

Pro Gradu – Master’s Thesis

**Impact Assessment of the Soil and Water Conservation**  
**Project: Participatory Impact Assessment**

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16.10.2006

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Department of Biological and Environmental Science, Environmental Science with a  
Specialisation in Development and International Cooperation

SALERTO, I.K.: Impact Assessment of the Soil and Water Conservation  
Project: *Participatory Impact Assessment (PIA)*

Master of Science Thesis: 50 p.

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October 2006

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Key Words: development, objective, impact, assessment, participation, PIA

## **ABSTRACT**

Development cooperation projects and programmes have been on the international agenda for decades. Development assistance has been characterised by both actors, donors and recipients. In order to know more about this cooperation and the outcomes of the proposed development objectives, several assessment procedures have evolved. Since the 1970s, engineering calculation type of estimations have expanded to become large multi-sectoral exercises that are meant to assess impacts, both positive and negative of the given development scheme. In development projects, sustainability stands as a key criterion for the planned development objectives. This has been ensured by local participation during whole project cycle. In order to ensure local voices are heard, several methods have been developed as tools for involvement. Participatory appraisal methods in planning phases of the project have been exercised since the 1980s. Environmental impacts are designed to reflect the health and social-economic aspects, instead of the direct negative environmental consequences, of the project. The underlying rationale is to understand how, after the project has been phased out, the communities who are main beneficiaries have benefited, if at all. Participatory impact assessment (PIA) has been introduced in order to encounter socio-economical and cultural barriers in understanding local development systems and restrictions. The emphasis is on participatory reflection for the entire assessment process including stakeholders, indicators and evaluation results. The case of soil and water conservation projects in Ethiopia is used in this Master's thesis to examine local opinions and gauge the performance of irrigation systems that were constructed two to ten years ago. The impact of access to water for the examined community livelihoods was the main objective of the study. The impacts were determined according to aspects of the environment, economics, and social (health, education, gender), institutional (capacity-building, water committees) and technical skills development. The results indicate how time constitutes a crucial factor in achieving positive and negative outcomes, with two to four years needed to establish the utilities of the water scheme in order to sustain all year round production. After this period, community members start to create more income generating types of activities. Improved standards of living can be observed with greater possibilities to educate the children, improve housing, widen access to health centres and increase participation in the administrative institutions of the community. Development challenges remain in public services and environmental management capabilities.

JYVÄSKYLÄN YLIOPISTO, Matemaattis-luonnontieteellinen tiedekunta

Bio- ja ympäristötieteiden laitos, Ympäristötiede, Kansainvälisen kehitysyhteistyön maisteriohjelma

SALERTO, I.K.: Maaperä- ja vesiensuojeluprojektin vaikuttavuuden arviointi:  
*Osallistava Vaikuttavuuden Arviointi*

Pro-Gradu: 50 p.

Työn ohjaajat: Prof. Jukka Rintala, Prof. Liisa Laakso

Tarkastajat: Prof. Jukka Rintala, Prof. Liisa Laakso

Lokakuu 2006

Hakusanat: kehitys, objektiivinen, vaikuttavuus, arviointi, osallistaminen, menetelmät

## TIIVISTELMÄ

Kehitysyhteistyöhankkeet ovat olleet kansainvälisellä agendalla jo vuosikymmenien ajan. Niin avun antajat kuin saajatkin ovat tuoneet oman leimansa toimintaan. Tarve tietää kehitysyhteistyön todellisista saavutuksista ja tuloksista on tuonut mukanaan erilaisia tapoja arvioida tehtyä työtä. Menetelmien painopisteet ovat muuttuneet sitten 1970-luvulla tehtyjen arviointien, jotka perustuivat enemminkin kohteen rakenteelliseen ja taloudelliseen kestävyys- kuin ympäristöön ja ympäröiviin yhteisöihin kohdistuviin monialaisiin positiivisiin ja negatiivisiin vaikutuksiin. Kestävänkehityksen periaateilla on suuri merkitys suunniteltaessa kehitystavoitteita. Kohderyhmän mielipiteen huomioiminen ja mukaansaaminen on tuonut osallistavat menetelmät projektien koko elinkaaren hallintaan. Osallistavat menetelmät ovat olleet hankesuunnittelussa näkyvänä työkaluna sekä hankeiden arvioinnissa jo 1980-luvulta lähtien. Sen sijaan, että suorat ympäristöön kohdistuvat negatiiviset vaikutukset olisivat pelkästään huomioitu ympäristövaikutusten arvioinnissa, ovat mukaan tulleet sosiaali-ekonomisten vaikutusten huomioiminen terveysvaikutusten lisäksi. Ympäristökehitysprojektin vaikutukset hankkeen päättymisen jälkeen ovat lisääntyvän mielenkiinnon kohteena. Kuinka pääedunsaajat ovat hyötäneet hankkeesta, jos mitään? Osallistava vaikutusten arviointi on menetelmä, jonka avulla paikalliset aukkaat voivat tuoda esille omaa arviointia ja auttaa huomioimaan heidän kehitykseen liittyviä esteitä, sekä yhteiskunnallisia ja taloudellisia rajoitteita. Arviointiprosessissa korostuu paikallisten asettamat indikaattorit ja tulosten arviointi. Tässä Pro-Gradu työssä esimerkki tapauksena on käytetty maaperän- ja vesiensuojeluohjelmaa Etiopiassa. Projektikohteina ovat kahdesta kymmeneen vuotta sitten valmistuneet kastelujärjestelmät sekä niitä käyttävät yhteisöt. Tutkimuksen päätavoite oli tarkastella parantuneen vedensaannin vaikutuksia yhteisön elinkeinoihin ja elämään. Vaikutusten arvioinnissa huomioitiin vaikutukset ympäristöön, taloudelliset vaikutukset, yhteiskunnallisten palvelujen kehittyminen (terveydenhuolto, koulutus sekä sukupuoliroolit), institutionaalinen kehitys ja teknisten menetelmien käyttöä kastelujärjestelmään liittyen. Tulokset osoittivat kuinka pitempiäaikainen lisääntynyt veden hyödyntäminen johtaa asteittaiseen kehitykseen yhteisöissä. Kahdesta neljään vuoteen tarvitaan ympärivuotisen kasvituotannon vakiinnuttamiseen. Sen jälkeen kuvaan tulivat kaupalliseen tarkoituksen soveltuvat lajit. Elämän laadun paraneminen näkyi lasten koulutukseen panostamisena, talojen uudisrakentamisena, terveysasemien kunnostamisena, ja yhteisöjen viralliseen hallintoon osallistumisena. Yhteisvastuut kuten laajempi terveydenhuolto sekä ympäristönsuojelu ovat vielä kehityshaasteita.

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## Abbreviations

DAC	Development Assistance Committee
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EHIA	Environmental Health Impact Assessment
FFW	Food For Work
GAD	Gender and Development
GOPP	Goal Oriented Project Planning
LFA	Logical Framework Approach
masl.	Meters above sea level
NGO	Non-governmental Organization
ODA	Overseas Development Assistance
OECD	Organisation for Economic Cooperation and Development
PIA	Participatory Impact Assessment
PE	Participatory Evaluation
PRA	Participatory Rural Appraisal
RRA	Rapid Rural Appraisal
SIA	Social Impact Assessment
SNNPRG	Southern Nations, Nationalities, and Peoples Regional Government
SWCP	Soil and Water Conservation Project
SWOT	Strengths, Weaknesses, Opportunities, Threats
ToR	Terms of Reference
UN	United Nations
UNCED	UN Conference on the Environment and Development
UNEP	United Nations Environmental Programme
WID	Women in Development
ZOPP	Zielorientierte Projekt Planning

## **1. INTRODUCTION**

Impact assessment has gained more attention in development cooperation due to the increased need to demonstrate the outcomes of development projects and programs. The findings are used for institutional learning, transparency and accountability between agencies, donors and beneficiaries. Impact assessment can be understood as the process of estimating the adverse impacts of the proposed scheme or conducted study after completion of the development intervention. Conventional environmental assessments have mainly been conducted through pre-survey types of studies of intended intervention and its possible impact on humans and the environment.

Since the 1970s, environmental assessment has evolved to increasingly become a part of the strategic assessment of global effects on human living conditions. These effects are determined by using social, economic and environmental parameters. Today, impact assessment is conducted after the completion of the development intervention in order to determine the long-term effects and direction that the achieved development objectives have taken.

Evaluation and impact assessment are subsequently mixed and confusing terms. The characteristics of these two types of operations provide clarity at the analytical level in terms of timing specificity, etc. Evaluation examines processes of development taking place during the implementation of the scheme, whilst impact assessment deals with the long-term changes stemming from the same intervention. Also, specificity differs in that it compares the plan and its results, and examines what these results have developed more, even determining the external influences and events, affecting on positive and negative trends over time.

Participatory approach is a way to ensure that the voices of local people are heard when impact assessment is carried out. Public participation across the different stages of the project cycle is crucial to the empowerment, ownership and sustainability of the intended development outcomes. Planning and implementation are the typical areas of project cycle management where local participation has been targeted. There has been a growing emphasis on monitoring and evaluation by local implementers and the main beneficiaries in order to achieve “lessons learnt” and feedback for development agencies. The information gathered can be used for relevant program development and improvement of organizational performance.

In this Master’s thesis, the concept of impact assessment is examined as a multi-sectoral exercise of socio-economic and environmental consequences in a development cooperation project that has been implemented in a particular culture and location. In this study, the Soil and Water Conservation Projects (SWCP) in Ethiopia were used as the case for the conducted impact assessment.

## **2. IMPACT ASSESSMENT**

This chapter briefly outlines the main concepts of the different forms of impact assessments. Also, their roles in the concept of environmental impact assessment are discussed. Participatory approach is the main approach adopted by this exercise when environmental and social changes are assessed. Other factors, such as economic, institutional and technical impacts are included, although they are mainly concerned with determining the impacts on environment, social development and health. Dale (2004) raised the issue of assessing people’s living environments and examining how quality of

life depends on interrelations and interactions between people and a range of environmental factors. He included factors such as political, economic, social, cultural, organizational, build physical (infrastructural) and natural environment. Berlage and Stokke (1992) defined the aim of the evaluation to determine project or programme efficiency, effectiveness, *impact*, sustainability and the relevance of the objectives. Efficiency defines how aid can gain the most results by using the least costly resources necessary to achieve its objectives. Effectiveness relates to the effects of aid in comparison to the pre-defined objectives. *Impact* is the effect of the intervention on its surroundings in terms of technical, economic, socio-cultural, institutional and environmental factors. Sustainability refers to extend to which the objectives of an activity will continue after the project assistance is over. Also, there is a widely recognized need to analyze the ongoing relevancy of the objectives and mandate of the programme. (Berlage and Stokke, 1992 p.5).

## **2.1 Evolution of Environmental Impact Assessment (EIA) and evaluation of development aid**

Environmental Impact Assessment (EIA) has evolved since late 1960s. Environmental and development dilemmas were brought to the fore from a global perspective after the publication of the Club of Rome's *Limits to Growth* in 1972. This was based on a theory stipulating that if economic, resource use and population trends continued unchanged then the limits to physical growth on this planet would be reached within 100 years, leading to economic and ecological collapse (Miller, 1996). Biswas and Modak (1999) reflected on Sadler (1994) while defining the stages through which Environmental Assessment (EA) has gone over the past few decades. In the 1970s the, EIA was primarily based on an engineering and economic feasibility study that gave less consideration to environmental consequences. A cost-benefit analysis (CBA) was used as a means of measuring the sustainability of a project.

Methodological development took place in between 1970 and 1975 when the focus was placed on the identification, prediction and mitigation of biophysical effects. The EIA was introduced in some developing countries, with possibilities for public involvement in major reviews. The term "social impact assessment" was used in 1973 with the assessment of the Trans-Alaska Pipeline on the Inuit people (Burdge 1994 in Barrow, 1997). The United Nations Conference on the Human Environment was held in Stockholm, Sweden, in 1972. The conference created the United Nations Environmental Programme (UNEP) to negotiate environmental treaties and to help to implement them (Miller 1996 p.706).

In 1975-1980 Social Impact Assessment (SIA) and risk assessment dimensions were incorporated into EIA. Public consultation became an integral part of development planning and assessment, thereby emphasising justification and alternatives in project review.

There were growing efforts to integrate EIA into policy planning, research and development focusing on monitoring, audit and process evaluation. This procedural redirection was introduced between 1980 and 1985, and was adopted by international aid agencies and developing countries like Malaysia and Philippines. Debate on the term "sustainable development" started when the term was originally proposed in the World Conservation Strategy in 1980 (Carley and Christie, 2000).

The next phase of EIA development emerged between 1985 and 1990 when regional and global environmental changes and cumulative impacts were introduced as a new

paradigm. This led to increased international cooperation on EIA research and training. The “Limits to Growth model” was notoriously placed on the global agenda with the 1987 Brundtland report, a publication of the World Commission on Environment and Development, which underlined the common global interest and the inter-dependency of the world’s countries. Foreign aid was increased in order to support developing countries to implement their environmental policies (Degnbol-Martinussen and Engberb-Pedersen, 2003).

From 1990 onwards, EIA was introduced into the policies, programmes and plans of several developing countries, known as strategic environmental assessment (SEA). International meetings such as convention on transboundary EIA were held. New demands were placed on the concepts, methods and procedures in EIA to promote sustainability (Modak and Biswas, 1999). In 1992, during the UN Conference on the Environment and Development (UNCED) in Rio de Janeiro, Brazil, a consensus was reached on *Agenda 21*. Agenda 21 was an action plan to guide countries toward sustainable development and the protection of the global environment during the twenty-first century. Consideration for the environment was emphasized as a global obligation that should be the motive for giving foreign aid. A wide range of issues was discussed, although these were nonbinding and none of the participant countries ratified them. The issues concerned about environmental policy development for pursuing sustainable development, poverty eradication, forestry, reduction of green house gases, and protection of biodiversity. The UN Commission on Sustainable Development was established during the Rio de Janeiro conference (Miller, 1996, Degnbol-Martinussen and Engberb-Pedersen, 2003).

Generally, EIA has been conducted in cases where the scope or magnitude of the intended development scheme required this approach due to the possibility of adverse impact on humans or the environment. Multilateral donor agencies such as the Asian Development Bank (ADB) has categorised the projects according to the significance of environmental impacts. Categories A, B, C and FI represent significant, lesser significance and unlikely to have any adverse environmental impacts. FI concerns projects involving credit lines or intermediate and environmental management systems that are used in scoping the environmental concerns of the intended enterprise or scheme ([www.adb.org/](http://www.adb.org/)). The responsibility of carrying out the EIA exercise belongs to the project proponent. This is done with the help of external consultants or institutions. Typically, the EIA involves multi-sectoral dimensions due to the scale of the issues affected by the impacts. Multidisciplinary teams conduct the impact assessment, and include experts from the fields of specialized environmental sectors, socio-economists and representatives of the communities and organizations that the project concerns.

During the mid- 1990s, the discussion about participatory impact evaluation and assessment came into the picture. This approach was called “listening and piloting”, as stated by *Cracknell* (2000 p.176). This gave more space for local people to define the quality of their livelihoods and the indicators of development as they were emerged within their society and environment.

## **2.2 Social Impact Assessment (SIA) in EIA**

Development programmes operate in a society and in a particular environment. Whenever intervention takes place, it has an impact on both individuals and communities, thereby affecting their livelihoods, environment and customs. These *social impacts* need to be addressed during the impact evaluation process. Barrow (1997) referred to Burdge and Vanclay (1996 p.59) as he sought to define social impacts: “Social impact consists all social and cultural consequences to human populations that alter the ways in which people



live, work, play, have relations with each other, organize meet their needs and generally cope as members of a society”. Cultural impacts are closely related to social impacts and typically produce changes in norms, values and beliefs. Cultural heritages can be affected including archaeological remains, holy places and cultures.

Cracknell (2000 p.281) argued that in order to determine indicators of impact, a definition for *poverty* is needed. Without this, project output indicators risk being used as definitions in themselves and put forth by the project planning officers involved. If the recipients, or the main beneficiaries, of ‘development’ define poverty, *participation* becomes more important to finding the local “measures” of standard of living. Also, he pointed out that evaluating poverty-focused projects against the people’s objectives is not always income related.

Conventionally, social development, and therefore impacts dealing with the issues related to health, education and housing, were related to the European post-war conception of the welfare state. According to Hall and Midgley (2004), the social policy agenda has broadened to encompass a more global concern for strengthening livelihoods. This includes poverty reduction, social protection, fighting social exclusion, promoting human rights and even the natural resources conservation that is basis of many people’s livelihoods in less developed countries (LDCs).

In development cooperation, social impacts are people oriented because they are the main actors for the development. This is due to the environment where the social policy implications take place. These implications include community development, indigenous knowledge and social movements or even conscientization and communitarianism. This can be seen as a *populist approach* of social policy development. The *enterprise approach* is more market based and focuses on support for the individuals. The latter approach champions the private sector as a main catalyst for societal development. In LDCs, the use of social funds to encourage individual productive enterprise through micro-credit and similar schemes mirrors something of the ethic ideology of this work, as argued by Hall and Midgley (2004 p.33). These two approaches represent normative theories and they function in the social context to improve the welfare state of societies. The third aspect is a *statist approach* based on ideology of collectivist that the society is one where people cooperate to meet their common needs. The ultimate collective is State being the body comprising all citizens. These ideas have inspired liberal reformers who believe that the State’s power and ability to control and direct resources could be used to promote the well-being of all (Hall and Midgley, 2004). Several developing countries have experimented these ideologies and still they are present in the minds of people and governments.

Holistic social policy integrates the elements of the statist, enterprise and populist paradigms. From statism comes importance of a pro-active government in making economic and social investments and regulating the private sector whilst meeting people’s basic needs and guaranteeing fundamental freedoms. In the enterprise approach, the emphasis is placed on poverty reduction measures and the protection of disadvantaged groups via the efficiency of the service sector. Income generating possibilities and market strategies form ground for economic development through the privatizing the services. Institutional development and people’s participation in policy development and implementation could be enhanced by the populist approach to normative theories that emphasizes the involvement of the people and their values, beliefs and culture. The failures in aid projects relate to the poor socio-cultural circumstances. Cracknell (2000) listed reasons for the causes of post-project failure. According to him, planners tend to assume that they know best what people want and dialogue remains minimal between the agency

and beneficiaries. A similar project might have worked successfully elsewhere and it is assumed that it will work in another. Increasing local participation and determining what is it that the beneficiaries want is not easy as it sounds. Attitudinal workshops are time consuming and generally accompanied by language problems. There is pressure to push ahead with the project in order to see the immediate results whilst the present politicians are in power. The projects are often designed 'for' people rather than 'with' people.

Growing consideration has been drawn to gender roles in aid evaluation. In most developing countries, women play a key part in all agricultural and rural activities. Their workload includes work in the field, firewood collection, keeping small livestock, and involvement in petty trading. The role of women as an integral part of development has been characterised by the establishment of 'Women in Development' (WID), which aims to create greater awareness of women's issues, and more recently 'Gender and Development' (GAD), which views women as an integral part of any development strategy. Both men and women are viewed in their socio-cultural and political contexts. Basic needs are assessed according to access to facilities such as water, healthcare, employment, equitable status in society, credit, political rights, or control their own assets (Cracknell, 2000). The concept of *empowerment* is used in this context.

### **2.3 Health Impact Assessment (HIA) in EIA**

Health impact assessment (HIA) is a topic of growing importance in the field of development. In last few years, several book reviews have been published in order to strengthen the HIA concept, framework and methodology. HIA's conceptual roots are in environmental impact assessment and have the fundamental characteristics being carried out before the implementation of a project, programme or policy development. The results feed the decision-making process, so that interventions can be modified to avoid or mitigate negative health impacts and enhance positive ones, as stated by Utzinger (Bulletin of the World Health Organization 2004) in a book review of health impact assessment: concepts, theory, techniques, and applications (Kemmer, *et al.* 2004). Hence HIA is considered as pre-requisite for EIA. Banken (2003) mentioned that legal frameworks for EIA in many countries already include health impacts as a compulsory element, although in practice this is often poorly carried out. For the least-developed countries, poverty reduction strategies are among the most structured ways of developing investment policies, and HIA seems to be an ideal way to support these strategies and integrate economic and social activities with health concerns. Also, during Caussy *et al.*'s (2003) discussion about the needs of HIA in the developing countries, it is pointed out how health issues are inextricably linked to the environment.

Development projects are invariably accompanied by a range of unintended impacts on human health. A significant proportion of diseases is associated with environmental and occupational risk factors related to unsafe water, unsanitary conditions, and air and noise pollution produced in Southeast Asian countries. Therefore, there is a need to apply HIA to inform policy and decision-making in order to promote sustainable development through maximising the benefits and minimizing the negative impacts on health. Caussy *et al.* (2003) argued that EIA has traditionally been used to evaluate the impact of development projects. However, most EIAs are confined to environmental impact at the project level and have a narrow focus on the assessment of health impact, which generally does not fall within the scope of EIA. As examples, they mentioned water supply projects, including dams and reservoirs, that have favourable conditions for the breeding of disease vectors; road projects have increased the rate of road accidents and injuries and exposure of local communities to sexually transmitted diseases, and industrial wastewater discharge into

rivers that has affected the health of the people who depend on the river as a source of water.

#### **2.4 Evolution of Participatory Impact Assessment (PIA)**

During the evolutionary history of development aid, the trend of carrying out the task has moved towards a more bottom-up participatory approach. Cracknell (2000) divided the evolution of evaluation into four phases. The *first* phase in the late 1960s to 1979, called Early Developments, began to first establish evaluation as a key part of the project cycle, mainly towards the later stages of the cycle. The emphasis was on getting the initial design right, and then establishing the criteria for success against which project performance could be measured. It was during this time that the Logical Framework Approach (LFA) project design tools were developed in the USA, although it took a decade to reaching the United Kingdom. In the late 1970s, there was very little expertise available and no resources being devoted to the subject (Cracknell 2000 p.42). The Organisation for Economic Cooperation and Development (OECD) assumed a leading role in getting things moving on the evaluation front and two conferences were organized on the topic during that period.

During 1979 to 1984, “Explosion of Interest”, as the *second* phase was called, took place. Suddenly evaluation became popular. The ODA/UK budgets and staff for conducting these studies were increased, resulting in a rapid increase in the number and quality of evaluation reports. The sector wide synthesis studies were completed giving more valuable information for policy purposes than one-off project evaluations. Examples of such syntheses were studies on rural roads and rural development. Amidst the growing academic interest in aid evaluation, a two-day conference was held at the Institute for Development Studies at the University of Sussex, leading to publication of “The Evaluation of Aid Projects and Programmes” by Cracknell in 1984. Paul Mosley wrote reports on “effectiveness of ODA’s poverty-focused aid in 1981 and later a book on overseas aid in general in 1986. This second phase period was a time when the trend to set up monitoring and evaluation units in the developing countries was high. It was during this time that the multi-donor coordination of evaluations also started. These included, for example, the European Community’s evaluation of livestock projects in Africa. In the end of this era research, the question began to be raised: “Who are the beneficiaries and how far do the benefits of the project spread?”

A relatively short period, 1985-88, represents *phase three*, labelled as the “Coming of Age”. A major study on the theme ‘Does Aid Work?’ was conducted by Robert Cassen and his team. The report suggested that by and large the objectives of development aid had been achieved although there were weaknesses and failures to be addressed. The team evaluated the project reports and argued that these were not altogether satisfactory as evidence of the effectiveness of aid, as most of them had been designed with other objectives in mind. Roger Ridell from the Overseas Development Institute carried out another major study. In 1987, he pondered the arguments for and against foreign aid by examining a large number of evaluation reports. These two major studies were milestones on the road to aid evaluation as a subject in its own right (Cracknell 2000 p.47). During this period, ODA introduced the logical framework as a mandatory system of project management. For the first time the objectives had to be clearly stated and criteria for measuring progress had to be identified. Although the logical framework requires participation at least certain extent and have advantages in a project logic, its weaknesses became more apparent. The top-down model of aid administration began to be questioned, and a process of experimentation with bottom-up approaches emerged.

The *fourth phase* from 1988 onward is “Aid Evaluation at the Crossroads” emphasises stakeholder analyses and a willingness to experiment with *participatory approaches*. There is a growing realisation of the need to enhance the evaluation capabilities of the developing country partners, so that they can assume more direct responsibility for the evaluation process. Evaluation is perceived to be far more difficult than it once was, with old certainties disappearing and the process at the crossroad. It has been strongly argued that there is a need to move further down the road of participatory evaluation methods, albeit keeping in mind the principle of accountability. This means moving cautiously towards a more participatory approach while maintaining the tradition of the logical framework approach in the project management system.

In the context of development cooperation the term “participation” has been emphasized across the different stages of the project cycle. In early evolutionary stages, participation was more used in the planning and implementation stages of the project cycle. Nowadays, there is pressure to involve those people who are receiving the development aid in order to ensure results and sustainability. Organizations face public demand for accountability and the need to investigate results on both a short- and long-term basis. Participatory impact assessment (PIA) is an approach to put communities in charge of overseeing the development intervention and its results. So far, these activities have been very much donor exercises driven by external evaluators. Cracknell (2000 p.318) argued that “there is no way of measuring impact without people’s involvement in whole process.” This has been due to the shift in emphasis in aid evaluation from what the donor does towards how this affects the target population who are the main beneficiaries of the initiative. Cracknell (2000) referred to Chambers (1997) as pointing to participatory methods used in monitoring and evaluation. This has been a significant change, as they have been traditionally conducted by outsiders using their own criteria and methods. In 1997, the Development Assistance Committee (DAC) expert group carried out a synthesis study on evaluation of programmes promoting participatory development and good governance. They found out that the rhetoric favour of using more participatory methods was pre-dominant, but actual practice was still rare.

#### **2.4.1 Development, definition and methodology of PIA**

During the past two decades, PIA ideology has gone from being a planning tool to becoming a method for evaluation. Jackson (1997 p.8) put forth a *definition* of PIA as:

*“It is a process of evaluation of the impacts of development intervention that is carried out under the full or shared control of local communities and in partnership with professional practitioners”.*

He continued with *methodology* by stating that PIA should involve both *qualitative* and *quantitative* research methods. The research process should be conducted in close contact with community representatives. They should be involved in the definition of impact *indicators*, the *collection* of data and the *analysis* of data. They should be included in the communication of assessment findings and in the post assessment actions which are designed to improve the impact of development interventions in the locality. Typically, this is included in the report as recommendations by the external evaluator. PIA is an integrated process of research, learning and action (Jackson, 1997 p.8). Cracknell (2000) called this new method the “listening and piloting approach”. Methods include useful and appropriate tools such as transect walks, mapping of local resources, closed-end survey questionnaires, focus group discussions with open-ended semi-structured questions, and cost-benefit calculations.

### Participation in research

Robert Chambers has been considered the one who promoted participatory methods in research in agricultural development projects. He implemented Rapid Rural Appraisal (RRA) techniques and ecological methods for community-based agro-forestry research with the local communities. Several fundamental differences can be determined in farmer-scientist relations. One is when normal science generates seasonal packages whilst resource poor farmers see farming as a continuous performance. Farmers are specialists in survival, which have an effect on how farmers select their varieties of rice and how their criteria differ from those of scientists. Barriers between these should be overcome and lead to learning from each other. The farmers' skills and knowledge have to be fully recognized. An anthropologist at the International Rice Research Institute (IRRI) found that 90 percent of those skills being promoted had been derived from Asian farmers (Chambers, 1993 p.6).

The RRA techniques can be combined with ethno-ecological methods. Here, the style of RRA was emphasised instead of speed. For example, the data for both methodologies can be collected using a series of informal interviews, focus groups, mapping of farms and collection areas through participation, processing and other activities by the local community members. The same kind of information-gathering activities can be used for the monitoring and evaluation of experiments. This was organized still much by using methodologies by outsider as a main actor to involve local communities in development processes. The next step forward was a development of *participatory rural appraisal* (PRA) method.

### Community self-assessment tools

In the late 1980s, PRA replaced RRA. They have been distinguished as approaches rather than methods. Major innovators in developing appraisal tools were NGOs. Main users are also government field organisations. PRA focuses on local people's capabilities instead of knowledge replacing methodologies, with the outsider's behaviour and attitude not being dominating but facilitating. RRA used local resources in data collection, but PRA emphasises the empowerment of local people. When RRA created plans, projects and publications, the long-term outcomes of PRA were aimed for establishing sustainable local action and institutions (Chambers 1999 p.115). Cracknell (2000 p.178) observed that as he went through Chamber's references in *Whose Reality Counts* by checking 632 references of which 154 had some reference to participation in the title, only 10 of these referred specifically to participatory monitoring and evaluation. This gave an indication how this territory was largely unexplored.

Jackson (1997) listed several participatory methods for project planning and management tools. One of these is participatory planning tool called ZOPP (*German; Zielorientierte Projekt Planung*) or GOPP as goal oriented project planning, which was developed by the German technical cooperation GTZ. This was designed for project planning through a series of stakeholder *workshops*. ZOPP is similar to LFA, where a problem tree is generated to describe relationships between issues constraining local and regional development. Participants draw, by reversing the problem-tree, an objective tree, which sets out the actions needed to remove these constraints. The elements in the objective tree will then be addressed in a project plan. A project planning matrix or logical framework is developed by the participants and approved by the stakeholder groups. Variations of the ZOPP tool are team-building software, SWOT analysis that is a strategic planning tool, responsibility and GANTT –scheduling and

progress charts, and total-quality management approaches. Social Gender Analysis (SGA) is another workshop-based technique. Class, gender, access to and control of resources, benefits from participation, and links between local, national and global levels, are all key elements in SGA discussions (Jackson 1997 p.18). This is concerned more broadly with social sustainability.

The second group of self-assessment methods are field-based techniques. PRA is probably the best-known toolkit, using group-animation techniques, problem-analysis, semi-structured interviews, focus groups, ranking, needs assessment, mapping, transect walk, and other participatory observer techniques.

#### **2.4.2 PIA for impact assessment in development cooperation**

Poverty reduction is one of the main goals of development cooperation. Possibilities to maximize this depend on continuous participation by village or community residents in the development process in order to generate and sustain economic, social and political gains. In the definition of PIA, the emphasis is placed on full or shared control of the evaluation of the development intervention process. The full control represent ideal situation. There are systematic political considerations and personal resistance that act as barriers to achieving to this objective. Shared control is already much less than full community control, according to Jackson (1997). It is instructive to remember that human rights and democracy, which are constitutive of local voices and acts, have been issues to be mainstreamed in development programs by bilateral and even non-governmental organizations (NGOs). This is more than participation. It leads to the ownership.

PIA has evolved from participatory evaluation (PE). The difference is in the focus. When PE focuses on process, methodologies and research strategies, then PIA examines development results. PIA focuses on whether the poor actually achieve *improved living standards* or greater political power. The difference between PE and PIA is a difference in emphasis, wrote Jackson in the article Participatory Impact Assessment for Poverty Alleviation (1997). Marja Liisa Swantz used PE in a participatory research and the evaluation of the effects of aid for women in Tanzania in 1983 (Berlage and Stokke, 1992). She justified the use of PE by arguing that the beneficiaries are the best judges of the effects of development projects aimed at improving their lives and should therefore take part in the evaluation process. The strength of PE resides in the educational process for all participants and the gains achieved by the communities through the process itself. They are not left to wait for results after the release of project reports that are usually written in a language which is not understood, Swantz clarified.

#### **2.4.3 Weaknesses of PRA method**

Despite its widespread use and rapid learning results in community research, several weaknesses have been associated with the PRA method. Community assessments are generally carried out in three- to five-day sessions. Assignments take place within local power structures and social settings. Grenier (1998) highlighted some of the weaknesses, which are connected to power, group processes and gender relations. The interviewer has to be aware of these structures; otherwise, the results distort the views of the most powerful as common interests, especially when the aim is to generate a consensus. Non-dominant people, classified as *disadvantageous groups*, including the poorest people, women, children, and minority groups, generally lack the ability to make their personal opinions and interests publicly heard. The participation of women in group events is usually limited and discontinuous. This can result from women's general exclusion from public spaces and activities. Grenier (1998 p. 45) claimed that PRA offers no techniques for exploring such

social complexities or for dealing with the conflicts that PRA may expose or provoke. In addition, it should be stated that PRA is not the “only way”, although some non-participatory methods, e.g. social-analysis techniques and techniques used to assess the impact of participatory work, can yield very useful data when used in conjunction with participatory exercises.

PRA has been criticised to be an empty ritual. Feeney (1998) claimed that PRA is predominantly a method of extracting data, although PRA pretends to be a process of empowerment. This is the result of the one carrying out the PRA rather than of the method itself. The time scale used in the exercise is usually very limited. Feeney suggested that PRA has been a victim of its own success: the rapid proliferation has led to a bad practice. PRA has become a mechanical exercise which fails to ensure the participation of all groups within the community. The main reasons for the failures of PRA stem from the tendency among those persons carrying out the exercise to dominating the process. The villagers’ participation is limited to providing the officers with information. Another reason is that the time-scale is generally limited to a day or less, as mentioned earlier (Feeney, 1998 p.81). Marja Liisa Swantz (in Berlage and Stokke, 1992) mentioned obvious limits of PE when measurable data is needed, although this can be collected with local consent and cooperation in some aspects of collection. Swantz also added that, as a limitation of PE, it is not a short-term input.

## **2.5 Other factors; economical, technical and institutional impacts**

Although soil and water conservation program contributes to soil fertility and the sound use of available water resources, several other factors are crucial to promoting the sustainability of environmental measures. These are the economical benefits coming from the development of agricultural production, technical skills and methodologies needed in maintaining the scheme, and institutional development that is required at the local community level to manage the utility and users.

Impact indicators are a crucial part of the impact evaluation. Indicators for the household economic situation and living standards could include changes in household income from particular crop production or activity, changes in levels of expenditures or in selected types of costs *e.g.* health and education. In addition to levels of food consumption, quality of housing, land holding, access to water and electricity, they indicate changes in the household’s economy, too. A household’s welfare can also be determined by sanitary facilities, household equipment, public services and school attendance, as listed by Cracknell (2000).

Technical aspects in rural development are connected to agricultural practices and irrigation techniques and the maintenance of sites. Soil conservation through the constructing of bunds, crop rotation and irrigation techniques including maintenance, are the main activities for improving practices. Environmental protection alongside the project schemes and its vicinity show the adaptability of the newly learned practices. Local applications of techniques and appropriate technology utilization are the indicators of the sustainability of the achieved developments.

Administrative aspects deal with capacity building and are considered as institutional development. Dale (2004) counted political and administrative as well as other organisational, cultural and certain social factors, as sub-entities of a broader category of institutional development. Local institutions’ ability to carry development projects’ management and further development initiatives determine the capacity and functionality

of them. Cracknell (2000) emphasised one of key findings for institutional development: it should strengthen existing institutions rather than sponsor the new ones.

### **3. RESEARCH OBJECTIVE: “WHAT IS THE OUTCOME OF THE SOIL AND WATER CONSERVATION PROJECT (SWCP); PARTICIPATORY IMPACT ASSESSMENT (PIA)”**

The purpose in this impact assessment of the project was to find out answers to the following questions:

*“What has happened (or is likely to happen) as a result of the project?”*

*What are the real outcomes of the development intervention? How have the local people and communities benefited from the development cooperation project? What time frame is needed for the developments to take place? What type of self-contribution elements exist to ensure the sustainability of the impacts? What social, economical, environmental, institutional and technical directions have been taken since the projects phased out three to ten years ago?*

Several aspects are connected in this study, like attribution; what caused any identified change, and aggregation; what type of advocacy has contributed one particular outcome that is in a disaggregate form (Roche, 1999). There are many external factors that have an influence on the development process. The factors come from cultural and political climates and they are very fresh in the memories of the local people. These impacts can be positive and negative. Also, the study determines the trends occurring in villages and in the views for the future of the local communities. The main aspect of the study is: “How does the environmental development scheme contribute the main goal of the development purpose; that is improved standards of living, or in the other words, poverty reduction?” The Soil and Water Conservation Programme in Ethiopia provides possibilities for drought-affected areas to develop livelihoods for local communities. The main aim of the study was to undertake an *impact assessment* of the soil and water conservation scheme and to examine how the *main goal, poverty reduction*, was achieved. This means assessing how the program contributed, through its outcomes, the purpose of the program.

## **4. BACKGROUND: RURAL POLICY, SITES AND PROJECT OBJECTIVES OF THE DEVELOPMENT COOPERATION INTERVENTION, SWCP IN ETHIOPIA**

### **4.1 Rural policy development and landholding**

The present social economic policy has been based on the land reform legislation since 1975 in Ethiopia. That reform nationalized rural land and established peasant associations. The agricultural system based on individual peasant farming was converted into “more modern and collective forms of production”. “Agrarian socialism” measures have been taken, such as the large-scale state purchase of main food crops, the fixing of agricultural prices, the expansion of the state farms and the creation of the state monopolies in crop exports. Nearly 90 per cent of the country’s population live in rural areas. The agricultural sector accounts for some 85 per cent of total employment. Since 1984, the government instigated the largest resettlement programme ever carried out on the African continent. Peasants have been relocated from the North into sparsely inhabited potentially fertile regions in the Southwest.



Land holding practice has changed over time, and tremendous variations occur not only in different regions, but also even within the same village and family. The concept of land tenure in Ethiopian tradition is a confusing one, and should be understood as access to land. The European concept of ownership is not applicable in Ethiopian tradition. Within African cultural tradition, land is a free gift to mankind, a resource that is necessary for living and cannot be taken away from a person (Pausewang *et al.* 1990).

The land reform redistributed very little land. Most peasants kept the land they had ploughed. Only that land that the landlords were cultivating for themselves was taken for distribution. In most villages, there was not enough land available for redistribution to the poor who had been granted rights to land. The newly established peasant associations ploughed up some areas of common grazing land in order to solve the problem. Land reform gave peasants a limited but secure right to a share of the community's land and preserved the collective responsibility for distribution in peasant associations. Due to peasants' right to land, they were freed from contributions to the landlords and therefore gained more. This was seen as an advantage for the peasants (rural communities) and as a disadvantage for the towns. On one occasion, the government had to send soldiers to confiscate grain from communal stores that were built to give peasants better control over trade and price developments. This led to the decision by the government to re-introduce taxation in order to make peasants to sell grain, and as the largest productive group, to contribute to the cost of administration.

Given the widely varying understanding of land tenure and rights, as well as the diverse terms and vocabulary set mainly by the donors, there has been a widespread misunderstanding in the concepts of evaluation. Environmental projects that were carried out on the common ground had received collective understanding for utilization of the scheme, but responsible ownership of the project site could not be related as one of property but as one of access to the natural resources.

In those areas where relief actions had to be taken, the motivation for participation in the development cooperation project might come from unwanted grounds. Due to the implementation of a given scheme e.g. Food For Work (FFW), people have built conservation measures primarily in order to obtain food. Even local government officials have told the rural communities what they should do to obtain the relief food. Grounds for discussion and local participation in conservation planning can be destroyed by this kind of behaviour. Wood (in Pausewang *et al.* 1990, p.194) expressed how FFW as payment can make farmers see conservation measures as belonging to the government rather than the local community. Therefore the quality of construction is often poor and maintenance of the measures is not important to farmers. The socio-political environment in Ethiopian context discourages farmers to invest or even participate in environmental protection activities. Insecurity of access to land does not attract investments in physical structures, trees, or even soil fertility unless there are clear rights to trees, which ensure that the benefits accrue to those who plant and protect them. The most vulnerable areas struggle with interventionist approaches that are mainly divided into two categories: relief and development.

#### **4.2 Environmental policy of Ethiopia**

The environmental policy of the Federal Democratic Republic of Ethiopia (1997) lays the grounds for natural resource development projects. The policy covers the resource base description, the goal, objectives and guiding principles. Sectoral environmental policies promote sound agricultural and forestry development and energy resources to substitute fuel wood in order to reduce pressure on using forests resources. Environmental

protection of agricultural soils and water resources, and of the promoting of cultural heritage through local participation, have been emphasised in the policy. Mining operations are encouraged to be managed and practiced in a good environmental manner and in accordance with legislation. Urban development, industrial and atmospheric pollutions contributing climate change have been addressed in the policy framework. For rural populations, tenure and access to land is a vital issue. The constitution ensures that the user of land has right to the land and to its renewable natural resources: trees, water, wildlife, and grazing.

Policy framework includes recommendations on social and gender issues in all social, economic and cultural groupings of society. EIA and related assessment methods are mentioned in order to maintain standardized impact assessment used in the development planning process, including project and programme preparations. These are needed to ensure consideration of environmental gains and losses by economic costs and long-term environmental impacts, fees, taxes and subsidies. In addition, EIA should not only consider physical and biological impacts but also address social, socio-economic, political and cultural conditions.

The policy addresses capacity building of national institutions. Environmental information and research improves the community's intellectual property rights by promoting the training and working conditions of researchers. Information exchange and institutional structure facilitate conditions to become technically competent and familiar with the agro-ecological and socio-economic conditions of the potential end users: farmers, pastoralists, government professionals and NGOs. Environmental education and awareness are incorporated into the curricula at schools and colleges. The involvement of the public and private sector with local communities and religious leaders to promote activities using mass media aims to foster the development of environmental awareness associations.

Allocating political and popular institutional frameworks, responsibilities and mandates to line ministries, commissions, authorities and bureaus, supports policy implementation at the federal, regional, district, and community levels. The existing institutions should be used up to their maximum potential. Legislative framework should encourage participation by the people of Ethiopia in the development of federal and regional policies, laws and plans for the sustainable use and management of the natural, human-made and cultural resources and environment. Monitoring, evaluation and review are the responsibilities of the appropriate federal and/or regional and/or regional implementing agencies.

### **4.3 Sites of the development co-operation intervention, SWCP in Ethiopia**

The impact assessment was conducted in three previous SWCP project sites and they are used as the case study in this Master's Thesis. The sites represent different agro-climates that are located in low-, middle-, and high-lands. Also, they have diverse cultures and livelihood systems. Dejene (1991) classified ecological zones according to how local farmers consider the type of cereal grown. The major crops of the highland area (2,300 to 3,200 meters above sea level) are barley, wheat, oats, horse beans, field peas, and lentils. In the medium altitude zone (1,500 to 2,300 masl.) teff, wheat, sorghum, chickpeas, vetch, and niger seed are the main crops. In the lowland zone (500 to 1,500) mainly sorghum, maize, chickpeas, and sesame are cultivated (Dejene, 1991 p. 13).

The sites where the impact assessment took place were Otore Harre river diversion, Furuna river diversion and Lower Bilate river diversion. The water development schemes represent both old and relatively new sites.

### Otore Harre

Otore Harre river diversion, implemented in 1993-95, is located in the Southern Nations Nationalities and Peoples Regional State (SNNPRS), North Omo Zone, 12 km from Arba Minch (about 1500 masl.). The irrigable command area is 600 hectare and that includes the house settlement areas. The community of more than 1000 households (815 in 1995) has been given an opportunity to affect their welfare after water was made available by canal works. The area has been transformed to become a “green shelter” in an otherwise semi-arid type of heavily deforested area having annual rainy and dry seasons. The whole area grows agro-forestry types of crops. Homestead have become gardens producing several crops such as maize, bananas, mangoes, tomatoes and trees locally called “halako”. The latter has leaves that are used in cooking, and is considered as a tree growing in a good environment. The community has gained social and economic benefits after the establishment and stable use of irrigation for income generation purposes. As one women noted about the present situation, irrigation in the area “has had an impact on crop production, general setting of community, housing, food and our thinking”.

### Furuna

The Furuna river diversion scheme was implemented in 1995-97 and the follow up period lasted until 1999. It is located about 2300 meters above sea level in vicinity of Adaba town, in Oromia state. The Furuna community consists of 1889 males and 1403 females. The total land area is 2492 hectares, which is divided as cereal crop 1805 ha; irrigated land 500 ha; grassland 37 ha; forest 17 ha; and garden 126 ha. The area comprises 270 households and 3292 habitants. The command area to be affected by the irrigation is 500 hectares including housing estates, vegetable gardens and fruit tree orchids.

The main road divides the area of the Furuna community. Upper slope households have access to the irrigation but lower parts below the main road do not have access to irrigated land in their homesteads. The housing yards are large, almost half a hectare each. Typically one quarter is occupied by the irrigated garden. The yards have partly grassland and space to keep animals.

### Lower Bilate

Lower Bilate is located in the SNNPRS, which is about 80 km southwest of Awasa town. The river diversion scheme was implemented in 1999-2003, therefore represented as young site. The main beneficiaries are 756 heads of households, of which 49 are women headed households. The households are located in four different zones. The average household has 6 members including children and parents. The typical land holding for a family is 0.5 hectares of agricultural field and 0.1 hectares of housing yard. Both of these areas have access to all year around irrigation. The total irrigated land area is 380 to 400 hectares, including distant fields and housing estates.

## **4.4 Development objectives of SWCP projects**

Findings from the earlier SWCP reports, proposals and project plans of similar schemes examining stated project objectives can be divided into two subgroups: development objectives and environmental objectives. Development objectives are food security, capacity building and women’s involvement in development activities (this was incorporated to the project design later as mainstreaming of gender perspectives became an issue in development cooperation). Environmental objectives are designed to minimise negative environmental impacts, create natural resources management in sustainable way,

appraise stakeholder involvement in environmental protection and develop environmental impact assessment system for regular monitoring of the project. Soil degradation by erosion, deforestation and monoculture were identified as the main environmental concerns during the project planning phase of the Furuna River diversion scheme in Soil and Water Conservation Project Southern Region, Ethiopia 1995 (in Shashemene, 1994). Generally, the goal of the projects has been to improve food self-sufficiency and improved the quality of life. Specific objectives have included widening access to water for agricultural soils and improving environmental protection methods of the soil conservation techniques.

The project planning process and content have seen dramatic changes during the past decade. Older sites were planned during a time when the mainstreaming of the fundamentals of development was not included in the project design. Still, most of the issues were somehow identified as a general need of that particular site, although for example gender aspects such as women's involvement in decision-making process and educational issues were not emphasized. These were designed as social and economical perspectives in the projects for short and long-term outcomes of the planned activities. Later, project designs became concerned about gender perspectives, credit schemes, vulnerable groups within society, strong local participation, ownership of the project, democratic development components, institutional development and capacity building, and health issues such as HIV/AIDS and safe motherhood programs. Nowadays, the main objectives of the SWCP are food security, health, economic livelihood, environment and social capital in the project plans. These are named as integrated rural development programs, IRDP (proposal for 2004-2007, FinnChurchAid).

## **5. CONCEPTS, MATERIALS AND METHODS USED IN THIS IMPACT ASSESSMENT**

Impact assessment determines the intended and unintended impacts of the programme. Impact concerns whether there has been a shift towards the achievement of the overall objective as a result of the achievement of the project purpose. Both intended and unintended impacts are reviewed. This can be determined by using the qualitative and quantitative indicators and variables that have been used in programme planning and monitoring processes during the implementation of the development objectives. The assumptions are external factors, which determine the success of the programme, as set out by the Ministry for Foreign Affairs Development Cooperation guidelines (1999). The assumptions are those key factors that keep a project alive, or if the assumptions fail, the project will most probably fail in long run. Failed assumptions are called the "killers" of the project. Also, it is agreed that external factors constitute a project's environment. The project objectives can be achieved only in a favourable environment. Therefore, assumptions can be seen as crucial factors when the impact of the project will be assessed. If the assumptions are met, then most probably the sustainability and overall goal will be achieved.

The main beneficiaries' own assessment of the programme is important. Chambers (1999 p.131) argued that local villagers have capabilities of which outsiders have been unaware. According to Chambers local people have shown a far greater ability to map, model, observe, list, count, estimate, compare, rank, score and diagram than most outsiders had predicted. Much of this is done through visualization, the physical expression and sharing of knowledge, judgement and analysis. Several methods have been used in research. For example, people create maps, models, lists, matrices and diagrams; they walk transects and observe; they investigate and interview; they present information; they

analyse and plan. Consequently, they are more in command of the process if they own and retain more of the information, and they are better placed to identify their priorities for action, and determine and control that action, as described by Chambers (1999 p.132).

Water and soil conservation measures do not depend on one variable. Therefore several different factors need to be examined. As Valkonen (in Dogan and Roggan, 1969) brought up in the quantitative ecological analyses of individual and structural effects, it is not realistic to assume that the ecological variation of 'y' can be explained by only one individual variable. In practise, there would be several ecologically relevant independent variables, each one reflecting of individual-level causal processes. According to Valkonen, these units have an ecological meaning, but from the point of view of sociological analysis these kinds of processes are not very interesting. Still, it is good to remember that in the context of development cooperation, integrated approaches are meant to deal within social, economical and environmental development as a whole. Different variables affecting the degree of impact could be cultivation or farming practices, selected species, water availability and education for the managing the rural livelihood and positive environmental contribution. Education represents the structural effects by segregating formal and non-formal education to lower and higher primary school students and to farmers and households on the non-formal basis. Social impact and ecological impact have to be assessed separately.

### **5.1 Research methods, data collection and analyses**

This Master's Thesis research included qualitative and quantitative methods. Several methods were used such as: questionnaire, direct observation, focus groups (women, farmers, teachers), project reports analysis, baseline studies, reference groups and institutional development for policy development. Table 5.1 shows type of analysis, method, type of data, where the data is obtained from and purpose of analysis.

Focus group, key informant(s) or resource person interview are cheap and quick to undertake. This type of data collection on *qualitative* aspects is often carried out using direct observation by the evaluator. This method allows the local beneficiaries evaluate their own contribution and feasibility of the development scheme. Research issues with the selected groups are: perception of water and soil management issues, indigenous knowledge used in e.g. plant selection, nutrient conservation, water management system, health, women and water, education, as well as reactions to and identification of significant changes in the community.

Questionnaire was used for quantitative data collection. The data may consist basic statistics of the property, number of people or cases of sicknesses. Also, different beneficiary groups' land holding and water use can be determined using questionnaire.

Transect walk provides insight into the profile the community, both in physical appearance and the various resources that it has. It shows the community resources, highlights the problems and potential opportunities. It enables the evaluator to make observations and ask questions about different features of the visible environment. The results are transferred into a transect diagram (Jayakaran, 1998) or a map. Research topics covered by the field walk exercises include: gender roles in conservation activities and water use profiles. Also, the discovery of species cultivated and agricultural techniques used can be observed during a field walk. The topographical layout of the community and its' resources can be determined as well by using a transect walk research.

**Table 5.1** Type of method, tool, form, source, and purpose that were used to obtain data during the study of impact assessment.

<b>Method of analysis</b>	<b>Tool of obtaining data</b>	<b>Type of data processing</b>	<b>Data obtained from</b>	<b>Purpose of analysis</b>
Qualitative	Focus group discussion, observation.	Notes, memos, tape recorder.	Farmers, women, teachers.	Perception of water and soil management issues, indigenous knowledge used in e.g. plant selection, nutrient conservation, water management system.
Qualitative	Field walk, observation, discussion.	Notes, photos.	Active working groups.	Who is involved, gender analysis.
Quantitative	Questionnaire.	Statistical evaluation for determination of the degree of commitment.	Farmers, village leaders, main beneficiaries.	Commitment, sustainability, determined use of water, statistical evaluation, different groups' level of commitment.
Quantitative	Baseline data vs. present data	Project report and documents	Baseline data, reports.	Achieved change, e.g. cultivated area (ha)
Qualitative	Reference group.	Observation notes, discussion, memos, photos.	Non-project communities.	Impact reference within non-project communities in the area.
Qualitative	Stakeholder discussions.	Notes, memos.	District governmental offices, village leaders.	Institutional capacity building, agreed policies on water and soil issues.

Software tools for qualitative analysis of the reports help to identify and code themes and concepts that will contribute to our understanding of social life. The analytical challenge is to identify thematically similar segments of text across the data available. Lists of words are an important tool in this tradition, as briefed by Lee and Fielding (in Bryman and Hardy, 2004). Also, reports can be analysed using the software or manual applications or the computer aided 'cut and paste' method to find out the same material placing that below one heading as Laws *et al.* (2003) explained. Observation memos can be categorised by using this method. Software, such as Excel spreadsheet, can be used in analysing quantitative data, for example analysing base line data in form of age, sex, housing type, number of children, cultivated area in hectares and other correlative relevant data for an impact assessment. Coding, counting up totals, percentages, grouping data and analysis of open-ended questions conducted with the questionnaires can be processed by basic

software or specially designed tools like SPSS. Forms of the presentation of quantitative data are cross tabulations, charts, graphs and correlation figures.

Reference or control groups, which has not been affected by the project, makes the comparison possible. Without any comparison with a control group, the result is quite predictable: the project had some impact on various aspects. The use of a control group is often costly and difficult and is done by comparing baseline data and the situation before and after the intervention (Ministry for Foreign Affairs Development Cooperation, 1999). Traditional *quantitative* methods include sample surveys where quantifiable aspects are measured using standardized questionnaires and interviews (Ministry for Foreign Affairs Development Cooperation, 1999). Comparing numerical data obtained in the beginning and the present gives numerical information of the achieved change or improvement.

Policy research is ultimately concerned with knowledge for action, and the long-term aim is in line with the famous dictum that is more important to change the world than to understand it. Hakim (1989) explained that the distinctive feature which differentiates policy research from purely theoretical research is a focus on actionable variables. Institutional capacity building and agreed policies on water and soil issues have a long-term impact, constitute indicators of sustainability and are therefore important factor of impact assessment. Hakim (1989 p.67) mentioned that the term 'sociography' is used for studies to denote the social mapping of the community's institutions, structure and pattern of relationships. Community studies may focus even more specifically on policy issues or theoretical questions, such as patterns of residential segregation, the role of pressure groups or the implementation of a regional plan, just to mentioning few examples.

## **5.2 Description of the impact assessment process**

The following steps describe how the research process will be carried out. In the beginning, detailed *terms of reference* (ToR) will be design with the client (usually the donor) to give a framework for the study. Secondly, the whole concept is familiarised by reading the project documents and the relevant *literature* of the water and soil conservation measures, poverty reduction, integrated approach to development and conservation, and impact assessment. The third step is to *select the most relevant research method or methods* for the actual fieldwork. The fourth issue is to clearly *define clearly the research question(s)* and final *selection of the methods*. The fifth task is the *preparation of the material* such as questionnaires and plans for interviews and observations. The sixth point in the process is the *practical arrangement and plans with the programme staff* to reach the intended locations, community groups and concerns to be studied. The seventh task is the *actual fieldwork of carrying out the research work*. Finally the *data processing and analyses* of the research results should be conducted.

When the research methods are selected, then the more detailed research questions and procedures for analysing the results are determined. In the beginning is essential to draw a timetable or schedule to control the procedure of data collection and fieldwork. This is essential because the fieldwork will be done within the given time constraints. After all, there has to be flexibility if it should be discovered that the research design does not fit to environment where the study is actually conducted. Busy schedules might fail due to any unknown local reasons or even due to the weather and geographical conditions.

## **5.3 Validity and reliability of the chosen variables**

Bryman (2004) clarified how validity is concerned with issues of whether a variable really measures what it is supposed to measure, especially when the impact deals with at

least two mediums, people and nature, and their interaction. The human satisfaction of the program activities does not necessarily contribute to sustainable environmental development unless they utilize environmentally sound methods. Therefore, methods of how environmental sustainability and soil conservation has been carried out were also examined in this study.

Reliability is concerned with the consistency of the variable. According to Bernard (1994), reliability refers to whether or not the same answer can be found by using an instrument to measure something more than once. Reliability deals with the tools to measure the objective. Working with indigenous knowledge, it is important to be aware of *nonsampling errors*, if the question is understood and if the answer is understood correctly by the researcher. As Grenier (1998) referred to (Kater, 1993) regarding a study on the learning of indigenous graft, they found that people were not fully conscious of their learning processes. They never discussed learning processes among themselves and hence found it difficult to be interviewed on a topic they never been verbalized. Interviewees failed to understand the researcher's questions. Interviews could not yield satisfactory results and observation was more important. Reliability can be threatened by the *courtesy-bias errors* when respondents feel compelled to express only views they think the interviewer wants to hear. Several errors can occur and affect reliability: *sampling errors*, *socio-cultural errors*, and *language and translation errors*.

The present trend emphasizes the local opinions and assessment. There have been success stories and there are "lessons learnt" types of schemes. What have caused these two different types of situations can indicate how the programmes were initiated, what level of local participation was involved in planning phase, and how implementation and evaluation were arranged. Development philosophies have changed over time. "Wisdom above" has become more cooperative and has incorporated locally inspired holistic program management in line with the development strategies of the country. Since these programs have continued for "decades", the "donor-dominated" origins might have been accepted as development trends in the 1970s. Hopefully, this research will target genuine groups of people to indicate how the development schemes have had impact on local communities and management of natural resources.

#### **5.4 Selected methodology for impact assessment**

The selected methodology was participatory impact assessment (PIA) using participatory tools and exercises. The reason for the selection of the method was to ensure local voices and assessment of the development project, namely the processes of development taking place after the project was phased out. The main sources of information are the main beneficiaries, the local people themselves. The methodology proposes the researcher's role to be more of a facilitator that gives inputs to the discussions in order to cover the topics and areas that are within the scope of the study. Also, he ensures that the voices of different groups in the community, stakeholders, are to be heard. In order to carry out the research within a certain time frame and within the intended groups, a plan for the process is needed. Main community stakeholders, different aspects of impacts, tools and indicators of the impacts have to be designed. Table 5.2 shows the main structure of the research in the field.

This study took a multidisciplinary approach to the impact. These impacts can be determined as economic, environmental/ecological, social, institutional and technical



**Table 5.2** Data collection matrix including type of impact, stakeholders, indicators and tools (in brackets). Type of impact and stakeholder where the information drawn using the tool for the mentioned indicator. (\*HH survey = household survey)

<b>Impact:</b>	<b>Economical</b>	<b>Environmental Ecological</b>	<b>Social -education -health -gender</b>	<b>Institutional development</b>	<b>Technical</b>
<i>Stakeholder:</i>					
<i>Leaders</i> -COLTA committee -Water Committee -Peasant Association	INDICATOR -Crop production  TOOL (most significant change, seasonal calendar)	-Land use -Agriculture -Environmental protection  (most significant change, discussion, mapping)	Men / women in committees  (discussion)	Leadership for development  (discussion)	Irrigation -management -distribution -maintenance  (discussion, observation)
<i>Farmers</i> -Peasant Association -Farmers	-Crop production -Community livelihoods  (discussion, daily routines, resource mapping, HH survey*)	Land use data, soil conservation measures  (discussion, daily routines, resource mapping, observation)	Distribution of domestic tasks  (discussion, daily routines)	N/A	Irrigation/ Agricultural techniques -management -distribution -maintenance  (discussion, observation)
<i>Disadvantages</i> -women -widow -elder -disabled	-Food sources -Income sources  (discussion, daily routines, HH survey)	-Land use -Irrigation use  (discussion, daily routines, HH survey)	-School attendance  (discussion, daily routines, HH survey)	-Women's involvement in leadership  (discussion)	N/A
<i>Children</i> -boys & girls	N/A	N/A	School attendance (data, discussion)	N/A	N/A
<i>Health post</i> -health officer	N/A	N/A	Health issues (data, discussion)	N/A	N/A
<i>School</i> -Head master -teachers	N/A	N/A	-School attendance -Classes available (data, discussion)	-Classes available -Further education (discussion)	N/A
<i>Households</i> -small hut -grassroof -iron sheet roof	-Food source -Income source -home expenditures  (HH survey, observation)	-Land use -Irrigation use  (HH survey, observation)	-Family size -School attendance  (HH survey, observation)	-Membership in committees  (HH survey)	-Water use   (HH survey, observation)

points of views. The assessment has been done with a holistic picture of the development of community, livelihoods and local standards of living. The impact assessment is based on findings, comments and definitions by the main beneficiaries. Some conclusions can be drawn by the researcher, for example, from the home surveys and observations, for creating classification for the welfare categories in community.

The tools used in the study included discussions, exercises, home survey and observations within several methods in order to gather both qualitative and quantitative information and data. The research key informants were the main beneficiaries within different stakeholders. These included men, women, farmers, committees and associations in the village, health officers and teachers. Boys and girls were interviewed, but more emphasis was placed on the observation of children's activities and tasks in the family. A framework questionnaire for guiding the issues during the PIA exercises is attached as Appendix 1.

Several participatory exercises were applied to the field research including qualitative and quantitative methods. Qualitative methods included the participatory observation different ecological zones in the community. The 'most significant changes' exercise was carried out among the groups of women and men. The emphasis was on changes related to access to water by both genders. Daily routine analyses were drawn across both sexes to indicate the time and tasks affected by the irrigation development scheme. Several discussions, which encompassed a number of topics to be covered by the open ended questions, were held with the different focus groups such as farmers, elders, women, health officer, school head master and NGO evaluation and monitoring office.

Quantitative information is based on the disaggregate data on school attendance obtained from the school head master, health officer providing data on sanitation, mother-child health care and malaria occurrence. Also small-scale home survey was carried out among people having diverse economic and social status (well-off vs. poor) according to area and house type, including qualitative and quantitative aspects.

## **6. RESULTS**

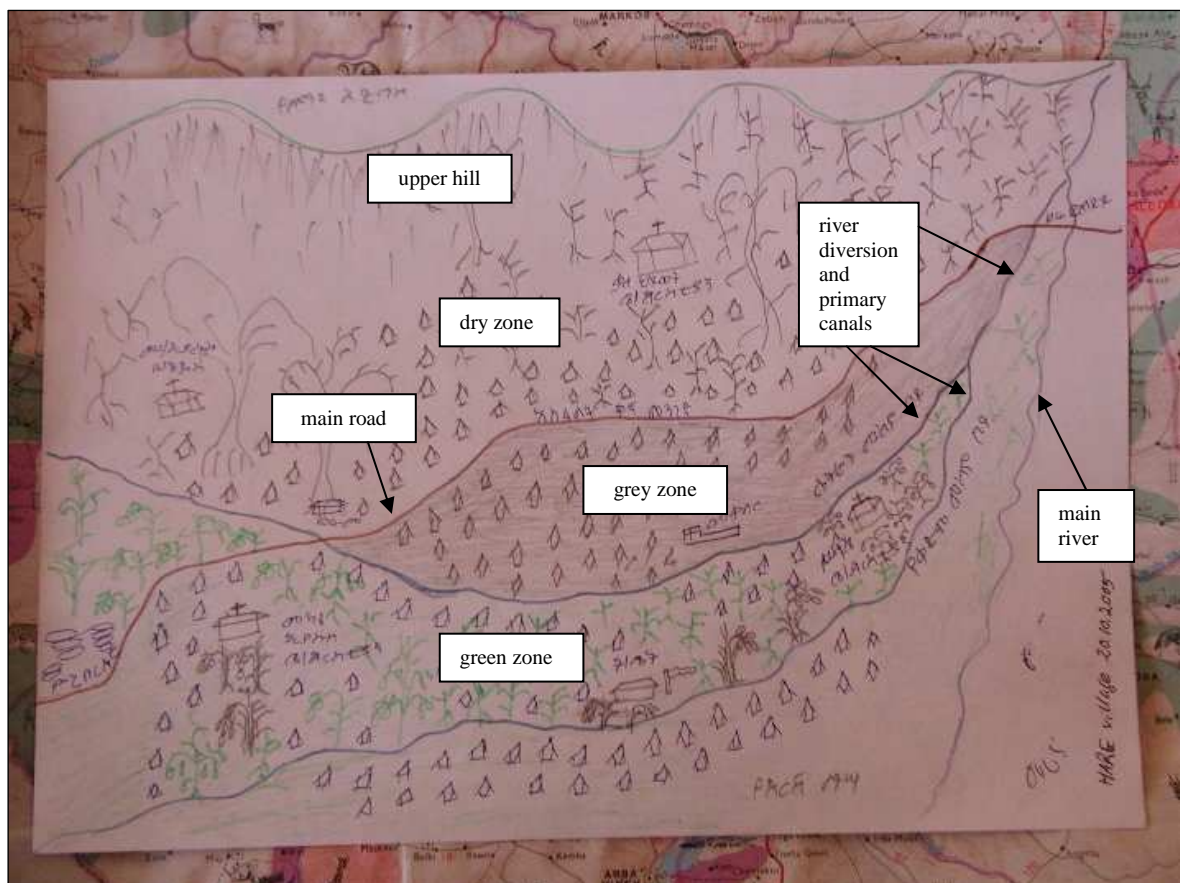
### **6.1 Economic impact of the SWCP**

Economic impact has been mainly achieved through increased crop production. An increase in crops has two-fold effect. First, it helps to secure food for the household and, secondly, to create a surplus which can be sold. Economic benefits for the household came as water for the all year round agricultural production and time used for water related activities, *e.g.* fetching water and laundry, at homes. Several crops were harvested and more time was left for domestic work due to easier access to water resources. Increased cropping gave food for the families and there was no need to buy food grain from the market. Surplus was sold in the market and income was used for family expenses such as education, clothing, sugar, tea, salt, and improved housing. Later, more organized cash crop production plantations were started. Depending on site, estimations for the main source of income generation capacities for the villagers varied from main source to supplementary income source. The typical time frame of the development was 2 to 4 years to achieve sufficient food supply and from there onwards, more business and income generating activities were implemented.

## Otore Harre

Recently, villagers in the Otore Harre community had started more intense cultivation of cash crops, which consists mostly of bananas. Maize was grown up to some extent, but due to being widely cultivated at the homesteads, the market value was low. Also, the landholding affects how much each household is able to produce surplus above of own consumption needs.

Villagers drew a picture (see Figure 6.1) of the area, indicating different zones in the river diversion affected area. These can be considered as economical and ecological zones. Households were allocated into three different zones. The main beneficiaries were households having secondary and tertiary canals passing by their homesteads (green area in the drawing). The second best option was to have an irrigated piece of land at some distance from home, located just above the primary canals, as indicated by the grey colour in the drawing. These two options had very similar opportunities for income generating. The third option was domestic immigrants moving from surrounding villages to upper dry slopes of the hill and having access to water for home use like cooking, bathing, laundry and even drinking purposes. The type of economic indicators used to determine the welfare of the households located in the different ecological zones of the area included school attendance of the children, land holding according to type of house in the ecological zone.



**Figure 6.1** Ecological zones in Harre village. The red colour is the main road. The blue lines; upper one is the river diversion main canal and lower one is the old one. The green area is where the homesteads have irrigation weirs in their gardens. Dry zone is located above the main road and upper primary irrigation canal. The main beneficiaries are the households located below the upper irrigation canal and those living in grey zone but having their fields in the irrigated zone.

Generally, the green zone households had sufficient food supply and could afford to pay domestic expenses like school fees, schoolbooks and clothing. They tend to have a future plan for the next investment they were going to make. These investments were typically to improve the house with cement flooring, costing 8.000 to 10.000 BIRR (10 BIRR equals to 1 EUR). Also, purchasing some furniture and electronics were on the typical wish list of consumer goods. This could be considered as a result of the economic impact of the increased income generation possibility by using the irrigation water and land holding together.

In Table 6.2, households living in the different zones, green and dry, were characterised according to the type of housing they are living in. On the other hand households living in the dry zone represent the situation of the whole community before the development intervention. The income and welfare situation depends on access to irrigated agricultural production. Keeping livestock and having green pasture were included in rural livelihood system. Typical annual production and preferred crops for sale and domestic use are displayed in Table 6.3.

**Table 6.2** Household welfare in different ecological zones.

<b>Housing</b>	<b>House in green zone</b>	<b>Hut in green zone</b>	<b>Hut in dry zone</b>
Electricity available	Yes	Yes (monthly cost ~6BIRR)	No
Members in household	8-15, joint family	3-6, one family	4-6, one family
Migration	Came to seek work 20-30 years ago	Came with parents and now have established own household.	From one day trip usually mentioned as 7hours trip or 7 km distance.
Marital status	Married	Married	Married, diverse backgrounds.
School attendance / education	Children go to school and some continue to high school, parents illiterate or attended adult education for literacy.	Children go to school; younger couples have finished 1-6 or still go for grades 7-8.	Children do not go, or go for grades 1 to 3. Parents illiterate or attended grade 1.
Source of income	Cash crop: banana. Income enough to build a house in 2 to 3 years, investment needed about 6000 to 10000 BIRR.	Cash crop: banana, maize. Income in 3-4 months between 200 to 300 BIRR* (20-30 EUR)	Husband: -construction worker Wife: -petty trading: bananas, etc.
Land holding	1 hectare	0,5 hectare	No land or quarter hectare
Meals per day	3-4	3-4	1-3
Use of irrigation water or have access to river water for irrigation	Cultivate maize, banana, teff and sweet potato.	Homestead irrigated and have irrigated field.	Water fetched for household use.

\*1 EUR equals to 10 BIRR

**Table 6.3** Seasonal calendar of preferred crops for sale and domestic use by the farmers, Otores Harre. (Ethiopian year starts from mid September in international calendar.)

Crop	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August	Preferred crop for	
													food	sale
Maize	xx	xx					x*	x	x	x	xx*	xx	1	3
Teff	x	x	x				xx	xx	xx				3	4
Sweet potato		x	x	x	x	x	x	x	x	x			2	2
	xx	xx	xx	xx	xx				xx	xx	xx	xx		
Banana								→ 1 to 1,5 years					4	1
Mango					Harvest			→ Planting seedling, seven years to get 1 <sup>st</sup> harvest, after then annually crops.					5	5

\*x=1st crop, xx=2nd crop

### Furuna

The 874 households, of which 851 male- and 23 female-headed families, have utilized irrigation. The cultivated land is 500 hectares. The cultivated vegetables are red onion 275 ha, potatoes 89 ha, carrots 6,5 ha, cabbages 9 ha, redroot 29 ha, white onion 0,2 ha, nuts 27 ha and “local nut” for oil production 28 ha.

All the interviewed villagers identified the main benefit of the irrigation water as increased vegetable production and family income through it. The negative side effect was the fluctuation of the market prices due to high production of goods at the same time. Several examples from the community showed net sales of vegetables from 900 to 4.000 BIRR (90 to 400 EUR) per harvest. Without irrigation, they could produce one crop during the main rainy season. Vegetables and growing periods are shown in the seasonal calendar, listed in Table 6.4. Also, minimum and maximum market values are mentioned.

The main expenditure for families were food items, clothing, education, health service, seeds for vegetables and livestock. Many households were improving their housing to become a new “modern type of house” with a steel roof. Across the area, the increasing number of houses was connected to an electricity line.

The community had an opportunity to take credit loans from government based cooperatives and especially from women targeted funds. Usually, the loan was taken for seeds, livestock and petty trading. A pair of oxen was needed for ploughing the fields and cows for milk production. If one did not have a cow, that person could be classified as a pauper. These people were usually elder widow women without children to take care of them. They belonged to one of the *vulnerable people groups* in the community, especially if they lacked physical strength to do gardening work. Some widows seemed to be very creative and active in their daily duties such as gardening, pottery and trading.

Several observations could be made about the impact of the increased vegetable production on expanding income generation possibilities for local families. For example, a man described how he grew beet, obtained 950 BIRR (95 EUR) and then bought a cow. Now, his family had milk production which paved the way for selling processed goods such as cheese, butter and cream in local markets. Another women came up with a similar

story, also claiming weekly income of 30 BIRR (3 EUR) from milk products. One can easily count and see how a 900 BIRR investment pays back in six or seven months. There had been a promotion of new plants and fruits like sweet apple fruit tree orchids. Several houses had cultivated a garden with apple seedlings planted. Apples have good market value at 20 BIRR per kilo. So far, experiences have been positive. The seedlings are from Spain and were provided by the development organization Ethio-Italy cooperative.

#### Furuna household welfare profiles

In order to see how the use of water relates to family income, a research questionnaire was carried out, with results collected in Appendix 2. Eighteen (7%) households from 270 were interviewed, most having the access to irrigation and two families located outside of the irrigated area.

Eight households (44%) out of the 18 mentioned irrigated vegetable gardening as their main source of income with cereal crops. All the people having irrigation mentioned vegetables at least as the secondary income source. Eighty-nine percent of those interviewed having cereal crop fields of 0.5 hectares or more (n=16) consider barley, wheat and other grain crops as the main livelihood for them. These products are listed in the seasonal calendar in Table 6.4.

**Table 6.4** Seasonal calendar for irrigated and non-irrigated production in Furuna river diversion area.

Month	September	October	November	December	January	February	March	April	May	June	July	August	CASH (no. 1 best)	FOOD (1no. best)	Farmer price Per 100 kg (BIRR)	
RAINFALL	X					(x)	(x)	(x)			X	X				
<b>Vegetable Irrigated</b>																
Onion		X	X	X	X								1	6	50-240	
Potato			X	X	X		X	X	X	X			2	1	30-80	
Carrot	X		X	X	X		X	X	X		X	X	3	5	10-60	
Beet	X	X	XX	XX	XX	X	X	X	XX	XX	XX	X	5	7	5-35	
Cabbage	X	X	X	X									4	2	50-70	
Chilly			X	X	X	From same plant 4 harvests.						6	3	35 (small container)		
Tomato			X	X	X	From same plant 2-3 harvests.						7	4	15-25 cent / piece		
<b>Cereals non irrigated</b>																
Wheat	X	X									X	X	4	2	85	
Bean	X	X									X	X	5	4	110	
Teff	X	X									X	X	2	3	220-250	
Barley	X										X	X	6	1	100	
Chick beans	X	X									X	X	3	4	230	
Nuts	X	X							X	X	X	X	1	5	250	

X=main crop or season, (x)=second "small" rainfall season

Household appliances such as radios, chairs, tables or bicycle were rare. During discussion with the group of nine women, they mentioned that before the development intervention, they had a shortage of income. Now, they were able to buy oxen, cows, and

start building what they call “modern housing”, houses with steel roofing. The vegetable gardens were the only source of sufficient income in addition to the cereal fields. From the gardens, multiple crops can be harvested during the year. Before, for the daily diet vegetables had to be bought, but following the intervention they were readily available. Home users preferred potatoes, red onions, chillies and cabbage. The best sales come from red onion. The main daily expenditures were education for children, clothing sugar, tea, sugar, grass for livestock and medical expenses.

Six households (33%) had used loan from the available credit fund (Ethio-Italy cooperation). Two out of three female widows had taken out a loan. Usually the credit was used for buying good quality seeds from agricultural office, livestock and personal expenses like their children’s further education.

### Lower Bilate

According to the villagers, food supply and agricultural production for their income generation depends on irrigation water. The area very low annual rainfall and that happens exclusively during two months, March and July, only for few days. During these rainy months irrigation is also needed but only at half of the amount needed during dry months. More detailed crop production was collected as a seasonal calendar, Table 6.5.

**Table 6.5** Seasonal calendar of the agricultural production in Lower Bilate area.

	September	October	November	December	January	February	March	April	May	June	July	August	Food crop preference	Cash crop preference
Rainfall days							3				7			
Field crops:														
Maize				X	X	X	X		X	X	X	X	1	1
Sweet potato	X								X	X	X	X	2	
Tobacco				X	X	X								2
Long bean										X	X	X		
Onion	X	X	X	x	x	x	X	X	X	x	x	x		3
Cotton								X	X	X	X	X		
Teff										X	X	X		
Backyard crops:														
Coffee	First harvest after 3 years, planting any time (irrigation)													
False banana	Matures in 4 years. Planting in January.												4	
Banana	Matures in one year, planting any time.													1
Sugar cane	Harvested after one year, planting any time.													2
Avocado	First harvest after 4 years.													
Papaya	6 to 12 months.													
Cabbage			X	X	X								1	
Chilly			X	X	X	Several harvests.						3		
Cassava	Harvest after one year, planting any time.													
Mango	First harvest after 5 years, then annually.													
Moringa	Seed bed 45 days, harvests after five months.												2	

X and x = growing seasons

The group of men and women were asked to define a *good life standard*. They came up with the following *definition*:

*“A person has a good life if he/she has got pair of oxen, two or three milking cows, can produce surplus of 12 quintal (1 quintal equals to 100 kg) maize for sale in market, whose children go to school and by saving can build house with iron sheet roof.”*

One quintal of maize is sold for the price of 100 BIRR. A typical land holding of 0.5 hectares can produce in one harvest 20 quintals that is equivalent of 2.000 kilos.

Villagers did not have “regular” monthly income, but they had a system that they called a “project”. If they had a financial need for any reason like education fees, house construction or buying oxen, then they created their own “project” for earning the required money. This happened by agricultural means. They bought a cow or bull, fattened it and sold it. Also, more intensive cash cropping for sale was used as means for financial needs. For house construction, this “project” took longer and for other financial needs less time was sufficient.

The household welfare indicators, combined in Appendix 3, name income generation sources. The results showed how most, 87% of those interviewed (n=13), had agriculture as their primary source of income. Two families worked by collecting fuel wood or producing charcoal for sale and did petty trading. These families were disabled and widows, and were considered as belonging to a disadvantageous group.

## **6.2 Environmental impact of the SWCP**

### **6.2.1 Land holding and soil conservation**

The average land holding was decreasing due to migration and people sharing their agricultural soils with in-laws. Typically, a new family had a quarter hectare for their use. The largest landholdings were told to be between 1–1,5 hectare and in some cases one or two households cultivated one plot together. This was done at least with the banana plantations, due to the need for initial investment in the beginning stages. Costs came from the seedlings and external labour for preparing and maintaining the soils and plants.

Soil conservation was performed mainly through crop rotation and constructing bunds around fields. This was followed very carefully to obtain proper yields of the crops. Farmers rotated the crops in order to maintain soil fertility. Usually, the first harvest of the same crop was good and the second showed already decline in the yield. The rotation period took place annually according to the seasons of different crops. This happened by shifting between the parts of the plots and replacing one crop with another. Tables 3, 4 and 5 show the growing seasons of the typically cultivated crops. Annually, there were two harvests of the crops. Also, species variations affected the growing seasons, for instance, three or four month’s maize.

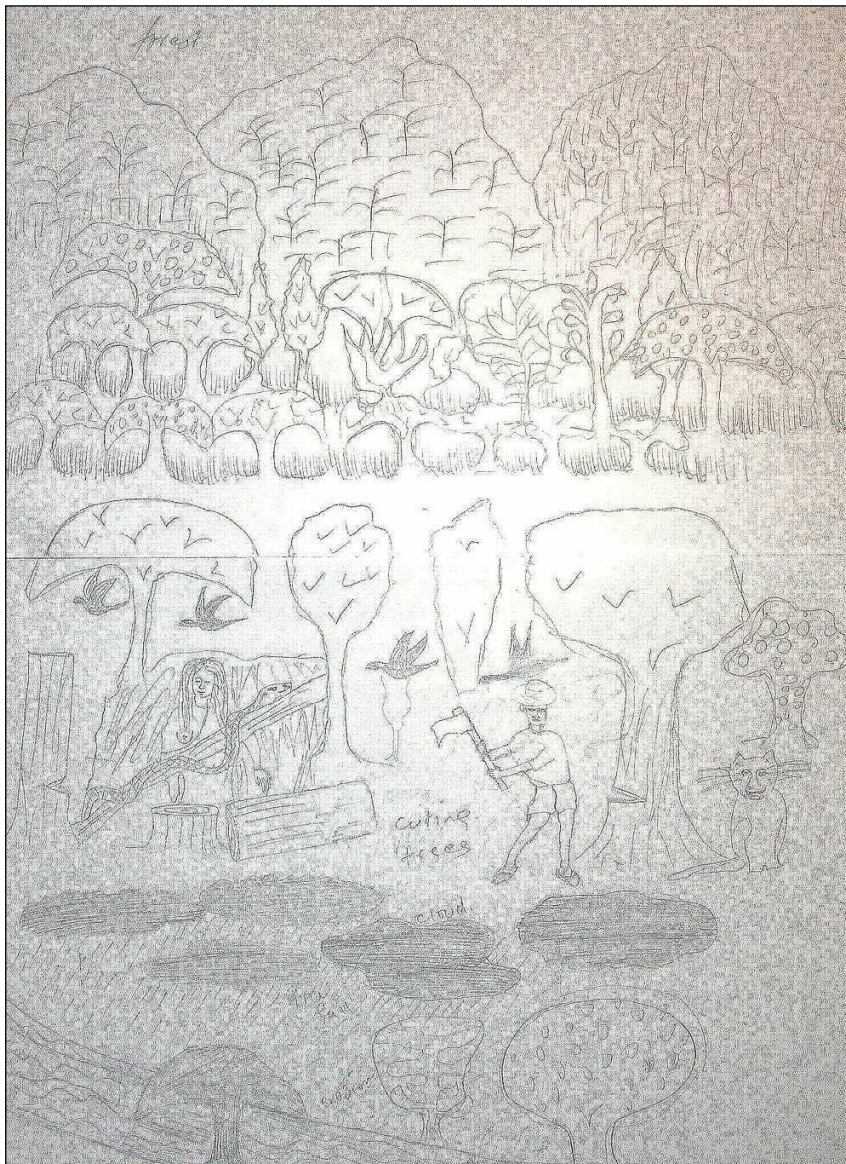
Soil fertility was maintained by preparing a mixture of dung and leaves that was ploughed into the soil. The external chemical fertilizer was not used. Furrow irrigation techniques were used in watering fields. In rainy seasons, flooding caused the most damages on fields and top soils were washed away. Reasons and possible mitigation measures were understood and even discussed with district agricultural offices, but action has not been taken until now.



## 6.2.2 Environmental impact of the irrigation scheme and environmental management

### Otore Harre

It was clearly understood that erosion happening at the upper slopes had impact on the lower areas. The villagers reported increasing needs of canal cleaning from the silt. The lower plains of the river basin had high amounts of aggregates and rocks coming down during the rainy seasons. This was due to the intensive collection of firewood and animal grazing at the higher hill slopes. This has a negative impact on canals and sometimes causes damages and extra work for the villagers. The upper slopes and forests around the communities are the property of the state or “everybody”. Deforestation, animal grazing and fuel wood collection were the main reasons for increased run-off waters and erosion. This also increased the maintenance frequency of irrigation ditches and canals. Reforestation was mainly practised just along the primary irrigation canals for the protection of earth works. The landholding policy of Ethiopia discourages people to engage in public action for environmental protection. Because of this, nobody was responsible for reforestation activities in order to reduce the erosion. Those causal reasons of the erosion were generally the most neglected environmental issues, even at national level. The local views of erosion occurring in the surrounding areas are drawn in the Figure 6.2.



**Figure 6.2** The local view of the reasons leading to high soil erosion at the hill slopes. Need for the fuel wood and housing construction leads to high loss of protective vegetation cover. (Picture by villagers.)

### Furuna

The high siltation rate and run-off waters from the slopes above the canal works had caused extra work, especially for men. During the previous year, they had to clean the canals for seven times with erosion as the mentioned reason. People need firewood and material for house construction. The issue had been discussed with the agricultural development office and more terracing with stones bunds and wood had been considered. Mitigation actions had been very minimal. People had tried to handle the effects of the problem instead of preventing causes of it. Reforestation and environmental protection measures were not practiced widely, although the need for and techniques of environmental protection were understood.

Flooding was also considered as a harmful environmental hazard. This could even destroy fields that were under cultivation for vegetables. The floods were mainly caused by the same reasons as the siltation, namely high run-off waters during the heavy rainfalls due to deforestation.

### Lower Bilate

During the project implementation, training for environmental protection measures was given. These activities included nursery for tree seedlings and agricultural techniques. Trees were planted along the primary canal to protect the structure and prevent soil erosion. The agricultural methods included planting and irrigation techniques. These practices are still used.

The change could be observed by comparing the areas situated just next to the irrigated land area and the surrounding non irrigated area. The irrigated area creates a green zone and supports life for both humans and livestock. Access to water made the area become a different agro-ecological type compared to the area without all year round irrigation. Local farmers identified climatic differences in the project affected areas. The cooler weather pattern could be experienced within the green zone having vegetation cover and several trees with evaporation and shade.

Good environmental practices had been noticed and continued. The benefits of the community forestry had encouraged villagers to approach the district agricultural office and the latter had provided tree seedlings for extended planting of trees. During the LWF project, different species such as Neem tree, Acacia, Jacaranda and several fruit trees such as Mango and Avocado, were planted. These fruit trees have already born fruit, four years after the project implementation.

### **6.2.3 Energy resources**

The primary energy source for cooking came from collected fuel wood. Women mentioned how they used to have improved models of cooking stoves but once they broke down, they did not repair them. Now, “three stone stoves” were used and energy saving models were abandoned. This had led to an increased demand for fuel wood and was one of the major causes of increased erosion at the upper slopes of the hills.

Alternative energy resources were electricity and bio-gas. Electricity is mainly produced by the hydropower stations. The communities that were located close to the main roads had easy access to the main electricity power lines that follow the main roads. Also, villages that were located close the larger factories or military bases had access to main electricity lines. Increasing number of houses were going to be connected to the grid.

Electricity was used for lighting and radios. Electric cookers were not found in the villages, although they were already available in the bigger market places.

Bio-gas potential exists due to the high number of livestock and agricultural residues *e.g.* sweet potato stem, but had not being introduced. Bio-gas technology projects exist and some have been introduced at least institutional level, like at technical colleges and cooperation projects. Promotion and test use at village level was not common. People having commercial plantations showed more interest in bio-gas technology.

Dried cow dung mixed with straws was used as cooking energy. This reduced the need for wood from the forest. On the other hand, lack of firewood forced people to utilize all available energy sources. Villagers also collected dry branches and agricultural residues. Straw residues from maize production were a source for animal feed and fuel wood.

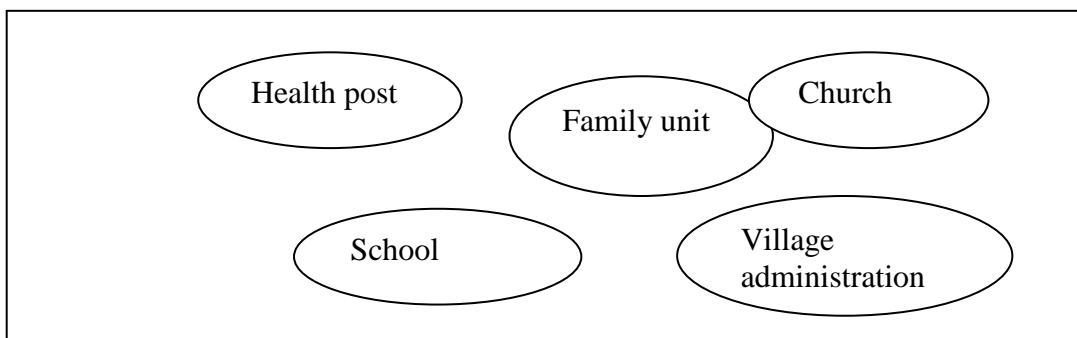
### 6.3 Social impacts of the SWCP

The social impacts were divided between education, health and gender perspectives. Education refers to the school attendance of the children of the main beneficiaries. Health aspects are seen as the main health problems occurring in the community and gender reflects to workload and tasks according to both sexes.

The social network forms the social services in the community. The villagers identified the following units in their social networks: school, health post, church and village administrative office as drawn in Figure 6.3. Table 6.6 outlines the most significant changes related to the social network that people are involved with.

These were very much the same local institutions which operate closely within the community. People benefit from their services. The most significant changes included drinking water and irrigation water developments. According to the villagers without water development schemes, other developments could not have been taken place. They did list them as a priority because they felt that the components of development contributing to changes were interrelated and enabled each other. Table 6.6 combines the changes that had been occurring and describes situations before and after the development had taken place by both men and women.

**Figure 6.3** Social network institutions of family unit in a community.



**Table 6.6** Most significant changes that have taken place in the Otores Harre community during the past 15 years.

<b>Change occurred</b>	Church	Health post	Village administration	School	<b>Irrigation scheme</b>	Drinking water / well
<b>Before the change</b>	Traditional witchcraft. Under fear and constant animal sacrifices.	No access to health services. Difficult to get healthcare e.g. for malaria. The help was searched at very late phase of disease, many times too late. Patients had to be carried to clinic.	No freedom of speech. Landlords ruled. Administration was far away.	Children as domestic labour.	Everything was “dry”. There was less population. Canals were not durable and needed reconstruction annually.	Time consuming work, girls and women had to go to fetch water. Water borne diseases common. Girls were scared to go for lonely trips to get water.
<b>After the change</b>	Spiritual reformation. Education through teaching e.g. home care, moral issues, family values, etc.	Children’s vaccination, safe motherhood, medicines, awareness e.g. for HIV.	Relationship between government and community. Villagers have official way to approach governmental offices.	Skills development. Can get higher education. Job and income possibilities. Awareness through education.	Nature changed. Food production. Impact also in animal health quality. More income. Physical and material well-being.	Better access to safe drinking water. Improved security for girls.

The most significant changes determined by both sexes separately indicate more clearly the impact of each change which has occurred during past 10 to 15 years. Men appreciated changes that occurred within the health sector, general village administration, education for children and access to irrigation water. Women saw changes more from a workload perspective. They saw things in practical manner, whereas men tended to be more administrative and pointed to more broad improvements, e.g. women talked about food and cooking whilst men mentioned better income. These changes were by the organizations working with them and represented *external factors* contributing to the ongoing developments.

The location of the Furana and Otores Harre was just a few kilometres from the towns and therefore most of their social activities such as higher education, health care and trading are based there. The Lower Bilate consisted mostly resettled people from the surrounding hills. There was also government-based programs that aimed to relocate even more people into the area. Construction work was going on for expanding the irrigation weirs to the new areas. A non-governmental organisation called *Concern* was contributing to the project.

Primarily, all the children went to school. It is obvious that education for children had become one of the main focuses for the families. The irrigation scheme was mainly helping

them to create more income and have the needed equipment for school, like clothing and materials. The Otore Harre community had contributed to the new school buildings by donating money. The responsibility of the Government was to provide teachers. There were several associations working in the community such as women, youth and farmers associations as well as cooperative funds.

### 6.3.1 Impact on gender and workload

#### Otore Harre

Easier access to water had particularly reduced women's workload and therefore increased "quality" of life. More time was used for family care and domestic work by saving time in activities such as fetching water, security and carrying heavy loads. The daily routine of men and women was examined separately (Table 6.7). The men tended to be the ones who look after fields and livestock, and women take care of the home environment including homestead gardens. Farming was the main livelihood and therefore accounts for the main activity undertaken by men. The maintenance of canals and soil conservation works belong to men.

**Table 6.7** Daily routines according to gender.

<b>Time</b>	<b>Women / girls</b>	<b>Men / boys</b>
4:00-6:00	Wake-up and make breakfast	
6:00-8:00	Take care children, homework	Wake-up, take breakfast
8:00-10:00	<b>Wash</b> clothes, gardening	<b>Field farming</b>
10:00-12:00	Cook lunch	Return from field
12:00-14:00	Clean home, grains to mill	Eat and rest
14:00-16:00	Collect wood	<b>Field farming</b>
16:00-18:00	Get drinking water	<b>Field farming, return</b>
18:00-20:00	Take care children, cooking	Free time, chatting
20:00-22:00	Supper	Supper

Because the water for washing and bathing was available at the home area, the times for trips to the water resources were not mentioned. Drinking water was drawn from the community water post and cost 0,10 BIRR (0,01 EUR) for a 20 litre bucket. Carrying water was typically daughters' task in the family.

#### Furuna

By having a gender based daily schedules for both sexes, the time used for irrigation and gardening was indicated. Men stated that their workload has increased very much since the irrigation scheme was implemented. This included cleaning canals from silt and the actual irrigation work in the fields. Still, they had to prepare and plough the soil, weed, and plant vegetable seeds. They emphasised that the benefits were greater than the all the work they needed to do. Their welfare depended on agricultural production.

Watering the vegetable gardens was the responsibility of both spouses, as seen in Table 6.8. Time needed at one time to irrigate the average size garden was about 4 to 6 hours. Depending on the vegetables, they needed to be watered once a week or twice a month. The fields were located in two places, in the home yards and in distant areas. Women worked more in the homestead gardens and men took care of the other farming, livestock and cereal crop fields.

**Table 6.8** Daily schedule for the farmers, men and women in Furuna area.

<b>Time</b>	<b>Men</b>	<b>Women</b>
6:00-7:00	Have breakfast.	Cook breakfast, clean the house.
7:00-8:00	Farming, cereals and livestock.	Send children to school, send husband to field/farming.
8:00-9:00		House cleaning, bath babies, wash dishes.
9:00-10:00		Laundry.
10:00-11:00		Prepare lunch.
11:00-12:00	Lunch.	Take lunch to fields.
12:00-21:00	<i>Vegetable farming, water distribution shifts/timing.</i>	Cleaning, washing, looking after children, <b>irrigate garden</b> , prepare dinner.
21:00-23:00	Dinner. Go to bed.	Dinner. Wash husband's legs, wash own legs. Go to bed.

### Lower Bilate

The irrigation development scheme had a direct impact on daily routines and tasks for the family members. Men did most of the fieldwork and women assisted as they had extra time from home duties, shown in Table 6.9. Access to the irrigated agriculture workload had increased crop production leading to several benefits like better nutrition and income. There were men and women included in the Community Organizing and Leadership Training for Action (COLTA) committee, having a total of 25 members of which 5 were females.

**Table 6.9** Daily task according to gender in a family of the Lower Bilate community.

<b>Time</b>	<b>Men</b>	<b>Women</b>
Morning 6:00-12:00	Go to field. Wife brings breakfast.	Make breakfast, take cattle out, take breakfast to field for husband, send children to school, and prepare lunch.
Afternoon 12:00-18:00	Take lunch. Continue fieldwork; ploughing, sowing, weeding, <i>watering</i> and harvesting.	Take care of children, laundry, breast-feed babies, bathing and prepare dinner.
Evening 18:00-23:00	Have dinner. Stay at homestead.	Milk cows, wash children's feet, preparations for next morning breakfast.

### **6.3.2 Impact on health**

Water and soil conservation had affected health issues indirectly by improving diet and hygiene due to better access to water. By empowering communities to have a 'self-help' attitude, they have contributed to building health posts in the Otores Harre and Lower Bilate communities.

Villagers contributed labour and building materials for the health post. The health officer was trained by the Lutheran World Federation (LWF) project and later the government covered the officer's salary. Health services provided were a follow-up of

pregnant women, children’s vaccination programmes, follow-up of malaria incidents (Figure 6.4) and improved hygiene levels through the implementation of latrines in every house. Malaria occurrence was constant throughout the year and high infection rates could be noted during the rainy months e.g. in November there were 10 to 15 cases per day in Lower Bilate villages. Stagnant waters in irrigated soils make good hatching medium for mosquito eggs and larvae.

የወጣ በስተ ጭንቅ በየወሩ መስተዳድር ታርቅ

ወር	1995 <sup>ግ/ም</sup>	1996 <sup>ግ/ም</sup>	1997 <sup>ግ/ም</sup>	1998 <sup>ግ/ም</sup>
ሰኔ	43	84	43	
ነሐሴ	75	28	38	
መስከረም	55	55	19	
ኅዳር	49	34	23	
ጥቅምት	117	69	51	
ታህሣሥ	53	78	48	
ግር	69	50	60	
የካቲት	61	52	11	
መጋቢት	63	36	21	
ሚያዝያ	66	21	11	
ግንቦት	70	21	12	
ሰኔ	136	57	19	

**Figure 6.4** Malaria occurrence in the Otores Harre community. The Ethiopian year 1995-97 equals the international calendar 2003-06 respectively. The left column labels the months beginning from July downwards. The malaria occurrence has decreased during past three years. Annual incidence pattern increases according to precipitation in rainy months. (Picture from the data poster at the Otores Harre health post.)

The health post buildings were constructed 11 years ago in the Otores Harre and in Lower Bilate two years ago. The buildings were not yet finished, lacking water pipe connection and medical equipment. Also, the health officer reported insufficient medicine supplies and materials for preventive health care such as mosquito nets. These social services were provided due to area having permanent settlers after the irrigation scheme was constructed.

### 6.3.3 Impact on education

The head master of the school claimed that the villagers had contributed to the two school buildings in the Otores Harre community's area. The last constructed building was recently finished and was awaiting for opening ceremony in 2005. The school was for the grade eight students. Every household had contributed to the building by donating 50 to 500 BIRR (5 to 50 EUR) according to the welfare of the family. Government policy was to provide teachers if the community provided the building. This development had taken place ten years after the water scheme was implemented. The school enrolment had been slightly increasing during past five years, and boys and girls attend in same number, about 520 each.

Ethiopian government policy states that education should be mandatory for every child at the lower primary school level. The Lower Bilate community had opened a lower primary school. They offered schooling for children from grades one to four. At a distance of seven kilometres, there was a higher primary school which offers education from grades five to eight. Parents needed to send their children to nearby towns for further education, including high school level (grades nine to twelve), vocational training, colleges and universities.

According to the home survey every child went to school except in some cases of children coming from very poor families. Those children were needed for the income generation activities of the family such as collecting firewood and looking after livestock.

Education for children was one of the major expenditure of the family. Parents invested on children's education and hoped that it will pay back later, after graduation and through a well paid job. They conformed this with several examples of people in the other communities and their in-laws' experiences. In Table 6.10 provides the present school attendance rates at the local school in Lower Bilate.

**Table 6.10** School attendance at the Lower Bilate primary school.

Grade	Boys	Girls	Total in grade
1.	74	41	115
2.	32	38	70
3.	51	28	79
4.	34	26	60
<b>Totals</b>	<b>191</b>	<b>133</b>	<b>324</b>

The villagers expressed the need to build a school offering provision from grades five to eight. Now, the nearest school for these grades is located 7 kilometres out from the village. Several families told their children to attend the school in spite of the distance. The government provided teachers for the grades one to four after the community contributed school building. This had taken place in all the project sites.

### 6.3.4 Impact on institutional development

The water committee were established to supervise and manage the irrigation schemes. The main duties were to look after water distribution and organize canal maintenance duties. Those looking after the distribution and timing of water users were called 'distributors'. They were selected people from different parts of the villages. A committee member served two to four years at a time, and then new members were trained for the task. One member of the Otores Harre water committee described the process of skill training for the new water committee members in following way:



*“When one rides on horse you can see if one riding knows how to do it. It is same with irrigation scheme.”*

The water committee continued functioning after the phasing out of the project and maintained its responsibilities including resolving possible conflict stemming from water distribution. Communities have local rules and regulations for the water use.

The latest site had a COLTA -committee established at the beginning of the project. The Community Organization Leadership Training for Action (COLTA) was the functioning body for the management of the community development issues during the implementation of the project and also after the handing over of the scheme. Also, the water committee was established with three duties: chairman, cashier and secretary, and community representatives. These committees were still working and fulfilling their tasks for the irrigation works of the command area. There were bylaws to guide the proper use of water and the distribution structure. In the Furuna community, the local peasant association (PA) delivered all of the information related to irrigation management.

### **6.3.5 Impact on technical skills development**

Technical skills included the maintenance and timing for the water distribution in the area of 600 hectares comprising the housing estates in Otore Harre. During the rainy months, heavy flooding damages occur. These increased the maintenance workload and people were looking for further advice. Upper slope environmental conservation practices were not applied and therefore much run-off water was causing soil erosion in the catchment area. This prompted the need to clean the canals more often annually, which was done by hand. In the Furuna area, a three kilometre long water canal required constant maintenance and management. Villagers explained how the increased erosion caused more soil to be deposited into the canal. During the heavy rains, the need for cleaning the canals had increased to eight times per year. The water committee and water distributors were selected by the community in order to supervise the timing for the distribution. The water committee has 15 members. They controlled the amount of water let into the command area. The irrigation works consist primary and secondary canals, which are maintained in an organized manner by the water committee and community. The silt removals from the canals are done twice a year in Lower Bilate. The tertiary canals were under the responsibility of each user. The amount of water in the canals was adjusted with the main gates of the weir. This had been taken care by the peasant association and two guards who were paid by the community 120 BIRR per month.

Soil conservation techniques such as field bunds and vegetation cover over the canal bands were practised. Soil nutrition conservation was maintained with the crop rotation practices. These practices were based on experiences of harvested yields of the crops. From the experience of villagers, for example, if planted twice the same crop in same place in a row, the lower yield was harvested at the second time. The skills for the crop rotation had been taught by fathers and elder brothers to the younger generation.

Furrow irrigation techniques were used for watering of the fields. Crop rotation was practices in order to maintain expected yields of particular crops. New varieties, like sweet apple, had been introduced to the villagers by the NGO working in the area. These seedlings were originally from Spain. The fruits were expected to be good cash crop. Several orchards had been planted and first fruits harvested. These were all new methods and plants required specific techniques in irrigation works and vegetable and fruit production. Further marketing and transportation systems should be introduced. Vegetables

were sold at the local market. Due to the high number of farmers cultivating the same products, prices fluctuate by season.

## 7. DISCUSSION

Concerns about the impact of development assistance are largely discussed topic. Generally, discussion focuses on the impacts at the community level to the impacts on the society as a whole (Hakkarainen and Onali, 2006). This impact assessment study remained at the community level, concentrating on how access to improved agricultural production had affected rural communities' living conditions. This discussion includes two main aspects: PIA as a method for impact assessment and, secondly, the results collected using PIA. As Jackson mentioned (1997), PIA enables communities to measure their gains or losses of the development projects on a cost-effective and action oriented bases. The same aspects were discovered in the case of the SWCP when community members started to define the impacts of the previous projects. They brought up issues like the labour force needed to keep irrigation schemes working, duties and hours used in actual duties and management for the whole system. Gender reflections brought up more gender and household related issues. Women, whose duty was fetching water, especially appreciated the value of time saved for family care and income generating possibilities. Institutional development was not directly mentioned, but was clearly observable as the capability of the community to maintain water-related issues such as distribution, timing, guarding and the maintenance of the large irrigation system.

PIA, by using participatory exercises, provided a more analytical structure to determine the different types of impacts. As a facilitator, or the one conducting study, it was quite easy to direct the discussion to certain topics. It was surprising to see the extent to which villagers were able to engage in detailed issues deep thinking. Using stones and branches, representing *e.g.* the changes occurred, increased the intensity of the discussion and analysing results during PIA sessions. Some PIA and PRA exercises are quite "Western" oriented although they exist in the rural livelihoods. Understanding the idea of "income" and purpose of earning money may vary in villagers' and researcher's thinking. Whereas people in the North talk about monthly salary meaning income, people in the South rely on products from the natural environment. The PIA process can be researcher-driven and therefore the settings for the exercises should focus on open-ended types of exercises or questions that leave more room for villagers to determine the whole question again and set the indicators in terms of both the qualitative or quantitative aspect. The Ministry for Foreign Affairs Development Cooperation (1999) guidelines emphasize that a scientific approach improves the quality of information but may not be justified because of time constraint or the nature of evaluation. The selection of appropriate methods for data collection and analysis affects the quality of the study. Defining how to choose a sample becomes essential; its size and nature determine whether it is representative or not. Also, sampling methods vary from a random sampling to a selection made by the evaluator.

Benefits of PIA included the methodology that involved villagers in the situation so that they were free to express their views. This became more evident when more time was spent within the particular community. In the beginning, they did not realize the meaning of asking questions and making people to do something in order to make evaluation on their livelihoods. After several days, they started to express how these kinds of discussions were useful for them so that they could analyse the issues in their own villages, livelihoods and future challenges. Jackson (1997) concluded that PIA is an integrated process of research, learning and action. Swantz (in Berlage and Stokke, 1992) pointed out that the

beneficiaries of the project became the main focus when using participatory methods in evaluation to incorporate missing components of the typical terms of reference for evaluation. Commonly, evaluations are designed in the interest of the implementing agent or the supporting organisation, added Swantz. In development cooperation, EIA processes public involvement, and the ethnic minorities and indigenous knowledge are typically neglected. Doberstein (2004) mentioned that EIA guidelines in the Son La hydro development scheme in Viet Nam were crucial in suggesting how biophysical aspects were to be carried out, but they were inefficient in determining the social impact and public involvement aspects. It was found also that when approval for the project had been given in advance of EIA studies, EIA will serve a limited role, mitigating only the worst impacts of the proposed project rather than fundamentally challenging the site, design or need for the project. In the case of Vietnamese hydropower site, the government started to relocate “the soon to be flooded” provincial capital of Lai Chau to Dien Bien, long in advance of formal approval or EIA studies.

In an article by O’Faircheallaigh (1999), similar experiences were reported of indigenous peoples participation in the SIA process. Reasons behind the lack of effective participation were financial reasons, poor access to technical information and lack of expertise needed for effective communication. Highly formalized and legalistic public hearings created problems during the SIA process. Also, rational and scientific approaches to impact assessment were far from value-neutral because they usually promote development agendas and deny the validity of perspectives and evidence put forward by the indigenous people. This has led to general cynicism towards SIA. SIA has been typically conducted as *ex ante* study for the project proposal approval process of large infrastructure development schemes. Therefore, SIA may ignore the cumulative and longer-term impacts. Severtson *et al.* (2002) found that the community was tired of being surveyed, resulting in low participation rate. Also, they were challenged by a lack of interest as a participatory assessment of environmental health perception required collaboration with community members to interpret survey results within the context of community norms. PIA is used in order to overcome these problems during the *ex post* evaluation and impact assessment.

The study found that geography creates inequalities, as also reported by Feeney (1998). Those people who were not living in the area where the primary irrigation scheme was located could not benefit from the water of its full potential, but were allowed to use water for any household purposes. Irrigation works have limits such as geographical location at the hill slopes ending to the river basin and facing upland. The available volume of water affects the capacity to meet extended agricultural demand.

PIA allows for the gathering of gender sensitive information. The results provided insight into how daily routines were arranged according to access to the irrigation water sources. This led to further information about other activities such as income generation opportunities, domestic works, and even more a sense of security due to a reduced need to go on long trips to remote areas. Women particularly valued this kind of outcome that had not even been included as an indicator for project progress or objective. The deep feelings and willingness of participating in development activities and historical reasons would not have been found out unless there had been a chance for free and open discussions in a focus group.

Also, focus group discussions helped to concentrate on specific issues like women’s health care, girls role in society and those techniques used in conservation that were especially defined by male farmers although women were involved in irrigation in the

home gardens. Men brought up more labour-related issues such as maintenance work and time needed for farming. An evaluation of the Dodota Water Supply Project in Ethiopia (SIDA Evaluation Report 1990/1) used participatory methods for qualitative information. Their findings showed that it was not enough to supply women with water, but that they should be involved in the project by taking part in construction, maintenance, and management. The report resulted in a number of recommendations that were put forth by the women themselves.

Seasonal calendars were useful tools to show agricultural patterns. Chambers (1993) stated that mapping and diagrams are useful for farmers to identify annual crop cycle and critical times of the seasons in terms of weather patterns. Chambers gave an example of how the farmers were able to recall the number of days of rainfall in each month for the previous five years in northern Ethiopia. The similar accuracy was met during this impact study while talking with the farmer groups.

The selection of three sites, representing different timescale since the projects were phased out, gave an indication of the stages that the communities went through after the end of the project. Improved access to water increased the degree of self-sufficiency in food supply. After a few years, villagers created all year round cultivation. Quite soon after this, more commercial thinking and income generating activities emerged. Selections of crops were made according to the best food crop for their own consumption and the best selling vegetables in the local market. The economic benefits were used for basic household needs. The priority seemed to be in education, health care, clothing and agricultural tools. During the next stage, three to five years after the project, villagers started to improve their housing quality. The new “tin-roof” houses were constructed. The houses were later improved with concrete flooring. The latest improvement was an electric connection that made lighting possible. The next phase will most probably be to buy consumer goods that include TVs, DVDs and other electronics. These were already available in the nearby towns.

The social services such as education and health facilities followed the water development schemes. In the beginning school buildings were constructed at the lower primary school level. Higher-level primary school was arranged later, two or three years after the project. If higher-grades were not available and students had to travel for long distances, the drop out rates were very high, estimated up to 70-80 per cent of enrolled students. Health care seemed to have low priority as far as the quality and participation in activities to improve the facilities were concerned. The villagers expected some project or government to assume a greater role in providing services for preventive health care, medicine supply and safe motherhood issues. Family planning and HIV/AIDS awareness materials were there. In terms of both social development issues, health and education, the government policy was to provide teachers or health worker if the community contributed to the infrastructure of the health post or school building.

Environmental degradation was mainly reported as a siltation of the irrigation canals and stones and aggregates in the fields. According to the villagers, the upper slopes of the surrounding hills were cleared due to animal grazing and fuel wood harvesting. During his fieldwork, Dejene used participant observation (1991), and discovered that soil erosion that was seen largely as a highland problem was also a problem of equal magnitude in the medium altitude and in some of the lowland zones. Barren hills of worn-out sandy soils and considerable stones were everywhere in the lowlands. Dejene’s research indicated the relationship between the two variables: soil fertility and soil erosion. This was concluded due to the decrease in yield and observed decrease in the amount of topsoil covering the

plough. Dejene (1991) studied conservation measures such as establishing a community forest. It was understood that the purpose of the community forest was for environmental reasons, meeting subsistence needs or a source of cash income. The community forests were the property of peasant associations, and villagers considered them as state property. Uncertainty about who would be able to utilize forest products led to the poor management of the community forests. According to Dejene's study, neither the presence of a community forest nor the existence of a tree-planting program in a peasant association made any difference in ameliorating the shortage of fuel wood. In this impact assessment study, the same phenomenon was discovered especially with the highland community (Furuna community). Dejene also found that substituting fuels were used when the wood became scarce, but not as a result of conservation purpose of the forests. Substitute fuel materials were dried cow dung mixed with straw and sugar cane straw. Small-scale tree planting activities were successful as they were meant to protect the irrigation canals and provide shadow in home yards. The relevance of soil and water conservation projects was evident because of the prolonged environmental deterioration and human poverty.

Water is the most needed element for humans, animals and nature. Improved access to water resources is a basic pre-requisite for human settlement and other development to take place. SWCP had been able to achieve these goals in Southern Ethiopia. Access to water and the needed skills to manage the irrigation schemes were essential for the sustainability of the development. Environmental development project like the SWCP had impact on environment, economic, social lives, as well as institutional and technical capacities. The main benefits of the SWCP had been food self-sufficiency and improved income-generating opportunities. Also, people have learnt methods to maintain and operate the irrigation scheme and soil conservation techniques. Other aspects like marketing, environmental protection and management still faced challenges that were more institutional development objectives than actual practical site management. For further development, continuous followed-up is needed to assess the needs in the present situation.

Several community-owned activities had been started since the SWCP was phased out. Villagers had contributed construction of school buildings, send their children to school, contributed health care facilities and had attended further training for agricultural production. For the needs that were common within the whole community, they were not able to take further. The needs that required specific investments were drinking water supply and medical services. Both of these issues required a management plan to keep the system functioning. It seemed that they were able to maintain the necessary facilities for the support their livelihoods, like irrigation system. It was too much for the villagers to address any need and take initiative for further improvement and outside assistance was sought for help. Or, they had just used to get some project to do this for them!

The negative impacts were mainly due to intensive use of natural resources in the areas around the communities. This would take place even more if there were not any development projects going on. Land ownership system did not support environmental conservation although national do policies exist. This kind of project environment would be the place to address environmental conservation issues and the roles of district and provincial offices to address environmental conservation issues and the roles of district and provincial offices to initiate actions according to national environmental policies. Also, migration to those areas where the resources are more available increases the degradation of the environment and limits the carrying capacity of the area for large populations.

## 8. CONCLUSION

Impact assessment is a challenging process that includes understanding of several aspects at the same time. The background of the society and political climate affect the willingness of the villagers to become 'self-help' driven communities. Also, a lack of resources and the proper use of these discourage development efforts. PIA helps in a research situation to approach the community in a more structured way and, at the same time, provides the opportunity for discussions to go in an unexpected direction. The open-ended questions let people express the matters that are important for them. PIA becomes useful when one knows why and what it is used for. People feel that their opinions and experiences are listened to and they also discover how one type of development scheme can make such a wide impact. PIA is very useful especially for organizations working in third world countries for gathering information in order to learn more about people's real lives and to improve their organizational performance. If the participatory approach is used from the beginning of the project cycle, impact assessment is easier to carry out due to the villagers being familiar with the evaluation methodology. In the project environment, the regularly use of participatory planning and evaluation, and later PIA, are empowering methods for the communities to encounter their needs, resources (human and natural) and results of achieved developments that have taken place. The findings and assessment results could be used for further development initiatives by the community itself.

The results directly reflect the villagers' point of view. Several stakeholders could also have their opinion about livelihood development in the rural context. Different sectoral offices such as health, education, rural development, agriculture and forestry, could provide more insight into the district and regional levels of development. The development policy and priority areas are determined by the local government offices. Usually, the government offices assume the role of approving and being the local official counterpart of the project or program. Their participation in the planning, implementation and monitoring of the objectives and activities is relatively minimal. It also depends on the development agency and its willingness to include the government bodies in the project more than what is required. The risks of corruption, favouritism, and nepotism are always there and, unfortunately, continue to be very much practiced nowadays. These are difficult to prove and even talk about. PIA raises issues and provides the opportunity to go deeper into the problematic matters' causes and effects. Once these causes and effects are discovered, it is easier to tackle the problem at hand by taking those actions needed to correct the situation. This already takes people to the second round of development process that they have to reach in order to continue on the road to the sustainable development.

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### **People met during the research**

Otore Harre, Arba Minch Zuria. Duration of the fieldwork 19-31.10.2005. People met during the survey:

Translator: Lukas Hure, EECMY, Arba Minch

19.10. Village contactor, Mr. Tadesse

Group of 4 water committee members

Group of 4 village elders

20.10. Group of men and women

21.10. School head master

2 house visits

Group of women

22.10. Young farmer

24.10. Health officer

Group of women

25.10. Group of 11 village elders

Group of 5 women

Government NGO planning and evaluation officer

27.10. EECMY Rev. Ketema Kamile

28.10. 4 house visits

Group of 8 village elders

29.10. Group of 5 women

31.10. Previous staff member, Mr. Tesfaye Noko.

Furuna, Adaba. Duration of the fieldwork 23.11.-1.12.2005. People met during the survey:

Translator: Negash Urge, Irrigation engineer, Adaba Agricultural Development Office

- 23.11. Group of 3 men.
- 24.11. Group of 12 farmers, 1 woman.  
6 home visits.
- 25.11. Group of 5 men.
- 28.11. Group of 5men
- 29.11. 3 home visits.
- 30.11. Group of 9 women.  
3 home visits.
- 1.12. District administrative officer.  
6 home visits.
- 10.12. Peasant Association member.

Lower Bilate, Damot Woide. Duration of the fieldwork 5.12.-9.12.2005. People met during the survey:

Translator: Hailemichael Dagne, Planning Officer, South SWCP, Shashemene

- 5.12. Animator.
- 6.12. COLTA committee, 7 men, 5 women. 2 other women.  
4 home visits.
- 7.12. Health officer.  
Group of 7 farmers.  
5 home visits.
- 8.12. Group of 10 women.  
6 home visits.
- 9.12. South SWCP officer.

HOUSEHOLD AND STAKEHOLDER QUESTIONNAIRE -framework for topics

-IMPACT ASSESSMENT OF THE SWCP

**Gography and ethnicity**

Geographical location

1. Region
2. District
3. Village

Location & access

4. Type of agroecological zone
  - highland >2000m
  - medium altitude 1500-2500
  - low land <1500m
5. Distance from all-weather road
6. Distance from the nearest clinic
7. Distance from the nearest school
8. Distance from the nearest market

Background of the household / community

9. Religion
10. Ethnic origin
  - Amhare
  - Tigrie
  - Oromo
  - Other

**Family/Household welfare survey**

11. married / single / widow /orphan
12. No. of children
13. No. of members of the household and their relation and age
14. From where did you come to settle here
  - was born here
  - migrated from \_\_\_\_\_
  - relief center
  - other \_\_\_\_\_
15. How long have you been living in the area/village?
16. Do you own land
  - No
  - Yes, area (ha), what type of land; forest, agricultural soil, pasture, other \_\_\_\_\_

17. What livestock do you have?

- Oxen
- Cow
- Goat
- Poultry

18. Housing type

- Monson (hut)
- House (new style)
  - Yes, how many, rooms \_\_\_\_\_
- other \_\_\_\_\_

19. Position in the community

- village leader
- peasant
- member of any committee, what \_\_\_\_\_

20. Education?

- Primary school
- High school
- Literate
- Illiterate
- Vocational training

21. Main source of income, annual income: how much?

- agricultural production, what crops?      Cash crop; banana,maize
- livestock, what?      Oxen used in agriculture, plowing
- labor, where?      Banana plantation, based on contract
- other \_\_\_\_\_

22. Main expenditures?

23. Household appliances and machinery:

- radio \_\_\_\_\_
- TV \_\_\_\_\_
- bicycle \_\_\_\_\_
- motorbike \_\_\_\_\_
- tools \_\_\_\_\_
- tractor, car, lorry, bus
- other \_\_\_\_\_

Development assistance

24. How the SWCP has helped in improving your living condition?  
 25. How many years have you been using?  
 26. Did you participate SWCP?  
 -No  
 -Yes, What: trainee, canal construction FFW (Foof For Work)  
 27. What type of skills did you learn/training did you get?  
 28. Have you had access to credit fund or loan or e.g. seed bank?  
 -No  
 -Yes, -if Yes, what purpose did you take the loan for?

Research objective	Impact or evaluation	Question	Means of verification	Source of verification	Notes
Goals <i>Overall goal.</i>	The goals stated in the project plan	What are the main goals of the programme?	Project documents.	Project plan / documents.	
Stakeholders <i>People, groups, institutions involved.</i>	List of stakeholders.	Who are the stakeholders of the project?	Stakeholder analysis, matrix.	Project staff, project plan.	
Relevance <i>Does the undertaking make sense? LFA used?</i>	Project approach vs. goals, <b>local priorities</b> and development policy.	Do the selected approach (IRDP) contribute the goals?	Discussion.	Project staff, stakeholders, focus group; farmers, women.	LFA = Logical framework approach IRDP = Integrated rural development programme
Coherence <i>How the objectives correlate the needs of beneficiaries? LFA used?</i>	Development objectives vs. poverty reduction.	How do the project objectives contribute the poverty reduction?	Observation. Discussion questions. Reports.	Randomly selected families. Stakeholders: Agriculture office, PCR	PRC = Project completion report
Participation <i>Who determines the development objectives?</i>	Local participation in setting objectives. Initiators.	How the local stakeholders, beneficiaries were involved in the planning stage?	Discussion.	Staff, Village committee members, Stakeholders	

Effectiveness <i>Achieved objectives</i>	Extent the objectives have been achieved, implementation.	What extent the immediate objects have been achieved?	Project documents. Observation. Discussion.	Reports, PCR Village activities	
<b>Impact</b> <i>Changes brought by project.</i>	Changes occurred due to project inputs.	What has happened as consequence of the project?	Transect walk. Observation. Discussion. Participatory mapping, etc.	Project site profile.  Focus groups, stakeholders.	
	Social Impacts -education -health -gender	How does the project affect -on <b>education</b> <i>School attendance girls &amp; boys, enrolment rate? What education is available in the village area? Kindergarten, primary classes? Vocational training? High school? School buildings? Non-formal education, literacy classes? Literacy rate?</i>	Discussion. Village school data.	Teachers. Villagers.	
		-on <b>health</b> services, <i>Have your access to health services improved? Distance? Child mortality, age 1-5? How many children, any died? Safe motherhood? Contraception?</i>	Discussion. Health post data.	Health center. Women.	
		-on <b>gender</b> <i>How does the project affect to your workload? Women's development activities? Security.</i>	Discussion. Daily duties chart gender-wise. Observation.	Focus group, men, women.	
		-on <b>democracy</b> <i>Decision making at village level Have the both sexes represented in the decision making process? Voices hearth, how?</i>	Discussion. Describe the process. Attendance in committees (gender).	Focus group; men, women.	

		<p><b>-on social institution development</b>  <i>Have you established any new group due to development activities? What? Capacity building?</i></p>	Discussion.	<p>Focus group.          Farmers.          Women.          Teachers.          Development committees.          Women's groups.</p>	
		<p><b>-on migration</b>  <i>Are people moving in or out from the area/community? Where, cities, abroad? Why?</i></p>	Home survey.	Households.	
	Economical impact	<p><b>How does the project affect -on economy</b>  <i>Who holds the purse? Has the project helped you generate income? How?</i></p>	Discussion, Observation, Home survey.	Families. Women.	
		<p><b>-on welfare</b>  <i>Food security, have you food throughout year? Surplus? Home garden/field production or from market? Housing, type of house? Level of standard of living at the local scale? Employment; Where do you work, field, home, outside the community?</i></p>	<p>Discussion          House type as an indicator for welfare.          Transect walk, Photos, Participatory mapping, transect of the village and zones of irrigation and welfare levels.</p>	<p>Women.          Men.          Poor in community.          Rich in community.</p>	
		<p><b>-ownership</b>  <i>Landholding? How many hectares (ha)? Have you bought more land? What home appliances do you own? TV, radio, motorbike, Livestock, what?. What do you usually spend money for?</i></p>	Discussion, Questionnaire -included in questions 11-31.	<p>Households,          Focus group          -well-off          -poor.          Disadvantage groups;          orphan,          disabled,          widow.</p>	

**Appendix 1**

	<p>Environmental impact -positive and negative impacts</p>	<p>How does the project affect -on soil/land <i>What soil conservation methods are used?</i> <i>What changes have you observed in the soil structure, quality, during past years?</i> <i>Do you know the effect of the particular use/cultivation of plant?</i> <i>Have you increased the area of agricultural soils?</i> <i>Cutting fuel wood?</i> <i>Shifting cultivation, is it practiced?</i> <i>Burning the weeds?</i> <i>IPM?</i> <i>Crop rotation, explain?</i> <i>Composting?</i></p>	<p>Discussion. Observation. Transect walk. Seasonal calendar.</p>	<p>Focus group. Farmer. Women. Children.  Fields. Environment.</p>	
		<p>-on water Have you got access to safe drinking water, bathing, irrigation water? <i>Distance to water source, what kind (pond, well, stream, river?</i> <i>Type of pump?</i></p>	<p>Discussion. Flow diagram.</p>	<p>Farmers, women.</p>	
		<p>-on air <i>Dust, smoke in the air? Air quality?</i> <i>Respiratory diseases?</i> <i>Asthma? Coughing?</i></p>			
		<p>-on energy resources <i>What is the main source of energy?</i> <i>Efficiency, burners, cookers?</i></p>	<p>Observation.</p>		



**Appendix 1**

		<p><b>-on flora</b>  <i>Have the number of species changed?          What direction?          Any conservation practices?          Any new species introduced?          Natural species?          Indigenous knowledge of species, if any? For what use, medical, herbs, tools, handicraft?</i></p>	Discussion.	Focus groups.	
		<p><b>-on fauna</b>  <i>Species appearance, increasing, decreasing?          Any conservation practices?          Any new species introduced?          Indigenous knowledge of species, if any?</i></p>			
	<p><b>Policy development</b>  <i>-Do the good practices become the guidelines for the aerial management policy?</i></p>	<p><b>-institutional development</b>  <i>Environmental management, offices, groups?          How the environmental issues are managed?          Capacity building, what topics, how, skills?</i></p>	Discussion.	<p>Village leaders.          Villagers.          District Offices.          PA.          Committees.</p>	<p>PA =          Peasant association</p>
		<p><b>-latrines, waste management</b></p>			
<p><b>Programme management</b></p>	<p><b>Management system</b></p>	<p><b>How the project management has been arranged?</b>  <i>No. of local staff          No. of expats          Management at village level?          Reporting? Who, when?          Monitoring?          Evaluation?          Reviews?          Meetings with beneficiaries?</i></p>		<p>Project staff.</p>	

**Appendix 1**

	<p>PMS for impact assessment.</p> <p><b>Project Monitoring System</b></p> <p>Learning organization?</p>	<p>PMS support the impact assessment?</p> <p><i>Monitoring, by whom?</i></p> <p><i>Documentation?</i></p> <p><i>Reporting?</i></p> <p><i>Staff relations</i></p> <p><i>-hierarchical</i></p> <p><i>-flexible</i></p> <p><i>Practical arrangements?</i></p> <p><i>-accommodation</i></p> <p><i>-transportation</i></p> <p><i>-meetings, how they were arranged</i></p>	<p>Observation.</p> <p>Discussion.</p>	<p>Project environment,</p> <p>Project staff.</p>	
<p><b>Efficiency</b></p> <p><i>How the inputs, human and material resources, have been converted into outputs.</i></p>	<p>Budget</p> <p>Costs</p> <p>Timetables</p> <p>Appropriate technology</p>	<p>Have the cost-benefit analyzes been carried out?</p> <p>Justification for the selected operations?</p>	<p>Discussion.</p> <p>Project documents.</p> <p>Observation.</p>	<p>Project staff.</p>	
	<p>Available information on inputs and how they compare with what is known of outputs</p>	<p>How the investment correlate with production and other development followed by?</p>	<p>Previous studies, feasibility study.</p>	<p>Project documents, overall impact related to inputs.</p>	
<p><b>Sustainability</b></p>	<p>Do the efforts continue after outside aid has come to an end?</p>	<p>How recipient countries own resources and know-how is utilized?</p>	<p>Observation.</p> <p>Discussion.</p>	<p>Community.</p> <p>Stakeholders.</p>	
	<p>Covering the operational and maintenance costs.</p>	<p>How the finances are ensured for the costs of operation and maintenance?</p> <p><i>Management system in the villages/district?</i></p>	<p>Discussion.</p>	<p>Village development committees.</p> <p>Stakeholders.</p>	
<p><b>Project management</b></p>	<p>Project management system</p>	<p>Project hierarchy,</p> <p>Staff dynamics</p>	<p>Management chart.</p>	<p>Project staff.</p>	

**Appendix 1**

		Field work <i>How the planning, implementation, monitoring and have been carried out?</i> <i>MS in villages?</i> <i>ToT, VDCs?</i>			
		Monitoring, Follow-up <i>Project follow-up, Who did?</i>			
	Project cycle <i>Initiation</i> <i>Planning</i> <i>Implementation</i> <i>Monitoring</i> <i>Multiplication?</i>	How the local participation is ensured in all the stages of the cycle?	Discussion.	Project staff, Stakeholders,	
	Ownership	How the ownership is transferred to local stakeholders?	Discussion.	Project staff. Stakeholders.	
	Conflict management	What is the feedback process in the local organization?	Observation, discussion.	Staff.	
	Organizational learning <i>-Involvement in communication</i>	How does organization communicate? Different levels of the organization: Project offices; district, headquarters, beneficiaries.	Observation. Discussion. Open ended questions; <i>How do you get feedback of the project achievement and opinions about current activities?</i>	Staff.	

**Appendix 2** Household welfare survey of Furuna river diversion community.

	marital status	no. of children boys/ /girls	members in household	years in the community	land holding		house type	member of water committee	education of the family  school attendance parents / children	main source of income	money used for:  <b>yes</b> = food education clothing health	livestock:  oxen, cow, goat, donkey, horse	household appliances	used credit fund
					irrigated house garden	cereal crop field (ha)								
1	widow	3 / 1	5	30	yes	2.5	hut	no	not / yes	cereal crop	yes	none	none	not taken
2	elder couple	2 / 2	6	40	yes	0.25	hut	no	not	vegetables	n/a	none	none	not taken
3	younger family	3 / 3	8	20	yes	0.5	hut	yes	yes / yes	cereal crop	yes	2, 1, 0, 0, 0	radio, furniture	yes
4	family	1 / 6	9	10	yes	0.5	hut	no	adult educ. / yes	vegetables	yes	n/a	none	not taken
5	family	1 / 0	3	10	yes	1	hut	no	yes / yes	cereal crop	yes	0, 3, 0, 0, 0	radio	n/a
6	elder couple	4 / 2	10	50	yes	4	hut	no	yes / yes	cereal crop, vegetables	yes, land rent, livestock	n/a	radio, furniture	yes
7	family	2 / 2	7	20	yes	2	steel roof	yes	yes / yes	cereal, vegetables	yes	4, 3, 10, 3, 0	radio, bicycle	not taken
8	family	4 / 3	10	20	yes	0.5	steel roof	yes	yes / yes	cereal crop, vegetables, tailoring	yes	2, 5, 4, 2, 2	radio, bicycle	not taken
9	family	5 / 2	10	30	yes	3	steel roof	no	adult educ. / yes	cereal crop	yes, grass for livestock	5, 4, 10, 4, 0	radio, bicycle	not taken
10	family	0 / 3	7	7	yes	2	hut	yes	yes / yes	vegetables	yes	2, 1, 2, 2, 0	radio	not taken
11	family	1 / 1	6	30	yes	2	hut	no	yes / yes	cereal crop, vegetables	yes, livestock	4, 0, 0, 0, 0	radio	not taken
12	family	0 / 3	6	30	yes	1	steel roof	no	yes / yes	vegetables	yes, housing	4, 4, 4, 1, 2	radio, furniture	not taken
13	family	1 / 2	5	30	no	n/a	hut	no	adult educ. / yes	cereal crop, livestock	yes	3, 2, 5, 1, 0	none	not taken
14	widow	2 / 1	4	30	yes	1	hut	no	adult educ. / yes	pottery, cereal crop	yes	0, 4, 0, 1, 0	none	yes
15	widow	1 / 4	6	30	yes	3	hut	no	no / yes	cereal crop	yes	1, 0, 0, 0, 0	none	yes
16	family	3 / 3	8	30	yes	3	steel roof	no	no / yes	cereal crop	yes, housing	0, 2, 0, 0, 0	none	not taken
17	family	3 / 4	9	30	yes	3	hut	no	no / yes	cereal crop	yes	3, 2, 3, 1, 0	radio	yes
18	family	5 / 3	10	30	no	3	hut	no	no / yes	cereal crop	yes, land rent	4, 2, 0, 2, 1	none	yes

**Appendix 3 Household welfare survey of Lower Bilate river diversion community.**

	marital status	no. of children boys / girls	members in household	years in the community	land holding		house type: -iron sheet, -grass roof, -hut	member of water committee or COLTA or water distributor	education of the family school attendance parents children /	main source of income	money used for: <b>yes</b> = food education clothing health land tax	livestock: = oxen, cow, donkey, horse	bought household appliances (except cooking pans and pots)	used credit fund
					irrigated house garden	crop field (ha)								
1	family	2 / 4	8	4	yes	0.5	iron sheet	not	yes / yes	agriculture	yes, livestock	2, 1, 0, 0	radio	not
2	family	4 / 4	10	4	yes	none	grass roof	not	not / yes	agriculture	yes	0, 1, 0, 0	none	not
3	family	7 / 3	13	4	yes	0.5	grass roof	not	husband yes / yes	agriculture	yes	none	radio	not
4	widow woman	3 / 2	6	8	yes	0.5	hut	not	not / 2 yes	agriculture	yes	2, 1, 0, 0	none	not
5	family	4 / 3	9	9	yes	1	hut	COLTA	not / yes	agriculture, livestock	yes, livestock	5, 3, 1, 0	bicycle	not
6	family	3 / 2	7	8	yes	0.5	hut	not	not / yes	agriculture	yes	2, 0, 0, 0	none	not
7	family	4 / 1	7	8	yes	1	grass roof	COLTA, distributor	yes / yes	agriculture, livestock	yes, livestock, land renting	2, 3, 10 calves	radio	not
8	family	1 / 0	4	8	yes	0.5	grass roof	PA security	yes / yes	agriculture, livestock	yes, livestock	2, 1, 0, 0	none	not
9	family	6 / 4	12	6	yes	1.5	iron sheet	not	not / yes	agriculture, livestock	yes, livestock	3, 6, 0, 0	radio/tape, bicycle	not
10	family	3 / 3	8	8	yes	1	grass roof	distributor	yes / yes	agriculture, livestock	yes	3, 6, 0, 0	radio	not
11	family	1 / 3	8	6	yes	1	grass roof	COLTA	husband yes / yes	agriculture	yes, livestock	2, 1, 1, 0	none	not
12	family (2 wives)	4 / 1	7	13	yes	0.5	iron sheet	not	not / yes	agriculture, livestock	yes, house, livestock	4, 5, 1, 0	agri tools	not
13	family disabled	2 / 1	5	4	none	none	grass roof	not	not / yes	labour, firewood sales, petty trading	yes	none	none	not
14	widow woman	3 / 1	5	4	yes	0.5	grass roof	not	not / not	labour, firewood sales, petty trading	food	none	none	not
15	family	5 / 3	14	4	yes	1.5	grass roof	COLTA	yes, higher educ.	yes, yes, agriculture, livestock	yes	1, 2, 6 calves	radio, bicycle, TV, other house	not