwhile, the beneficiaries of a HDW at Adikawu village have a fear that wastes from the leather factory in their neighborhood (Shaba Leather Factory) may affect the water quality. Messanu project coordinator has disclosed that they shared the fear from the beneficiaries and are trying to investigate it. We recommend that the project staffs need to give quick response by investigating whether their fear has material ground or not and look for mitigation measures if their fear has substance.

Figure 27 Water supply (Aynalem Kebele) and sanitation practices (Mahibere Woyni kebele)

b) Awareness on Gender, HIV and HTP

Collaborative efforts of the project, woreda health and women affairs office, kebele leaders and the community have resulted in raising awareness of the community on HIV prevention as well as care and support for PLWHA & OVC. The community in the target area has very good awareness on HIV prevention methods. Voluntary counseling and testing is well adopted by the community. During focus group discussion, members of the community disclosed that they have got VCT services. During VCT, if a person is found to be HIV positive; he/she express him/herself and registered in the community-based PLWHA and OVC care and support program.

Each household in the target area contributes ETB 2.00 per month for the community-based care and support program. They have a committee established for this purpose which is chaired by the kebele women affairs office and it has a formal accounting system in place. After money is collected from the residents, the committee and women affairs office jointly identify the neediest ones and deliver services like food, cloth, scholastic materials, etc., which PLWHA and OVC deserve to get. Health extension workers in Mahibere Woyni Kebele, for example, have a database that shows the profile of all OVCs and their guardians, including their pictures. They use the database to mobilize additional resources from the government, NGOs or individuals. Meanwhile, family planning practice of the target households is very limited. Only 14% of them practiced family planning mainly by using pills and depot.

In general, the community-based PLWHA & OVC care & support system is an innovative practice that gives lesson on that: if the community members are convinced and organized, and if a transparent system that can equitably serve the members is in place; they have the capacity to address their problems even without external assistances.

As a cross-cutting activity to other interventions, the project was promoting gender equality through training community members. As a result of awareness raising on gender equality, women participation in productive activities and their role in decision making has improved. During focus group discussion, women disclosed that stereotyping gender roles has been decreasing from time-to-time. Men involve in household chores such as taking care of children and fetching water. Survey conducted in this regard (Table 11 also showed that people in the target area have been developing attitudes towards gender equality. They have also good awareness on HTP. Religious leaders play key role in combating HTPs. As a result, families have avoided early marriage and female genital circumcision and school age girls have been attending schools.

Table 11 changes observed in attitudes of households in relation to gender equality

Attitudes (% of HH who disagree on the idea)	After	Before
A husband has the right to discipline his wife	46	32
A man is the ruler of his home	18	10
A husband has the right to beat his wife if she does not accept his idea	74	38
A woman could be more productive if she work on household chores	36	5.5
Women can engage in farming activities, but they should not have control over the benefits	44	5.5
Sample size (n)= 50 households (33 male =17 female)		

Source: Household survey, October 2010

In general, the project has contributed to bring about positive changes in the context in terms of ecological, economical and social benefits. This is visualized using a "spider" or "amoeba" diagram (see Figure 28). For this purpose a rating of changes for each indicator is given as 4 "change is considered very good", 3 "change is considered good", 2 "change is considered moderate, 1 "slight change is observed', and zero "no change in the context".

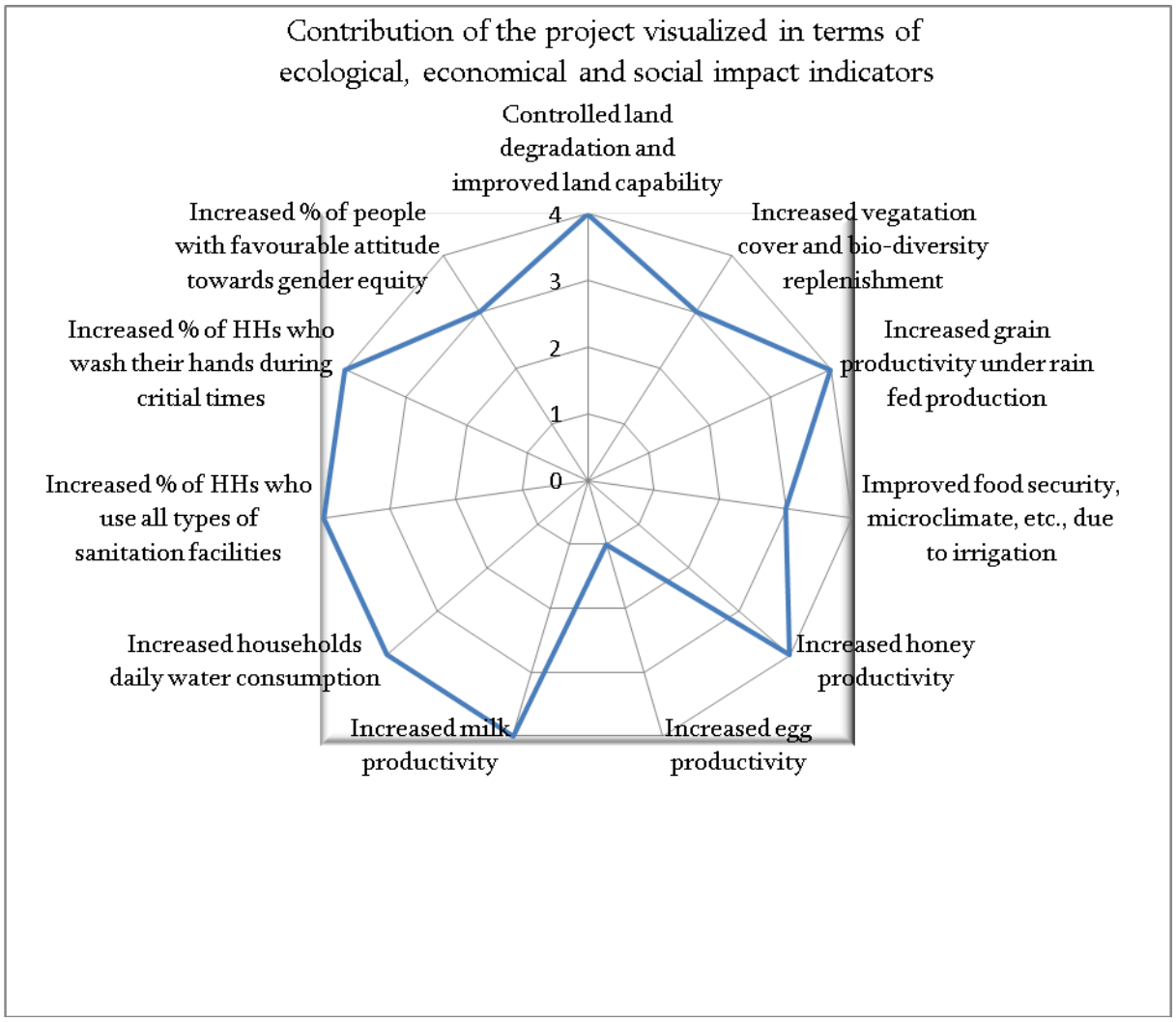

Figure 28 Visualizing changes in the projects context

4.4.4 Conclusion

Implementation of a multi-phased integrated agricultural development project at Messanu and the surrounding kebeles of Kilite Awlealo woreda have, in general, contributed to improve: the natural resources base, food security and people's access to social services (safe water, awareness on gender, HIV & HTP). The multi-phased project has tried to address priority needs of the target groups at different times. Interventions on natural resources management have been creating synergy with the safety net program. Strong collaboration with the government offices has helped to manage the project with reasonably few staffs and thereby commit most of the project funds to address the needs of the target people. Focus given to watershed approach has enabled to integrate different components of the project and maximize benefits. This has laid good foundation for sustainable natural resources management and agricultural development.

Integrated efforts of watershed treatment such as area closure at the upper slopes of the catchment with hillside terraces & deep trenches; and rehabilitation of gullies within the watersheds has prevented land degradation and improved land capability. Soil erosion at farmlands downstream prevented. The hydrology at downstream improved thereby enhancing irrigation practices at farms on lower slopes. Besides its long-term advantages of rehabilitating the environment and increasing productivity, participation of the community members in watershed treatment through cash-for-work has increased their income, and thereby their access to food.

Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure sites. And the communities have developed good knowledge on the benefits of timber and non-timber products that can be taped from closure sites.

The multi-phased projects were innovative in introducing new crop types- fruit trees that well adapt to the climatic conditions of the target area and provide economical and ecological benefits to the inhabitants. Fruits and vegetables give better yield and have good market value. As a result of integrated catchment treatment activities that reduced soil erosion and increased soil moisture; and also as a result of good extension services in providing farmers with farm inputs and technical advices, the productivity of rain fed crops has increased. Increase in production and productivity of crops has increased availability and access to food for the target households. Associated to feeding fruits and vegetables, dietary habits (nutrition) of the target households improved. Moreover, increase in production and productivity of crops has enabled them to create household assets which have strengthened their resiliency to shocks.

Limitations observed were poor quality of recently introduced motor pumps, lack of skill on motor pumps maintenance and lack of skill on bed making for tomato crops. In addition, water shortage during the driest period and flood damage during the rainy season are affecting irrigated farms at Messanu diversion.

Training farmers on dairy development, shoat rearing, beekeeping and poultry, including petty trade has contributed to increase productivity of milk, honey and egg. Dairy development has remarkably increased income of the households, enabling them to generate ETB 1000.00 to ETB 7000.00 per month. The contribution of the cooperative in increasing milk supply to the surrounding towns like Wukiro and Mekelle, including those towns in the neighboring region (Afar Region) is also magnificent. Limitation in this regard is market problem for the dairy cooperative, especially during fasting seasons.

Shoats and poultry contributed to diversify incomes for poor women headed households. The introduction of modern hives has remarkably increased honey yield per hive. Provision of loan for petty trade has also contributed to empower poor and voiceless women to be seen active in front of others. All these interventions have contributed to improve food security of the target households. Meanwhile, women engaged in shoat rearing were not organized in group, and group saving system that would have helped the beneficiaries mobilize savings for future scale up of these activities was not started.

Supports in creating access to safe water supply and sanitation facilities has contributed to improve health, reduce women/men work load and increase labor productivity of the target households. Increased accesses to water have led to improved hygiene practice of the people. Limitation in this regard is linkage of some of the underground tankers, which may be associated to quality of construction.

The community has good awareness on HIV prevention, including care and support for PLWHA and OVCs. They have established an innovative and transparent community-based PLWHA and OVC care and support system. Changes in attitude of the community are observed in favor VCT services, HTP eradication, and gender equality.

4.4.5 Lessons learnt

From the experiences of the multi-phased projects which have been implemented since 1998, the following lessons were learnt.

- Application of the watershed approach is important to integrate efforts in selected watersheds and maximize impacts. It recognizes the interrelationships among land use, soil and water, including the linkages between uplands and downstream areas; and organizes land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources.
- Implementation of the watersheds should further consider equitable sharing of the benefits to the inhabitants. It should further allow poor people (landless people) to benefit from short-term employment opportunities during construction of gully rehabilitation and other related structures, and provide sustainable livelihoods options such as beekeeping at closure sites, fattening small ruminants through cut–and-carry feeding practices, etc.; which tend to proportionate the benefits that people get from watershed development interventions.

- A lesson can be drawn in leveraging of resources from the safety net program to the resources of NCA by integrating activities in selected watersheds.
- Practical training should be given to capable farmers who have irrigation motor pumps on motor pump operation and maintenance, so that they can able to maintains their motor pumps and give maintenances services to their neighborhoods through charging reasonable payments. Arranging practical training and experience sharing with farmers at Fogera woreda of Amhara region is advisable, as the farmers at Fogera are real experts in maintenance of motor pumps. Moreover, good quality motor pumps like Robin should be supplied to the farmers.
- The high flood that has been affecting irrigation farms at Messanu diversion need to be controlled by constructing run off harvesting dam (if technically possible), or preventing it though river training and construction of ditches.
- Conducting on farm demonstration on production of tomatoes using beds can help farmers to maximize yields from tomato production at irrigation schemes.
- Lessons can be drawn from Agula Dairy Cooperative for it demonstrates the potential to transform food insecure rural farmers to modern farmers that can specialize in production of quality livestock products.
- So as to enhance sharing of experiences among them on management and marketing of shoats, shoat raring women need to be organized in a group. And group saving should be started to save money by installment.
- Improved breeds of poultry need to be introduced and mechanisms should be designed to supply chicken feed for the farmers.
- Looking better options of water supply such as construction of dam that can serve for both water supply and irrigation is advisable in order to sustainably address the problem of water supply at Tsewnet village.
- Unintended impacts of waste from Sheba Leather Industry, especially on ground water quality should be investigated and mitigating measures need to be designed.
- The community-based PLWHA & OVC care & support system gives lesson on that: if the community members are convinced and organized, and if a transparent system that can equitably serve the members is in place; they have the capacity to address their problems even without external assistances.

4.5 Dehana Integrated Rural Development Project (IRDP)

4.5.1 Retrospective overview of Dehana IRDP

Dehana woreda is located in Wag Himra Zone, Amhara National Regional State. Dehana woreda is one of the most denudated and drought prone areas where almost all people are affected by environmental hazards in one way or another. The area has very rouged topography where the potential productive agricultural land is very limited. Moisture stress associated to recurrent droughts has also affected crop production in Dehana. The woreda can be characterized as an area where environmental degradation, food insecurity and poorly developed social infrastructures are affecting the lives of the communities.

In order to address the problems, NCA/EOC-DICAC Dehana Integrated Rural Development Project had been implemented from 2000 to 2009. Dehana IRDP had been implemented in three phases and one bridging plan: 2000-2002; 2003-2005, 2006 bridging plan, and 2007-2009. The project was mainly working on natural resources management, water resources development (irrigation and water supply), income diversification and awareness raising of the community on VIH and HTP, including family planning. The project had been implemented in five target kebeles, namely: Kewzba, Chila, Shimamda, Shimella and Azila.

The projects interventions were designed and implemented in the target kebeles so as to enhance productive opportunities and increase accesses to social services (water, health, education, etc.,); anticipating that the cumulative effect of all these interventions can enhance food security-availability, access and utilization of food by the target communities.

Towards this, physical and biological conservation measures such as: area closure on 537.5 hectare, stone bund construction on more than 82.34 km and hillside terrace construction on 91.54 km had been implemented. Physical conservation structures were implemented through cash-for-work. The project had also supported individual and community nurseries in terms of materials and building technical capacities of the farmers. Vegetable seeds, grain seeds, shoats, poultry, modern beehives with bee colonies, and forage seeds had been provided through revolving grant to create startup capital, so that farmers can scale it up through time. It had also constructed seed grain stores for preserving local cultivars, and storing farm inputs. The projects had also tried to diversify income of poor households through building their technical and financial capacity on petty trade and hand crafts, though hand crafts were not successful may be associated to lack of social and financial feasibility.

More than, 10 springs, 1 hand dug well, 10 surface water harvesting structures and 2 roof catchments were constructed to increase the peoples access to safe water supply. It had also constructed guide canal, which has enabled 25 farmers to practice irrigation on their 6.5 hectare land. More than 22.35 kms of access road that has connected the target kebeles to the main road has been constructed. Alternative basic education centers were established by the project to create access to education service for children. And first cycle primary school has been constructed at Shimella kebele. The project has constructed one health center in Kewzba kebele. Moreover awareness raising was given to the communities on HIV and HTP, including family planning making use of religious leaders and school clubs.

4.5.2 Other actors involved in the target area

Other non-governmental organizations that have been operational in the target area are: (i) World Food Program (WFP) and Organization for Rehabilitation and Development in Amhara (ORDA). While ORDA works in other kebeles, WFP works in school feeding program in the woreda. This shows that NCA/EOC-DICAC project had been the main actor on which changes related to its interventions are attributed to it. Assessment of the impacts of Dehana integrated rural development project has, therefore, focused on those achievements that are manly associated to the utilization of

the project resources and collaborative efforts of the government staffs. Therefore, achievements elaborated in the following sections are mostly attributed to Dehana IRDP.

4.5.3 Achievements of Dehana IRDP

Projects effectiveness was measured based on the impact hypothesis developed for measuring the three objectives, namely: (i) Natural resources in the target areas rehabilitated through ecologically sound, economically viable and socially accepted natural resources management practices; (ii) Food security of the target communities improved through improving availability and access to food in the target communities; and (iii) well-being of the target communities improved through access to safe water supply, health services, education and awareness raising on Gender, HIV and HTP.

4.5.3.1 Natural resources management

i) Preventing land degradation and improving land capability

The communities understood the benefits of soil and water conservation structures. Household survey indicated that 38.7% of the households in the target kebeles have constructed buds on their farmlands; and among them 52.6% have planted forage trees along the bunds. Construction of soil and water conservation activities reduced soil erosion and improved soil moisture retention capacity. This has contributed to increase in productivity of crops.

iii) Increased in vegetation cover and bio-diversity replenishment

Area closure at Tela watershed (Kewzba kebele) enhanced rejuvenation of the vegetation cover, and enabled target communities to harvest forage through cut-and-carry practice. Tela watershed (36 hectare) is properly protected and enriched with plantation of different tree species like jatropha and Acacia saligna. The watershed has served for 105 households (93 male and 12 female) as a source of grass for their animal and thatched roofs. It has also benefited 17 landless youth (all male) in terms of bee forage and place for keeping bees. Rejuvenation of vegetation at the closure site and plantation of different species of trees in schools has contributed to increase bio-diversity. The nursery site in the watershed which has been handed over to the Kebele administration has been serving the community to raise different species of tree seedlings planted within the watershed, including seedlings distributed for individuals.

The vegetation cover in the target kebeles has increased as the farmers are planting woodlots around homesteads and forage shrubs on bunds. Result of the household survey indicated that 16.3% of the households in the target kebeles have woodlots for fuel wood and for market. During focus group discussion with the farmers at Shimella kebele, they disclosed that more than 300 households in the kebele have planted more than 150 eucalyptus trees (wood lot) per household. For example, Ato

Tessema Chanie has 300 eucalyptus trees planted along the side of a stream which he also uses for irrigation.

The drawback in this regard is ecological effect of eucalyptus, i.e., its high competition for water and nutrients affects irrigation practice along the stream. Farmers expressed that the flow of the stream highly reduces after December. The other limitation is that, except in Tela watershed, natural resources management activities were not implemented following the watershed approach. Even in Tela watershed, community structure like watershed association, which would have ensured sustainability of the project outputs and enhanced equitable benefits sharing among the inhabitants of the watersheds, was not established.

Figure 29 Woodlot planted along Bargiba stream and different species of trees in Shimella 1^0 School

4.5.3.2 Food security

i) Increased production and productivity of crops

Increased production and productivity of crops was observed associated to the introduction of irrigation development in the target area and provision of vegetable seeds. Gravity irrigation practiced at Azila kebele on 6.5 hectare through the project support in terms of construction of guide canal and provision of vegetable seeds, including capacity building on irrigation practices. This irrigation scheme benefited 15 households (9 male & 6 female). They produce vegetables like head cabbage, garlic and potatoes.

In addition, the project has introduced drip irrigation to the target kebeles. Though the assessment team did not observe operating drip system, key informants disclosed that farmers are producing using drip systems. For example, chairman of Shimella kebele disclosed that a farmer in the kebele – Ato Bihonegn - has produced head cabbage, carrot, and beetroot using drip irrigation, and sold it for ETB 2,500.00. Making use of the income from vegetable production, Ato Bihonegn has bought one cow and able to cover education expenses for his two children. The assessment team observed vegetable production by a famer that uses gravity irrigation from Bargiba stream at Shimella Kebele and a vegetable farm that uses overflow of the water reservoir at Kewzba kebele. In general, supports given in terms of constructing guide canal, provision of vegetable seeds and drip system has contributed to increase vegetable production in the target kebeles. As a result, availability and access to food for the target households has increased.

Figure 30 Head cabbage production by farmers at Shimella and Kewzba kebeles

As a result of integrated efforts of soil and water conservation activities and provision of grain seeds (teff, wheat and chick pea); productivity of rain fed production has also increased. Household survey showed that productivity of grains produced using rain fall has increased, on average, by 55.5%.

ii) Increased production and productivity of livestock

a) Beekeeping

Training farmers on improved beekeeping and provision of improved beehives helped target households generate income which enhances their access to food. The project trained landless youth and resource poor farmers on improved beekeeping and provided them with improved beehives with bee colonies. It provides more than 390 modern beehives with bee colonies through revolving grant. Landless youth (17 male youth) in Kewzba kebele, for example, have 40 beehives. They have been trying to tap into better opportunities created for bee forage on the closure site at Tela watershed.

The most significant change in this regard was observed on Fekadu Mamo in Shimella kebele. He disclosed the change as follows: "*I took one modern beehive with bee colony and harvested 38 kg honey. Then I increased the number of modern beehives to four. Last year, I harvested 28-35 kg honey per beehive. Making use of the income from honey, I bought one cow. Before the project support, I was harvesting 10-15 kg honey from a traditional beehive."* Training given by the project on modern beekeeping has built farmers skill (created human capital) on modern beekeeping practice.

b) Shoat rearing

Shoats (sheep and goat) were provided to poor women headed households and landless youth in the target kebeles. More than 336 shoat were provided to women headed households and landless youth through a revolving grant. Women headed households were leading their life mainly by selling local drinks. As a result of the project support, they have been able to diversify their income. These households have been able to increase their income and stock size. For example, W/ro Wubie had taken ETB 900.00 through revolving grant and bought 3 sheep. Currently, the number of her shoats reached to seven. She has also used her shoats to slaughter during religious festivities like Easter. In this regard, organizing the beneficiaries in groups would have helped them share experiences and mobilize group saving.

Figure 31 Women engaged in shoat rearing at Kewzba kebele

Associated to forage development and better management practices, maturity of shoat kids for slaughter has improved from 7 months to 5 months. In general, provision of shoats has enabled women headed households to improve food security of their families. Furthermore, their access to credit has increased for shoats can serve as collateral. All these better conditions helped them to develop a sense of self-reliance, which eventually can lead them to empowerment.

c) Petty trade

The project has also organized women group in each target kebele and provided them startup capital for petty trade through revolving grant. Group members are homogeneous in terms of their socio-economic status, and membership was based on willingness. Each member in a group has got ETB

900.00 as a startup capital, including business skill development trainings. Discussion with the groups at Shimella kebele revealed that they have been able to feed their families, educate their children, construct house, buy home equipment and buy heifer after they got technical and financial support from the project.

Moreover, group members regularly meet and discuss on issues like business status, families, HIV, gender, HTP and other social issues. Each member of the group saves ETB 10.00 per month. But the group did not start to give credit for the members. Rather the group members use the money saved for supporting a disable student who joined Mekelle University. Though this is very interesting job that gives lesson on self-help potential of the community, providing credit to the members would have also helped group members to expand their business and generate more income.

Discussion held with a similar group at Kewzba kebele has also indicated that petty trade has been successful and enabled all members of the group to feed their families, educate their children and create household assets. For example, W/ro Berinesh Melesse has able to buy household assets like Television and Deck after she has goat technical and financial support from the project. On average, she has been able to get ETB 500.00 per week from her business (tea and local drinks).

Figure 32 W/ro Berinesh showing her TV and Deck in her home

Members of the petty trade group in Kewzba have been saving ETB 10.00 per month. They meet monthly to discuss on issues of business growth, HIV, HTP and gender. As a result, they have very good awareness on gender, HIV and HTP. Being in group for the women groups has showed impacts more than improving income in enabling them to discuss on common problems and seek solutions for the problems. Meanwhile, the group did not start credit, as in the case of the group in Shimella kebele.

4.5.3.3 Improvement in peoples well-being

a) Water supply and sanitation

A total of 23 water facilities were constructed by the project. These schemes contributed to raise safe water supply coverage in the woreda. As a result, daily water consumption of the households increased, which in turn led them to improve hygiene practices. Survey result on hygiene and sanitation practice of the households living in the target area (Table 12) showed that changes were observed in hygiene and sanitation practice of the households.

Table 12 changes observed in relation to hygiene and sanitation practices of the households

Situation	After	Before

Daily water consumption per person (liters)	12	5.5
Minutes of walk to fetch water (per round trip)	10	25
Households who use Jerry can for fetching water (%)	65.3	8.2
Households who use pit latrines (%)	53.1	2.0
HHs who have pit latrine with hand washing facility (%)	67.3	0
Hand washing practice of HHs before eating food (%)	61.2	40.8
Hand washing practice of HHs after cleaning child faeces (%)	67.3	42.9
Hand washing practice of HHs before meal preparation (%)	67.3	46.9
HHs who always disposes solid wastes on disposal pits (%)	34.7	28.8
HHs who always disposes liquid wastes in disposal pits (%)	34.7	30.6
Sample size (n)= 49 households (23 male + 26 female)		

Source: Household survey, November 2010

Safe water supply, hygiene and sanitation services improved child morbidity and saved the time that would have been used for taking care of sick children, thereby improving labor productivity. Reduction in minutes of walk for fetching water has reduced women workload and improved the time that women can engage in productive activities.

Limitations in this regard were: passive water committees. Water committees do not collect water fee for maintenance of water facilities. Consequently a considerable number of water facilities constructed by NCA/DICAC were reported to be non-functional. The Woreda water desk disclosed that about 25% of the water facilities constructed by NCA/EOC-DICAC were not functional, which compared to the woreda average of 15% is a bit higher. The assessment team, however, has observed functional water supply facilities in Kewzba and Shimella kebeles. Any how it is advisable to note the comment given by the woreda water desk-the need to assign technically skilled persons during construction of water facilities.

Figure 33 Spring developed at Shimella Kebele

b) Health

The project has contributed to create access to health services through construction of Kewzba health center. Construction of access roads that connect the target kebeles to the main road has also increased outreach health services given for people and livestock. Moreover, the former project office which has been handed over to the community has served as an office for heath extension workers, who are serving the community in promoting preventive health practices. All these interventions have, in general, contributed to improve the community heath and thereby improve labor productivity.

Figure 34 Health center constructed by the project at Kewzba kebele

c) Education

Construction of class rooms and furnishing the class rooms for Shimella first cycle primary school has improved access to education for children. Before the construction of the school, children were attending class either at Kewzba or Shimella comprehensive primary schools by walking 1 hour for a single trip. During early phases of the project, alternative basic education services enabled children to get access for education in their localities. Moreover, the project has unintended impact on creating early childcare and education center. One of the rooms which had been used for the project office helped to start an early childcare and education program by the community.

Figure 35 Primary school at Shimella kebele and KG at Kewzba kebele

d) Awareness on gender, HIV and HTP

As a cross-cutting activity to other interventions, the projects were raising awareness of the community on HIV and HTP. Awareness raising has been done in collaboration with school Anti HIV and HTP clubs. Club members teach the community about harmful effects of HTPs and the consequences of HIV/AIDS by using music, drama and poem, in all public gathering occasions. In addition, schools supported with generators like Shimella Comprehensive Primary School has been teaching the community by showing films on harmful effects of early marriage and female genital mutilation. The school director also disclosed that the project had been enhancing girls' school enrollment though providing school materials.

Discuss with anti-HIV and HTP club members at Shimella comprehensive primary school disclosed that they have been working to bring attitudinal changes of the community on HTP and HIV. Religious leaders (priests) has also been teaching the community to avoid harmful traditional practices like early marriage and female genital mutilation, including HIV prevention (be faith full) and avoiding stigmatizing people in relation to their health status, difference in ability and occupation. As a result, FGM has remarkably reduced, and people are aware of HIV transmition and prevention methods. Discussion with women groups involved in petty trade has witnessed the change.

Figure 36 Music by Anti-HIV/HTP club members during awareness raising public gatherings

The community has to some extent brought changes in attitude towards gender equality. Survey conducted in this regard (Table 13) showed that some people have developed good attitudes towards gender equality.

Table 13 changes observed in attitudes of households in relation to gender equality

Attitudes (% of HH who disagree on the idea)	After	Before

A husband has the right to discipline his wife	44.9	4.1
A man is the ruler of his home	12.2	4.1
A husband has the right to beat his wife if she does not accept his idea	55.1	36.7
A woman could be more productive if she work on household chores	32.7	2.0
Women can engage in farming activities, but they should not have control over the benefits	53.1	38.8
Sample size (n)= 49 households (23 male + 26 female)		

Source: Household survey, November 2010

Awareness as well as practice of the community on family planning has also increased. During FGD, women disclosed that they have been using contraceptives such as pills and depot. Similarly, result of the household survey showed that 32.7% are using contraceptives.

In general, the project has contributed to bring about positive changes in the context in terms of ecological, economical and social benefits. This is visualized using a "spider" or "amoeba" diagram (see Figure 37). For this purpose a rating of changes for each indicator is given as 4 "change is considered very good", 3 “change is considered good”, 2 “change is considered moderate, 1 “slight change is observed’, and zero “no change in the context".

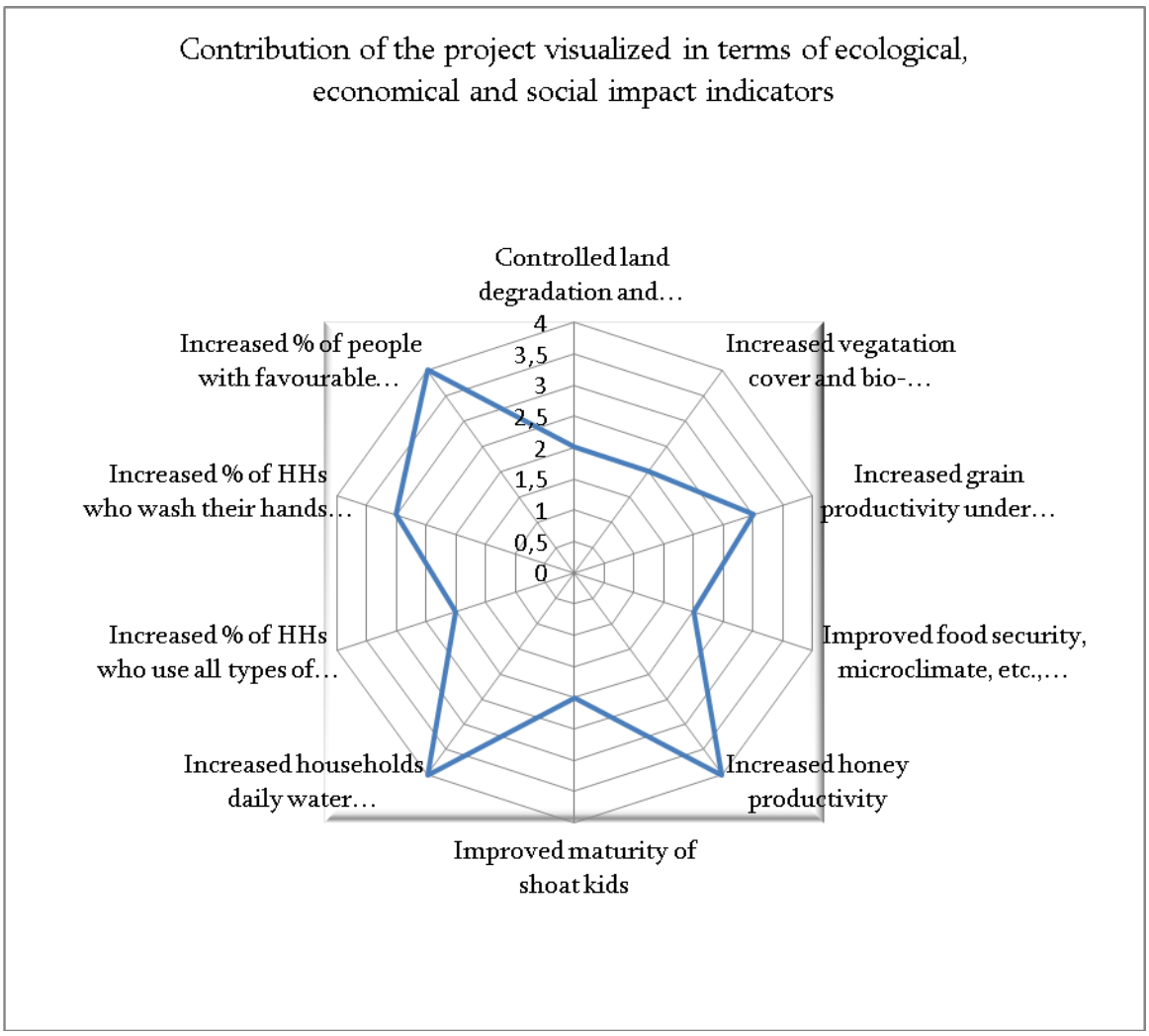

Figure 37 Visualizing changes in the project context

4.5.4 Conclusion

Implementation of multi-phased projects in Dehana woreda from 2000 to 2009 has, in general, contributed to improve: the natural resources base, food security and people's access to social services (health, education, safe water, etc). Good collaboration with the government offices has helped to manage the project with few staffs and thereby commit most of the project funds to address the needs of the target people. Integrated development efforts at Tela watershed (Kewzba kebele) served as good demonstration for the effectiveness of the watershed approach in implementing sustainable natural resources management and agricultural development activities.

Soil erosion in the target kebeles has reduced. Encouraging impacts are also observed in relation to bio-diversity replenishment on the closure site at Tela watershed. Limitations in this regard are lack of community structure that will be responsible for sustainable management of the project outputs

through mobilizing the community and carrying out timely maintenances of physical structures, including protecting the closure site. The other limitation is that, except in Tela watershed, natural resources management activities were not implemented following the watershed approach.

Supports given in terms of constructing guide canal, provision of vegetable seeds and drip system has contributed to increase vegetable production in the target kebeles. As a result, availability and access to food increased for the target households. Provision of grain seeds (teff, wheat and chick pea) has contributed to increase productivity of rain fed crops.

Training farmers on forage development, shoat rearing, beekeeping and petty trade has contributed to increase productivity of honey and enhance quick maturity of shoats. Shoats, have contributed to diversify incomes for poor women headed households. Women engaged in petty trade have also been able to feed their families, educate their children, construct house, and buy heifer after they got technical and financial support from the project. Limitation in this regard is lack of group saving systems for those engaged in beekeeping and shoat raring. This would have helped the beneficiaries mobilize savings for future scale up of their business and transformation in their well-being.

Supports given in creating access to safe water supply and sanitation has contributed to improve health, reduce women work load and increase labor productivity of the target households. Similarly, awareness raising on HTP has contributed to reduce HTPs such as FGM and early marriage. Supports given in terms of construction of clinic and school have also contributed to improve the community's' access for health and education services.

4.5.5 Lessons learnt

From the experiences of the multi-phased project which had been implemented from 2000 to 2009, the following lessons were learnt.

- Application of the watershed approach is important to integrate efforts in selected watersheds and maximize impacts. It recognizes the interrelationships among land use, soil and water, including the linkages between uplands and downstream areas; and organizes land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources.
- Implementation of the watersheds should further consider equitable sharing of the benefits to the inhabitants. It should allow poor people (landless people) to benefit from short-term employment opportunities during construction of gully rehabilitation and other related structures, and provide sustainable livelihoods options such as beekeeping at closure sites, fattening small ruminants through cut–and-carry feeding practices, etc.; which tend to proportionate the benefits that people get from watershed development interventions.
- Ecological effect of eucalyptus, i.e., its high competition for water and nutrients should be well considered while selecting sites for wood lot plantation.
- Saving mobilization is important to strengthen resiliency of the households' and create better financial capital for scale up of successful interventions. Especially, strengthening women saving and credit groups can enhance their financial independence, decision making role, and

eventually help them empower. Being in group for the women groups has impacts more than improving income as it enables them to discuss on common problems and seek solutions for the problems.

- Establishing water committees for water points and strengthening their technical skill and managerial capacity is important to sustain water supply facilities. Care need to be taken during construction of water facilities by assigning skill full personnel, as this point is the key step to bring the desired change.
- Transparent systems and structures should be in place for follow up and revolving of grants provided to the members of the community in terms of seeds, shoats, beehives, etc. Such grant should create a sustainable financial capital for the community in the target kebeles by revolving it through credit. Establishment of watershed associations that are registered under the countries law can be good option to manage such resources in a sustainable way.

V. GENERAL CONCLUSION AND RECOMMENDATION

5.1 General Conclusion

Norwegian Church Aid and its partners has/had been implementing projects related to: emergency relief aid and disaster preparedness, food security, safe water supply & sanitation, women development, HIV/AIDS and climate change. It has/had been implementing these projects in Amhara, Tigray and Oromia regional states of Ethiopia since 1993; in partnership with the Ethiopian Evangelical Church Mekane Yesus Development and Social Services Commission, Ethiopian Orthodox Church- Development and Interchurch AID Commission and Relief Society of Tigray.

The project areas are situated in those parts of the country where there had been armed struggle. Consequently basic infrastructures had hardly existed. These areas are frequently affected by recurrent droughts, which require supports in terms of interventions that increase food availability, access and utilization. Most of the target areas (especially Rama, Messanu and Dehana) are found in extremely degraded areas where farming had been practiced for many centuries. These areas have poor natural resource base and poor potential for agricultural development, which needs systematic interventions that can rehabilitate the natural resource base and at the same time increase agricultural production.

So as to bring about change on the wider and complex context, a number of multi-phased projects have/had been implemented in five project areas that are situated in different parts of the country. The context which had been given high priority, especially during the first phases of the projects, was related to lack of facilities for social services and emergency relief. And the context which had been given high priority during the middle phases of the projects was related to food insecurity. During the later phases of the projects, the context which has been given high priority is related to gender responsiveness and market oriented production.

The projects implemented so far in the five target areas were designed to bring measurable changes on the given context. Meanwhile, a concrete baseline data that shows the context before implementation of the multi-phased projects was not available. Hence the change in the context was

determined by subjective judgments of the target beneficiaries and other stakeholders on "before" and "after" situations in relation to the various sectors of interventions of the projects. For this purpose, impact hypothesis was developed visualizing impact chains – utilization, effect, benefit/drawback and impact of various interventions implemented in the target areas by different partners of NCA. Then relevant impact indicators were selected and used for measuring intended or unintended changes indicated in the impact hypothesis.

Major areas of interventions were: Emergency relief and recovery, Natural resources management, Agricultural development (rain fed & irrigated agriculture); Livestock development; Non-farm income generation activities, Safe water supply, Education, Health, Access roads, and Gender/HTP/HIV. Emergency relief provision such as food grain aid and therapeutic feeding to malnourished children has saved the lives of many people during the 1984/85 drought. Provision of farm oxen, grain seeds and farm implements through emergency recovery program has contributed to change nomadic pastoralist way of life in the target area to agro-pastoralist way of life. The shift in their way of life has led to sedentary settlement of the people. As a result, villages where there was no even a single permanent residential house have changed to small rural towns.

Natural resources management activities such as construction of hillside terraces, micro-basins, deep trenches, check-dams and bunds, including plantations on closure sites, gullies and bunds have got acceptance of the communities in the target areas. Treatment of watersheds prevented land degradation and improved land capability. Integrated efforts of watershed treatment such as area closure at the upper slopes of the catchment with hillside terraces & deep trenches, and rehabilitation of gullies within the watersheds has prevented land degradation and improved land capability. Soil erosion at farmlands downstream prevented and the hydrology improved thereby enhancing irrigation practices at farms on lower slopes.

The communities have developed good knowledge on the benefits of timber and non-timber products that can be taped from closure sites. Closure sites become good potential for bee forage as well as fodder for shoats and cattle through cut-and-carry practices. Plantations on closure sites are also found as good potentials to harvest timber products like sisal and other products. Moreover, rejuvenation of the vegetation cover on closure sites coupled with plantation has contributed to improve biodiversity as well as micro-climate.

Participation of the community members in watershed treatment through cash-for-work increased their income, and thereby their access to food. Participation in cash-for-work activities has especially increased women's own income, and it has to some extent increased their financial independence. Moreover, cash for work activities reduced seasonal migration of people in search of job opportunities.

Limitation observed in relation to implementation of natural resources management activities is lack of responsible community structure to sustainably manage the project outputs and ensure benefits. Community structure like watershed association would have ensured sustainability of the project outputs and enhanced equitable benefits sharing among the inhabitants of the watersheds.

The projects contributed to increase in production and productivity of crops and livestock. Crop production and productivity increased associated to irrigation development, soil & water conservation and farm input provision, including building technical capacity of the farmers. Irrigation has contributed to increase cropping intensity as well as productivity of crops, while other interventions have contributed to increase productivity of crops. Increase in production and productivity of crops has increased availability and access to food for the target households. Associated to feeding fruits and vegetables, dietary habits (nutrition) of the target households also improved. And may farmers (especially irrigation users) have been able to create household assets like livestock, houses, etc., which further strengthens the household economy.

Irrigation has increased participation of women in production and marketing of fruits and vegetables. In the process, men have started to acknowledge the role that women can play in improving the household economy, which is one step forward for gender equality in the household. As a result of the trainings given to them and practical exercises, farmers have developed good knowledge and skill on irrigation agronomy. Limitations in this regard are lack of skills on pump maintenance and bed preparation for tomato crops. Training few capable people among the beneficiaries of motor pumps would have addressed the problem. Similarly, practical demonstration on how to support tomato crops using beds would have helped farmers avoid losses associated to ruin of tomatoes before harvest.

Interventions on livestock development have improved food security of the target households through increasing productivity of milk, egg and honey. It has also improved the number of months that shoat kids mature for slaughter. Provision of livestock (shoats and poultry) has especially improved food security of women headed families, and strengthens their resiliency to cope up shocks. Meanwhile balancing forage or feeds availability with stocking density is of paramount importance to scale up the intervention and sustain the benefits.

Besides improving food security of landless youth, beekeeping on closure sites has shown good advantages in bee bio-mass replenishment as the closure sites which are the main sources of bee forage are free from pesticides that affect the bee bio-mass. Improved breeds of diary have contributed a lot in improving food security of farmers. Dairy production using improved breeds of cows has also been proved to be one of the potential interventions to transform the livelihoods of resource poor farmers, if well integrated with forage development activities and other reliable feed supply systems. Meanwhile, market problem for milk, especially during fasting seasons has effects on the income of beneficiaries. Hence, scale up of dairy development interventions needs to integrate with milk processing factories.

Non-farm income generating activities such as petty trade and had crafts had also been implemented so as to diversify income sources and create job opportunities for resources poor people such as women and landless youth. While petty trade was successful in increasing income of the households and thereby improving food security, had crafts were not successful due limitations in technical, financial, market and social feasibility of the interventions. Promotion of hand crafts would have been done after thorough assessment of technical, financial, market and social feasibility of the activities.

Construction of different types of water supply facilities has contributed to raise safe water supply coverage in the target area. As a result, daily water consumption of the households increased, which in turn led them to improve hygiene practices. Safe water supply, hygiene and sanitation services improved child morbidity and saved the time that would have been used for taking care of sick children, thereby improving labor productivity. Limitation in this regard was weak or non-functional water committees for some of the water points which were not active in collection of water fees and conducting timely maintenances of non-functional water schemes. The committees would have also fenced their water points with live fence (vegetation).

Interventions in building or renovating health facilities and provision of equipment have, in general, contributed to improve heath of the target people and thereby improve labor productivity. Construction of class rooms and furnishing the class rooms has contributed to increase children access to education. Establishment of alternative basic education centers has created opportunities for children to get education in their localities without compromising their engagement to support their families. In Medda Wolabu, establishment of adult education centers in all the target kebeles and assignment of adult education facilitators through covering their honorarium payments has enabled most of the people to read and write Oromifa.

As a cross-cutting activity to other interventions, NCA projects were promoting gender equality. As a result of awareness raising on gender equality, women participation in productive activities and their role in decision making has improved. During focus group discussions, women disclosed that stereotyping gender roles has been decreasing from time-to-time. Community-based PLWHA & OVC care & support system observed at Messanu project area is an innovative practice that gives lesson on that: if the community members are convinced and organized, and if a transparent system that can equitably serve the members is in place; they have the capacity to address their problems even without external assistances.

5.2 General Lessons Drawn

In general, watershed-based livelihoods development interventions assisted vulnerable people to use the natural resources at their disposal most effectively to survive shocks and stresses, and thereby thrive and move on to sustainable and rewarding livelihoods which can sustainably use the natural resources base, increase incomes, improve food security and enhance their well-being. It promotes capital assets of individuals, households and communities, i.e. (i) human capital (knowledge, skill and capability to work or adapt to changing situations); (ii) social capital (networks and connection, relationships of trust and mutual understanding, shared values and behaviors, common rules, mechanisms for participation in decision making, leadership, etc.); (iii) natural capital (land and produce, water, trees and forest products, bio-diversity); (iv) physical capital (* infrastructure-such as access roads, shelter, water supply & sanitation facilities, energy and communication, and * tools & technology- such as: tools and equipment for production, seed, fertilizer and pesticides); and (v) financial capital (savings/stocks, credit and wages).

Enhancing capital assets of the households helped target beneficiaries cope up with or adapt to the causes of vulnerability (shocks), and engage in livelihood strategies that can lead to sustainable livelihoods outcomes (more income, reduced vulnerability, improved food security, increased well-

being and more sustainable use of natural resources); which in turn will enhance their capital assets. It enables households which are differently affected by the causes of vulnerability to respond differently to such causes of vulnerability through enhancing their capital asset that most constrained them (Oliver Serrat, 2008).

The following key lessons can be drawn from NCA/partners projects implemented in the last two decades in different parts of the country with different partners.

- Application of the watershed approach is important to integrate efforts in selected watersheds and maximize impacts. It recognizes the interrelationships among land use, soil and water, including the linkages between uplands and downstream areas; and organizes land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources.
- Implementation of the watersheds should further consider equitable sharing of the benefits to the inhabitants. It should allow poor people (landless people) to benefit from short-term employment opportunities during construction of gully rehabilitation and other related structures, and provide sustainable livelihoods options such as beekeeping at closure sites, fattening small ruminants through cut–and-carry feeding practices, etc.; which tend to proportionate the benefits that people gets from watershed development interventions.
- Establishment of responsible community structure (institution) is vital to plan, implement and share equitably the benefits of watershed development interventions. In this regard, establishment of watershed development association, which is led by a democratically elected watershed development committee, is advisable. The association can initiate the community to conduct timely maintenances of conservation structures and protect closure sites.
- Saving mobilization is important to strengthen resiliency of the households' and create better financial capital for scale up of successful interventions. Especially, organizing women in saving groups can enhance their financial independence, decision making role, and eventually help them empower.
- In order to address the need for apple seedlings by many of the farmers, apple propagation should be considered as one business option for poor farmers. If poor farmers get organized, trained and provided with land and materials, they can address apple seedlings demand by farmers, and at the same time generate income. Apple-garlic-hop farm should be considered as one package, and be supplemented with beekeeping and water harvesting facilities. This can help households diversify as well as maximize income from a small plot of land.
- Training capable farmers who have irrigation motor pumps on motor pump maintenance can enable them to maintain their motor pumps and give maintenances services to their neighborhoods through charging reasonable payments.
- Integration of fattening with irrigation production is a profitable venture where the households can provide feed and water from irrigation farms and fertilize their farm land using manure from beef kept for fattening.
- Conducting on farm demonstration on production of tomatoes using beds can help to maximize yields from tomato production.

- Besides looking for different options of creating better market outlet for produces produced using irrigation, adjusting the cropping pattern as well as the planting time can help regulate the amount of produces supplied to the market, and thereby mitigate price fluctuation. Contract farming -farmers getting into contracts with hotels and restaurants in the towns - should also be promoted.
- Study, design and construction of diversion structures at Gennale River and other rivers in Medda Wolabu would enable the community to tap into the enormous surface water potential for irrigation, and thereby further transform their well-being.
- The introduction of sesame has proved that production of export oriented crop is the best option to bring about fast growth of the rural economy and transform farming households to modern farmers who can maximize benefits making use of their comparative and competitive advantages.
- Farmers need to engage in non-farm IGAs if and only if the technological, financial, socio-cultural, market and institutional feasibility of the IGAs is promising. Care should be given in organizing people that have common vision, similar economic status and psychological makeup in a group.
- The community-based PLWHA & OVC care & support system gives lesson on that: if the community members are convinced and organized, and if a transparent system that can equitably serve the members is in place; they have the capacity to address their problems even without external assistances.
- Technical investigations on balancing forage or feeds availability with stocking density is of paramount importance to scale up the intervention on the livestock sub-sector and sustain the benefits.
- Transparent systems and structures should be in place for follow up and revolving of grants provided to the members of the community in terms of seeds, shoats, beehives, etc. Such grant should create a sustainable financial capital for the community by revolving it through credit.

REFERENCES

Federal Democratic Republic of Ethiopia (FDRE) Ministry of Finance and Economic Development (MOFED).2002. Sustainable Development and Poverty Reduction Program, Addis Ababa, Ethiopia.

Federal Democratic Republic of Ethiopia (FDRE) Ministry of Finance and Economic Development (MOFED).2006. A Plan for Accelerated and Sustained Development to End Poverty (PASDEP), Addis Ababa, Ethiopia.

Karl Herweg and Kurt Steiner .2002. Impact Monitoring and Assessment: Instruments for Use in Rural Development Projects with a Focus on sustainable Land Management, Vol. I, Buri Druck AG, 3084, Switzerland.

Oliver Serrat .2008. The Sustainable Livelihoods Approach: www.abd.org/Projects/Tonle_Sap-200412.pdf.

Steve Diver.2002. Introduction to Permaculture: Concepts and Resources. National Sustainable Agriculture Information Service, Publication No. CT083.

World Food Summit. 1996. World Food Summit at the level of Heads of State or Government, Rome, Italy.

APPENDIXES

Appendix A: Questionnaire for Household Survey

0. AREA IDENTIFICATION

Region: _____Zone_____Wereda:_____Kebele:_____Village:_____

Interview date_____

I. HOUSEHOLD GENERAL INFORMATION

1. Name of respondent: _____, Age: _____
2. Household type: 1) Male headed 2) Female headed
3. Marital status: 1) Married 2) Single 3) Divorced 4) Widowed 5) Separate
4. Household size: Male---------- Female---------- Total ----------
5. Primary Occupation/income source : 1) Crop farming 2) Livestock rearing 3) Mixed farming 4) Petty trading 5) Remittance 6) Other (specify) _____
6. Secondary occupation/income source: 1) Bamboo craft 2) Pottery 3) Blacksmith 4)Weaver 5) Other (specify)_____
7. Educational level of respondent: 1) Illiterate 2) Read and write 3) Grade_____

8. In which program components have you been participated?

Component	**1) Yes 2) No**
Natural resources management	
Rain fed crop production	
Irrigation development	
Dairy development	
Sheep and goat rearing	
Bee keeping	
IGAs	
Water supply, hygiene & sanitation	
HIV prevention	
Harm full traditional practice eradication	
Access road construction	
Gender equity	
Family planning	
Emergency relief	

II. NATURAL RESOURCES MANAGEMENT

1. Did you construct soil and water conservation structures in your farm land? 1)Yes 2, No
2. Did you plant forage/fruit trees along soil conservation structures? 1) Yes 2) No
3. Do you have woodlots? 1) Yes 2) No
4. Household assets created from the interventions on natural resources management (multiple response): 1) Forage 2) Fruit trees 3) Other perennial trees 4) Other (specify)_____

III. AGRICULTURAL DEVELOPMENT

A. Rain fed agriculture

1. Average productivity increment of rain fed crop production in your farm

S/N	Crop type	After	Before
1			
2			
3			
4			
5			
6			
7			

2. Did you able to create asset as a result of increase in productivity and marketability of rain fed production? (1) Yes, (2) No
3. If yes, what assets did you able to create as a result of increase in productivity and marketability of rain fed crops? _____
_____

B. Irrigated agriculture

1. How many times did you produce in a year with irrigation? _____
2. Average productivity improvement of irrigated crop production in your farm

S/N	Crop type	After	Before
A	Supplementary Irrigation		
2			
3			
B	Full irrigation production		
1			
2			
3			

3. Did you able to create asset as a result of increase in productivity and marketability of irrigated production? (1) Yes, (2) No
4. If yes, what assets did you able to create as a result of increase in productivity and marketability of irrigated crops? _____
_____

C. Livestock development

Variables	**After**	**Before**	Skip
1. What is the average milk productivity (litre/day/cow)?			
2. Number of eggs per hen per year			
3. Kid maturity of sheep/goat for slaughter (in months)			
4.Price difference between local & improved sheep/goat 1=high (> 65%), 2=medium (30-65%), 3=(low < 30%), 4= no change)			
3. Amount of honey produced from a hive (kg) • Traditional/local • Transitional • Modern			
6. What assets did you able to create from livestock development interventions? _____			

IV. INCOME GENERATING ACTIVITIES

1. Have you been participated in income generating activities? 1) Yes, 2) No
2. If yes, what assets did you able to create from IGAs? _____

V. WATER SPPPLY HYGIENE & SANITATION

Variables	After	Before
1. Daily water consumption of the HH (liters)		
2. Minutes of walk to fetch water (per round trip)		
3. Materials used to fetch water		

4. Hygiene and sanitation practice in the target household

Hygiene & sanitation practices	After	Before
a. Do you have pit latrine? (1) Yes, (2) No		
b. If yes, which member of the household uses it? (Multiple response) 1. Women, 2. Men, 3. Children age greater than 7 year, 4. Children greater than 3 year		
c. If no, where do/did you defecate? (1) around homestead, (2) everywhere		
d. Do/did you have hand washing facility? (1) Yes, (2) No		
e. If yes, which member of the household wash hands after defecation? Multiple response 1) Women, 2) Men, 3) Children		
f. Do/did you wash your hands before food consumption (1) Yes, (2) No		
g. Do/did you wash your hands after child defecation (1) Yes , (2) No		
h. Do/did you wash your hands before meal preparation (1) Yes, (2) No		
i. Solid waste disposal practice (1) everywhere (2) On pit (3) Both		
j. Liquid waste disposal practice (1) Everywhere (2) On Pit (3) Both		

VI. GENDER EQUITY

	Tell us your opinion on the following statements about women rights? 1. Agree 2. Disagree 3. No opinion	After	Before
a	A husband has the right to discipline his wife. 1. Agree 2. Disagree 3. No opinion		
b	A man is the ruler of his home. 1. Agree 2. Disagree 3. No opinion		
c	A husband has the right to hit a woman if she does not accept his idea. 1. Agree 2. Disagree 3. No opinion		
d	Women could be more productive if they work on household chores. 1. Agree 2. Disagree 3. No opinion		
e	Though women are engaged in farming activities, they should not have control over of the benefits. 1. Agree 2. Disagree 3. No opinion		

VII. FAMILY PLANNING

1. Do you use contraceptive measures? (1) Yes, (2) No
2. If yes, what do you use? _____
3. If no, why_____
4. Do your spouse's use contraceptives? (1) Yes, (2) No
5. If yes, what does she/he use? _____
6. If no, why_____

Enumerator's Name_____Signature_____

Appendix B: Checklist for Qualitative Survey

Area Identification: Region: _____zone_____, Woreda: _____ Keble:_____
Number of participants: Male_____ Female_____Total _____
Type of Participant_____, survey date _____

I. NATURAL RESOURCES MANAGEMENT

1. Acceptance of natural resources conservation measures by the farmers (A=very good, B=good, c =poor)

Conservation structures	After	Before
Bunds		
Check dams		
Micro-basin		
Gully rehabilitation		
Plantation on physical structures		
Woodlots		
Community forest plantation		
Area closure		

2. Benefits of natural resources conservation measures practiced (list them)

Conservation structures	**Benefits**
Bunds	
Check dams	
Micro-basin	
Gully rehabilitation	
Plantation on physical structures	
Woodlots	
Community forest plantation	
Area closure	

3. To what extent do natural resources conservation measures benefited farmers (A=very good, B=good, C =poor)

Conservation structures	After	Before
Improved crop productivity		
Increased forage availability		
Soil moisture retention		
Increased fuel wood availability		
Improved bee fodder		
Increased availability of construction materials		
Improvement in micro-climate		
Improvement in scenic beauty		

4. Changes observed on the lives of farmers in relation to NRM interventions (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Knowledge and skill of farmers on NRM	
Community assets creation	
Gender equity	
Participation and claiming for their rights	
Replication of the practices to other similar sites	
Change in land use land cover	
Increase in tree species diversity	

5. Do you see any limitation in the implementation natural resource management activities?
   _____

6. What should be done to improve it? _____
   _____

II. AGRICULTURAL DEVELOPMENT

2.1 Rain fed production

1. Major crops produced by the farmers (list them)

Crop types	After	Before
Cereals		
Pulses		
Oil crops		
Vegetables		
Fruits		
Others		

2. Major types of improved farm inputs used by farmers (list them)

Input types	After	Before
Improved seeds		
Chemical fertilizer		
Compost		
Pesticides		
Herbicides		
Farm tools		

3. Farm input use by the farmers (A=optimum amount, B= less than optimum amount, C=None

Crop types	After	Before
Cereals		
Pulses		
Oil crops		
Vegetables		
Fruits		
Others		

4. Credit available to the farmers (A= required amt, B= less than the required amount, C=None

Crop types	After	Before
Cereals		
Pulses		
Oil crops		
Vegetables		
Fruits		
Others		

5. Changes observed in lives of the target beneficiaries associated to improved rain fed production (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Knowledge and skill of farmers on what and how to produce	
Household assets creation	
Gender equity	
Participation and claiming for their rights	
Replication of improved farming practices	

6. Do you see any limitation in the implementation of rain fed agriculture? _____
_____

7. What should be done to improve it? _____
_____

2.2 Irrigation development

1. Major crops produced by the farmers (list them)

Crop types	After	Before
Cereals		
Pulses		
Oil crops		
Vegetables		
Fruits		
Others		

2. Major types of improved farm inputs used by farmers (list them)

Input types	After	Before
Improved seeds		
Chemical fertilizer		
Compost		
Pesticides		
Herbicides		
Farm tools		
Irrigation equipment		

3. Farm input use by the farmers (A=optimum amount, B= less than optimum amount, C=None

Crop types	After	Before
Cereals		
Pulses		
Oil crops		
Vegetables		
Fruits		
Others		

4. Credit available to the farmers (A= required amt, B= less than the required amount, C=None

Crop types	After	Before
Cereals		
Pulses		
Oil crops		
Vegetables		
Fruits		
Others		

5. Changes observed in lives of the target beneficiaries associated to improved rain fed production (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Knowledge and skill of farmers on what and how to produce	
Knowledge and skill of farmers on irrigation scheme management	
Household assets creation	
Gender equity	
Participation and claiming for their rights	
Replication of improved irrigation practices	
Improved dietary habits	

6. Systems established to ensure sustainability of irrigation structures/equipments
   _____
   _____
   _____
7. Systems established to enhance marketing of produces and input supply_____
   _____
   _____
   _____
8. Positive /negative changes observed in the environment associated to irrigation development (malaria, water use conflict, micro-climate, etc)_____
   _____
   _____
9. Do you see any limitation in the implementation of irrigated agriculture? _____
   _____
10. What should be done to improve it? _____
    _____

2.3 Livestock Production

1. Major types of livestock breeds introduced (list them)

Crop types	List types of breeds introduced
Local breeds of dairy cows	
Improved breeds of dairy cows	
Local breeds of shoats	
Improved breeds of shoat	
Local breeds of poultry	
Improved breeds of poultry	

2. Main sources of livestock feed in your area (A=Most of the farmers, B=some of the farmers, c=None of the farmers)

Feed types	After	Before
Forage		
Concentrates		
Hay		
Crop residues		
After math grazing		
Communal grazing land		

3. Average productivity of livestock breeds (A=High, B=Medium, C=Same to previous, D=low)

Breed types	After	Before
Local breeds of dairy cows		
Improved breeds of dairy cows		
Local breeds of shoats		
Improved breeds of shoat		
Local breeds of poultry		
Improved breeds of poultry		

4. Changes observed in lives of the target beneficiaries associated to livestock production (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	After
Knowledge and skill of farmers on livestock management practices	
Knowledge and skill of farmers on forage development	
Household assets creation	
Gender equity	
Participation and claiming for their rights	
Replication of improved livestock management practices	
Improved dietary habits	
Impacts on environmental degradation	

5. Challenges of livestock production (A=High, B=Medium, C=low, D= No challenge)

Challenges	After	Before
Feed shortage		
Shortage of water		
Livestock diseases		
Market problem for live animals		
Market problem for livestock products		
Poor breed quality		
Poor management practice		

6. Do you see any limitation in the implementation of livestock development? _____
_____

7. What should be done to improve it? _____
_____

III. NON-FARM INCOME GENERATING ACTIVITIES

1. Rating of IGA's households involved (4= fully , 3= mostly, 2=equally, 1=rarely, 0=none)

Activities	Women	Men
Petty trade		
Weaving		
Blacksmith		
Pottery		
Carpenter		
Masson		
Tailoring		

2. Supports given to promote non-farm IGA's

	Women	Men
Startup capital as Credit		
Startup capital as grant		
Material support		
Skill training		
• Technical skill		
• Business skill		

3. Changes observed in lives of the target beneficiaries associated to income generation activities (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Knowledge and skill of farmers on IGA	
Household assets creation	
Gender equity	
Participation and claiming for their rights	
Replication of IGA	
Improved dietary habits	

4. Change in the perception of the community from stigmatizing people engaged on some IGA's (A= High, B=Medium, C=Low, d= As it is) _____
_____

5. Do you see any limitation in the implementation of income generating activities?
_____

6. What should be done to improve it? _____
_____

IV. WATER AND SANITATION

1. Who usually fetches water in the household? (gender dimension)

Fetching water by	After	Before	Difference
women			
Girls			
Boys			
Men			

2. General situation of potable water scheme

Issues	After	Before
Water quality ((A) very good, (B) good, (C) bad)		
Water quantity ((A) adequate, (B) inadequate		
Reliability/sustainability supply : (A) 12 months, (B) 11 months (C) 10 months (D) 9 months (E) < 9 months		
Accessibility: ((A) accessible, (B) not accessible		

3. Management of potable water scheme (sustainability issues)

	Unit	Amount
WASH committee members • Male • Female	 Person person	 _____ _____

Water fee per month	Birr	
Do you have guard?	Yes/no	
What do you pay for the guard?	Birr/kg of grain	

4. Hygiene and sanitation practice in the target community

Hygiene & sanitation practices	After	Before
Washing hands after defecation (A) Yes , (B) No (C) sometimes		
Washing hands before food consumption (A) Yes , (B) No (C) sometimes		
Washing hands after child defecation (A) Yes , (B) No (C) sometimes		
Washing hands before meal preparation (A) Yes , (B) No (C) sometimes		
Availability of pit latrines (A) Yes , (B) No)		
Utilization of pit latrine (A) Yes , (B) No (C) sometimes		
Waste disposal practice (A) ever where (B) on Pit (C) both)		

5. Changes observed in lives of the target beneficiaries associated to safe water supply, hygiene and sanitation (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Knowledge and skill of farmers on WASH	
Gender equity	
Participation and claiming for their rights	
Replication of WASH facilities	
Improved health of the beneficiaries	
Improved labor productivity	
Increased school attendance of children	

6. Do you see any limitation in the implementation of WASH? _____
_____

7. What should be done to improve it? _____
_____

V. EDUCATION

1. Situations created for the community associated to intervention on education (A= High, B=Medium, C= Low)

Variables	After	Before
Increase in rate of enrolment of children		
Retention		
Performance		

2. Do you see any limitation on the interventions on education sector? _____
_____

3. What should be done to improve it? _____
_____

VI. HEALTH

1. Availability of health services (list them)

Service types	List the services available
Use of contraceptive for women	
Use of contraceptive for men	
Life skill training for adolescents	
First aid services in the community	
Nutritional promotion in the community	
Maternal health services in the community	

2. Changes observed in lives of the target beneficiaries associated to interventions on health (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Acceptance of family planning by women	
Acceptance of family planning by men	
Practice of family planning by women	
Practice of family planning by men	
Assertiveness of adolescent youth	
Practice of first aid provision in the community	
Decrease in malnourishment of children	
Reduction of infant and maternal mortality	

3. Do you see any limitation on interventions on the health sector of health?
_____
_____

4. What should be done to improve it? _____
_____

VII. GENDER EQUITY

1. Gender division of labor in the household (4=fully , 3=mostly , 2=equally , 1=rarely, 0=none)

Gender roles	After			Before		
	Women	Men	Both	Men	Women	Both
Horticulture/ vegetable production						
Sheep and goat production						
Beekeeping						
Natural resources conservation						
Dairy production						
Poultry production						
Income generating activities						
Field crop production						
Forage development						

2. Control over resources/benefits in the household (4=fully , 3=mostly , 2=equally , 1=rarely, 0=none)

Resources	After			Before		
	Women	Men	Both	Men	Women	Both
Horticulture/ vegetable produces						
Sheep and goat						
Honey						
Wood (fuel , construction)						
Milk and milk products						
Egg and hen						
Cash income						
Field crop produces						

3. Decision making in the household (4=fully , 3=mostly , 2=equally , 1=rarely, 0=none)

Issues	After			Before		
	Women	Men	Both	Men	Women	Both
Buying of farm inputs						
Borrowing/lending/saving						
Selling of crop produces						
Selling/ buying livestock						
Selling/buying milk and milk products						
Buying household items (oil, salt, sugar, etc)						
Selling/buying egg and hen						
Selling/buying honey						
Buying utensils/furniture/equipment						
Buying clothes						
Sending children to school						

4. Do you see any limitation on interventions to promote gender equity?
_____

5. What should be done to improve it? _____
_____

VIII. HTP, HIV Prevention and OVC care

1. Changes observed in lives of the target beneficiaries on HTP (A=High change, B=Medium change, C= Limited change, D=No change)

Variables	After	Before
Female genital mutilation		
Early marriage		
Domestic violence		
Polygamy		
Widow inheritance		
Tooth extraction		

2. Changes observed in lives of the target beneficiaries on HIV prevention (A=High change, (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Change
Knowledge on ABC	
Attitude on the importance of ABC	
Practice of ABC	
Reduced stigma on infected and affected	

3. Care and support services given to OVC (Yes or No)

Variables	After	Before
1. Food/nutrition support		
2. Health care		
3. Scholastic materials		
4. Psychosocial support		
5. Legal protection support		
6. Shelter support		

4. Changes observed in lives of OVC associated to care & support (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Nutrition	
Health	
Education	
Trauma, anxiety	
Safety/security	

5. Do you see any limitation in the implementation of HTP, HIV prevention and OVC care and support?
   _____
   _____

6. What should be done to improve it? _____
   _____

IX. RURAL ROAD CONSTRUCTION

1. Road networks in the target area (Yes or No)

Networks	After	Before
Connection of the target kebeles to the Woreda capital		
Connection of kebeles to kebeles		
Foot path from villages to institutions ➢ Church ➢ Market ➢ School ➢ Health post ➢ FTC		
Livestock path to water sources		

2. Changes observed in the lives of the beneficiary community (A=very good, B=good, C =poor, D=no change, E=bad)

Variables	Changes
Social benefits	
Economic benefits	
Ecological benefits	

3. Do you see any limitation in the implementation of access road construction_____
_____

4. What should be done to improve it? _____
_____

X. FOOD SECURITY/EMERGENCY RELIEF

1. Food shortage in the households (list them)

Variables	After	Before
Number of months of food gap in the households		
Months of the year that households faced food shortage		
Coping mechanisms during food shortage		

2. Changes observed in the lives of the community associated to emergency supports (A=very good, B=good, C =poor, D=no change, E=bad)

Changes	After	Before
Assets depletion reduced		
Seasonal migration reduced		
Improvement in daily meals		
Improvement in quality of food		
Reduced family disintegration		

5. Do you see any limitation on interventions of emergency relief? _____
   _____

6. What should be done to improve it? _____
   _____

XI. CLIMATE CHANGE

Tick XXX, XX or according to frequency of the problem and intensity of vulnerability.

Variable	XXX, XX or X
What kinds of climate change observed in your area? • Drought • Flood • Both	
Who are the most Vulnerable? • Women • Men • Both	
What kinds of adaptability capacity developed? • New Crop variety introduced (mention crop type) • Production system changed • Livestock Feeding system changed (cut & carry system)	

Appendix C: Checklist for Discussion with project staff and Government staffs

I. Discussion with projects partners/staffs

1. An overview of socio-economic and vulnerability status of the target area
2. Rationale for initiation and presence of NCA-E and partners in the project area
3. Project profile: Implemented/under implementation in the target area
    - Phases
    - Duration of each phase
    - Components for each phase
    - Beneficiaries for each phase disaggregated by sex
    - Budget utilized for each phase
4. Strategies/approaches used to implement each component of the project in all phases
5. Major achievements of the project with sex disaggregated data
6. Best practices observed/documented including reasons for successes
7. Lessons learned, including reasons for failures/if any/
8. Challenges that faced in each phase of the projects, solutions taken and gaps that still exist
9. Recommendation to fill the gaps
10. Institutional gender mainstreaming

Do NCA-E partner/ project staffs have adequate understanding, confidence and capacity to:

a. Develop a gender data collection and analysis plan?
b. Facilitate participatory processes with women and men in target communities to collect and analyze information?
c. Monitor and report on gender equity activities and changes?

II. Discussions With staffs from government offices

a. Participation

1. What were the components of the project implemented in your area?
    - Did you participate in the selection of the project components and the project sites?
    - What were the criteria used to select the project sites?
    - What was the rational to select the project components?
2. Participation in project planning, implementation and evaluation process

2.1. How was the participation of the different stakeholders in the project management process?

(a) *Excellent (b) very good (c) good (d) poor (e) not participation at all*

Project Components	Level of participation of stakeholders		
	Planning	Implementation	Evaluation
Water supply, hygiene & sanitation			
Irrigation development			
Crops production			
Livestock Development			
Environmental Rehabilitation (FSWC, BSWC)			
Access road construction			
Capacity Building			
Income generation scheme			
Gender mainstreaming			
HTP eradication			
Family planning			
OVC care and support			

2.2 To what extent women participated in the project management (from planning to evaluation process)?

2.3 What was the contribution of the community (particularly women) in the preparation, implementation and monitoring process of the project?

b. Project sustainability and replicability

3.1. How is the process of handing over of the completed activities?

- Who receives them?
- Are there weaknesses in the handing over processes?
- Suggestions to improve them

3.2. Are the project components replicated by the district offices or the farmers themselves?

3.3. Which project components are less sustainable?

3.4. Which ones most sustainable?

c. Lessons learned

1. promising practice from the project
2. gaps/limitation
3. recommendation

Appendix D: List of Contacts for the qualitative survey

S/N	Representatives	Number of Contacts		
		Male	Female	Sum
I. Armachiho Project Area				
1	Beneficiaries of integrated watershed interventions in Fana watershed, Kerker kebele, Lay Armachiho woreda	8	4	12
2	Shoat raring group at Gind Metaya village, Kerker kebele, lay Armachiho	3	8	11
3	Non-Beneficiaries of the project in Kerker Kebele, lay Armachiho	2	-	2
4	Beneficiaries of integrated watershed intervention in Markibign watershed, Chira Ambezo kebele, Lay Armachioho	14	4	18
5	Farmer Desalgn and other beneficiaries of apple fruits in Chira Ambezo kebele, lay Armachiho	4	3	7
6	Chair person of the former tailoring group at Tikil dingay	1	-	1
7	Beneficiaries of integrated watershed interventions in Shanko Mesk watershed, Sayna Sabia kebele of Gondar town	5	3	8
8	Beneficiaries of water supply schemes in in Shanko Mesk watershed, Sayna Sabia kebele of Gondar town	3	2	5
9	Members of the weaving group Shembekit village, Sabia Sayna Kebele of Gondar town	3	-	3
10	Lowland rice producers in Fill Wuha Kebele of Tach Armachiho woreda	3	-	3
11	Beneficiaries of pump irrigation in Tach Armachiho woreda	2	-	2
12	Employees working at the fruit production demonstration site at Sanja Masero	2	-	2
13	Head of Tach Armachiho woreda office of agriculture and rural development	1	-	1
14	Development agent working at Fill Wuha Kebele	1	-	1
15	School director of Sanja primary school	1	-	1
16	Staffs of Lay Armacho office of agriculture and rural development	3	1	4
17	Staffs of Lay Armachiho woreda office of water resources	1	1	2
18	Head of Lay Armachiho woreda office of health	1	-	1
19	Staffs of Gondar town urban agriculture office	1	1	2
20	Staffs of Armachiho project office	3	-	3
Rama Project Area				
1	The beneficiaries of Nepheha diversion in Medhin kebele	5	-	5
2	Pump irrigation beneficiaries in Medhin kebele	2	-	2
3	Beneficiaries of shoat in Mywoyni kebele	-	3	3
4	Beneficiaries of integrated watershed development activities in Mywoyni kebele	3	4	7
5	Beneficiaries of water schemes in Mywoyni kebele	-	4	4
6	Manager of Mywoyni kebele	1	-	1
7	Staffs of Simiret health post in Simiret kebele	2	2	4
8	Staffs of Hamedo primary school in Hadush Adi kebele	3	2	5
9	Head of Merbleh woreda water resources office	1	-	1
10	Merbleh woreda office of agriculture-soil & water conservation expert	1	-	1
11	Merbleh woreda office of agriculture-crop production & protection expert	1	-	1
12	Rama project staffs	2	-	2
II. Medda Wolabu Project Area				
1	Beneficiaries of Dumme irrigation cooperative at Gennale kebele	5	1	6
2	Project beneficiaries at Mandicho kebele	4	3	7
3	Beneficiaries of women saving & loan groups at Mandicho kebele	-	3	3
4	Staffs of Mandicho primary school	1	2	3
5	Beneficiaries of the project at Medda kebelle	10	-	10
6	Beneficiaries of water supply at Medda kebele	3	3	6
7	School director of Medda primary school	1	-	1
8	Beneficiaries of the project at Hara korie Kebele	24	1	25
9	Beneficiaries of women saving and loan groups	-	3	3

10	School teachers at Hara korie kebele	3	-	3
12	Head of woreda office of agriculture	1	-	1
13	Former staff of Medda wollabu project	1	-	1
III. Messanu Project Area				
1	Beekeeping group at Tsementi watershed in Aynalem kebele	3	-	3
2	Beneficiaries of small ruminants and poultry , water supply and sanitation, HV/AIDs and HTP in Mahiberewoyni kebele	15	5	20
3	Health extension workers at Mahiberewoyni kebele	-	2	2
4	Beneficiaries of garlic production in Kehen kebele	6	4	10
5	Beneficiaries of petty trade in Aynalem kebele	-	4	4
6	Beneficiaries of Messanu diversion irrigation in Messanu kebele	3	2	5
7	Development agent at Messanu Kebele	1	-	1
8	Beneficiaries of Agula dairy cooperative at Daero town	2	2	4
9	Manager and milk shop workers of of Agula Dairy cooperative	-	3	3
10	Beneficiaries of water supply in Aynalem kebele	-	6	6
11	Beneficiaries of check-dams for irrigation and water supply in Negash kebele	2	3	5
12	Beneficiaries of check dam and pump irrigation in producing vegetables and apple in Hadenet Kebele	4	-	4
13	Development agent at Hadinet Kebele	1	-	1
14	Beneficiaries of underground water tanker	9	1	10
15	Beneficiaries of catchment treatment at Tsegereda Kebele	2	-	2
16	Mesannu project staffs	5	-	5
17	REST head office head of planning department	1	-	1
IV. Dehana Project Area				
1	Chairman of Shimela kebele	1	-	1
2	Petty trade group members	-	10	10
3	Beneficiaries of awareness raising education on HIV and HTP by the project	4	10	14
4	Beneficiary of beekeeping at Shimela kebele	1	-	1
5	Beneficiaries of wool lot at Simella kebele	2	-	1
6	School director of Shimela comprehensive primary school	1	-	1
7	Members of anti-HIV and HTP in Shimella primary school	20	17	37
8	School Director of Chila primary school	1	-	1
9	Beneficiaries of Tela watershed closure site	5	3	8
10	Beneficiaries of petty trade at kosba kebelle	-	3	3
11	Beneficiary of shoat provision at Kosba kebelle	-	1	1
12	Health extension workers at Kosba kebele	-	2	1
13	Beneficiaries of Kosba health station	2	1	3
14	Facilitator of childcare center at kosba	-	1	1
15	Head of Dehana woreda office of agriculture	1	-	1
16	Representative of Head of Dehana woreda office of health	1	-	1
17	Head of Dehana woreda office of water resources	1	-	1
18	Representative of head of Dehana woreda office of education	-	1	1
19	Representative of head of Dehana woreda administration	-	1	1
20	Former staffs of Dehana project	2	-	2