ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

NGOs NATURAL RESOURCES MANAGEMENT TECHNOLOGIES: THEIR ADOPTION BY FARMERS WITH EVIDENCE FROM KINDO KOISHA AREA, SOUTHERN ETHIOPIA

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BY

GINJO GIYA TAKKA

JUNE, 2000

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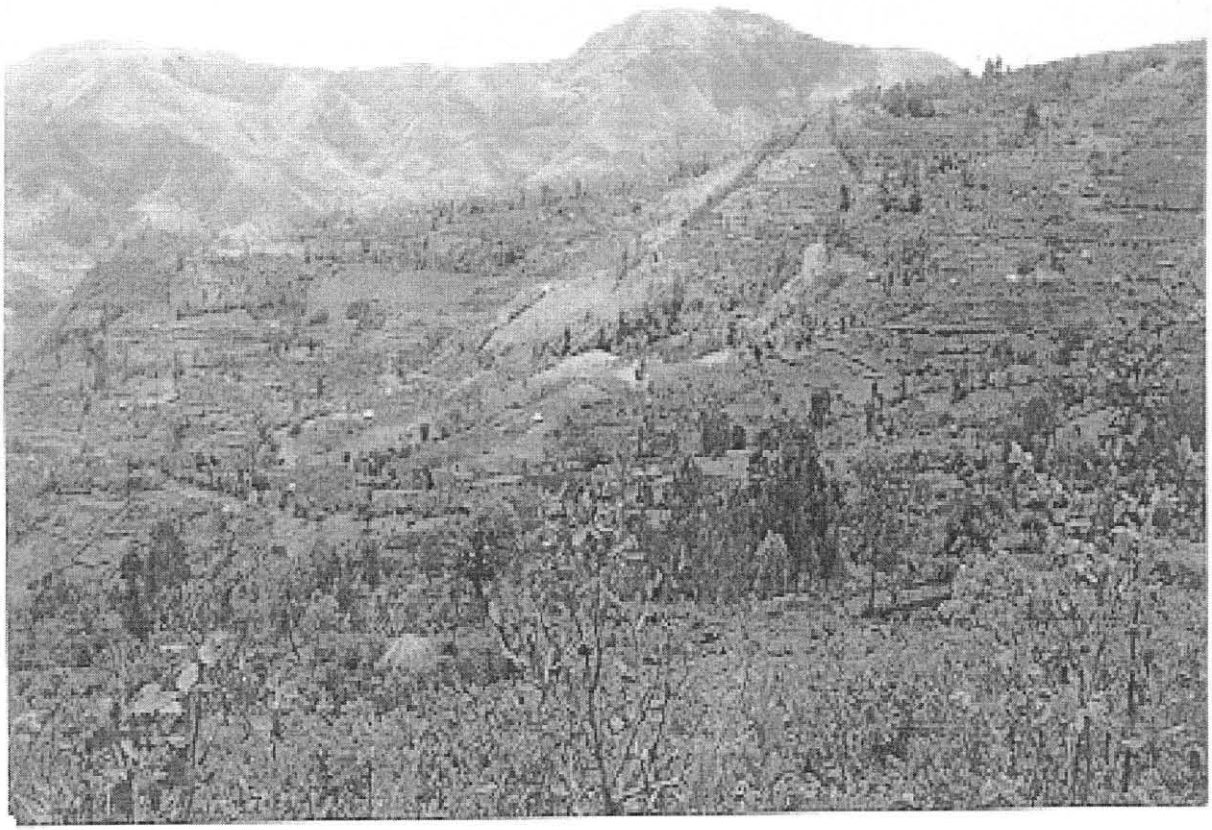

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By

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ACRONYMS

BoA	Bureau of Agriculture
BoPED	Bureau of Planning and Economic Development
CBOs	Community Based Organizations
CSA	Central Statistical Authority
CSE	Conservation Strategy of Ethiopia
CFW	Cash for Work
CRDA	Christian Relief and Development Association
DPPC	Disaster Prevention and Preparedness Commission
EHLRS	Ethiopian Highlands Reclamation Study
EBSNP	Employment Based Safety Net Program
EFAP	Ethiopian Forestry Action Program
EGS	Employment Generation Schemes
EPA	Environmental Protection Authority
ERO	Ethiopian Research Organization
FAO	Food and Agricultural Organization
FFW	Food for Work
GOs	Government Organizations
GTZ	German Technical Co-operation
HHs	Households
IDR	Institute of Development Research
IAR	Institute of Agricultural Research
IUCN	International Union for the Conservation of Nature and Natural Resources
IWSM	Integrated Watershed Management
LRM	Local Resources Management
KRDP	Koisha Rural Development Project
MOA	Ministry of Agriculture
MOJ	Ministry of Justice
NGOs	Non - Governmental Organizations

NRM	Natural Resources Management
PA	Peasant Association
PLUP	Participatory Land Use Planning
RCS	Regional Conservation Strategy
RECC	Regional Environmental Co-ordinating Committee
RRA	Rapid Rural Appraisal
RRC	Relief and Rehabilitation Commission
SAP	Structural Adjustment Program
SCRP	Soil Conservation Research Project
SNNPR	Southern Nations, Nationalities and Peoples' Region
SOS	'Save Our Soils'
SSA	Sub-Sahara Africa
SWC	Soil and Water Conservation
SWCS	Soil and Water Conservation Society
UNDP	United Nations Development Program
WADU	Wolaita Agricultural Development Unit
WOA	Wereda Office of Agriculture
ZDoPED	Zonal Department of Planning and Economic Development

ABSTRACT

NGOs have considerable experience in promoting and disseminating NRM technologies throughout the world. In line with this, since the 1984/85 Sahelian drought, NGOs have introduced various NRM technologies to rehabilitate renewable natural resources in different rural areas of Ethiopia. SOS ('Save Our Soils') Sahel /UK international is one of such environmental NGOs in Ethiopia. The major objective of this paper was to examine whether farmers in the study area have adopted the SOS-Sahel initiated NRM technologies and some socio-economic and institutional factors affecting the adoption and sustainability issue. The study was based on the survey of 92 randomly selected HH heads from Kindo Koisha Wereda and other institutional data sources from project, local, regional and federal offices concerned with environment and NRM. The study has employed both descriptive and qualitative analysis as methodological tools.

The findings have shown that both the structural and agronomic NRM technologies were introduced by the project. From among agronomic measures (multipurpose grasses and shade trees) and from structural measures soil bund were well adopted. For instance, the adoption level of technologies shows that out of the total farmers more than 93% adopted soil bund, 58% adopted grass strips and 50 % adopted shade trees. Training, labour availability, participation and access to hand tools were found to be highly affecting the adoption process in the study area. In fact, as compared to previous government intervention in the area the adoption is better due to improved participation (during implementation), favorable attitude of community towards the technologies introduced, better awareness creation and technical back-up services.

Although the SOS-Sahel introduced NRM technology is highly accepted in the study area its widespread replication and sustainability seems requiring additional technical and material assistant. In fact, about 78.6 % of respondents covered in this survey showed interest to continue the intervention. However, some of them put material and technical pre-conditions to undertake conservation measures in a sustained manner. Hence, addressing socio-economic and institutional arrangement such as additional training, access to hand tools, creating means for off-farm income sources, strengthening conservation work groups, improving basic social infrastructures like water supply, health facilities for human and animal and introducing agro-forestry and fuel wood saving mechanisms is necessary. In general the paper concludes by highlighting that SOS-Sahel /KRDP should design and implement a sound socio-economic and institutional NRM package arrangements in addition to technical feasibility to ensure the sustainability of the NRM interventions. Finally, NGOs efforts to mange natural resources should be encouraged through clear sector/actor-NRM Policy/ strategy and its subsequent implementation procedure which might be designed by Federal Environmental Protection Authority or government bodies concerned with NRM in SNNPR to ensure the lasting benefit from such NGOs intervention.

CHAPTER ONE

I.INTRODUCTION

1.1. Background of the problem

Ethiopia is one of the present world's poorest socio-economies that has been undergoing a serious crisis of continuing environmental resource degradation and poverty. In recent decades, particularly after the 1950s, there is found to be an increasing trend of degradation of local natural resources such as of farm land, soil and water resources, forest and forage in the country. There is a high and direct linkage between the most basic needs of man such as food, shelter and natural resources in poorly developed developing countries (Mitchel 1991).

Agriculture remains the chief *riason d'etre for* the sustenance of life for the vast majority of the people in Ethiopia. In fact, the primary purpose of agriculture is to provide an adequate, sustained food and raw material supply for the population. It is therefore the foundation of the social system and the space economy. The basic setting for agricultural production is the natural resources base. That means, the two systems (natural and social-economic systems) are both interrelated together in a complex and dynamic way. The latter evolved through time and space, essentially on the foundation base of natural resources with progressive contribution of human labour (mental and physical) process and its out-fit of knowledge, technology and institutional organisation. Although the physical world is parsimonious enough for directly fulfilling the needs and wants of man except at a very primitive and rudimentary physical survival (as resource gathering from the bush) level, and therefore it has to be punctured and used in several ways by human interference, for better and more productive sustenance, support and progress. Thus human interference with the physical world and its process is rather

essential. However, this interference has increased over-time in both scale and magnitude and has started affecting not only at the micro-scales of resource and process component, but also at the mega and macro scales of nature. This has been happening without adequate adaptational measures in socio-econmically and knowledge and technology poor-developing countries. Ethiopioa is one of them, with multiple degradational processes creating a series of crises. As such the constancy and sustainability of natural resource base, the physical environment and ecology and processes need be managed to remain uninterfered at least on a macro-scale for the human ecology sustenance and progress. Despite recently introduced but poorly structured and committed multi-faceted government initiatives through afforestation, terracing, water harvesting and area closure for conservation of basic renewable natural resources in the country for more than two decades there has been as yet limited success (Wood, 1990). This is partly because of lack of effective participation of people who are in a way directly and indirectly, partly responsible for such degradation, and resource 'mining'. These people who have been suffering because of these, and also many externalities all in a way pressurising them to degrade natural resources. In some cases in order to make their physical survival possible local people in Ethiopia are also less aware of the impacts and consequences of their activities which lead to a process of degrading natural resources.

However, the severity of the problem now requires and rather demands very committed and aggressively active partnership of the state, other development actors like Non Governmental Organisations (NGOs), farmers and the community at large. NGOs can particularly play a leading role at least at a limited local level by encouraging and assisting local initiatives (indigenous knowledge and technologies) in natural resources management. This does not mean by any means that NGOs can replace the state, but they can complement by encouraging

farmers' initiatives if they perform well. The term NGO hereafter used in the paper, is an ambiguous term that is widely used to refer to a variety of non-profit voluntary organisations working among the people at different scales of operation.

In the Ethiopian context NGOs are classified on the basis of their core objective as to whether they are institutionalised basically and essentially as development agents or relief-oriented actors, or they constituted to combine both functions. Development oriented NGOs are involved in diverse areas of natural and human resources development, agriculture, health and infrastructures etc., while the others focus on relief-oriented activities (National Policy on Disaster Preparedness and Management, 1993). However, in this paper NGOs are defined as those organisations other than government bodies that undertake long-term development activities. In Ethiopia today there are a large number of NGOs. Out of these, some of the indigenous and international NGOs are involved in natural resource management/ rehabilitation activities under the existing socio-economic and institutional conditions. North Omo Zone in Southern Ethiopia is one of the typical areas in the country where both international and indigenous NGOs are involved in functional area of local natural resources management. For instance, SOS ('Save Our Soils') Sahel, a British - based NGO specialising in agriculture and natural resources management in Kindo Koisha wereda of North Omo Zone is one among the environmental NGOs in Ethiopia. SOS-Sahel works in five major components (interventions): these include agronomy, soil and water conservation, livestock development, womens' development, and community development. SOS Sahel's involvement in natural resources management in the study area began in 1992, following the recognition of soil erosion by farmers as well as experts, as a major threat to agricultural production in the

Wereda. The natural resources management activities are particularly focusing on soil, water and forest resources management/ conservation.

In Ethiopia since the 1984 / 85 famine, a number of NGOs started working to rehabilitate / conserve natural resources in different parts of the country. In fact, there has been a plethora of national and international NGOs of different denominations, resource orientations and outlooks and scale and magnitude. A full one and half decades have passed and there is not much secular evaluation and assessment of their performance and success in their NRM efforts. It is this very crucial task which has prompted this researcher to undertake the present study within his humble intellectual and resource capacity.

1.2. Statement of the Problem

Ethiopia with a total area of 110 million ha. and population of around 60 million is one of the largest countries in Sub-Sahara Africa (SSA). The majority of its population is found to be at levels of extreme poverty due to a stagnation /decline or very low growth in its overall productivity, particularly in agriculture, its principal *raison d^etre*. Among other reasons, progressive land resource degradation in its diverse components happens to be the main cause.

The sectoral classification of economic activities indicates the super-dominance of agriculture in the SSA, as in Ethiopia. As such, land resources continue to be of prime importance: in fact, developing countries, especially poor ones like Ethiopia have a more immediate and very direct dependence on their renewable natural resources (land, soils, water, natural vegetation and physical environmental process) as compared to the developed countries whose dependency on natural resources is more indirect, roundabout and rather distant because of the significant role of their advanced technologies, knowledge creation, adaptability and application of human

capital to resource use in diverse areas. This is why, the existence of good and productive land resources is essential pre-condition for the sustainability of livelihoods of most peoples in SSA in general and in Ethiopia in particular (Belay 1996, Alemneh *et al,* 1997).

However, in many parts of Ethiopia, renewable natural resources i.e. land, soils, forest, range resources and water which meet the basic needs of food, clothing and shelter, have now deteriorated to a low level of productivity. The main aspects and processes involved of degradation include devegitation and deforestation, soil erosion and loss of soil fertility, water resources depletion, and desertification. The resource base is losing it's overall carrying capacity because of rapid population growth rate, land tenure and property rights conflicts, unsupportive technologies, lack of effective extension services, due to inappropriate, unbalanced and unsuitable land use, grazing and farming practices and a host of policy and institutional defects/ failures (Daniel 1988, Wood 1990, Bclay 1992b).

Ethiopia nowadays is carrying out ADLI (agricultural development led industrialisation) strategy. However, the success of such economic policy can be attained among other factors, very critically through a sustained balance between utilisation, productivity and conservation of natural resources on one hand and population on the other. Despite the Ethiopian government's two decade effort to conserve natural resources very little success has been achived, particularly because of top-down policy approach without incorporating in due measures the local communities/ farmers genuine problems and interests and their willing cooperation in desiging and operating the various conservation activities. In fact, much more committed efforts at both policy and excutive levels are required by ensuring peopls' active participation.

Ethiopian Forestry Action Program (EFAP, 1994) also stated that the commitment of government and formal organisations did not lead to success.

In Ethiopia, though most of NGOs were relief- oriented and welfare based, recently as stated above there have appeared a number of NGOs that are undertaking natural resources management. There are at least some good reasons for NGOs intervention in Local Resources Management (LRM):

- NGOs are in a position with good ground, expertise, experience and overall resource to provide technical support and man power for LRM (Lee.F, 1994)
- Many governments in SSA like that of Ethiopia are under economic crisis brought about due to World Bank and IMF- initiated Structural Adjustment Policies (SAP) and hence need NGOs as partners in development activities (Van den Breemer, 1995).
- NGOs have special talent in integrating the environmental issues with other aspects of community life such as creating awarness, poverty reduction and emancipation of rural women from too heavy work load, which reduces the amount of women's time required for getting involved in environmental projects (Jasnaoff, 1997).
- Both multilateral and bilateral donors choose to give their donation through NGOs channels (Meyer, 1993). For instance, US AID has increasingly chosen to work with the NGOs sector in Latin America rather than public sector.

Although, of several NGOs like SOS-Sahel are undertaking natural resources management in Ethiopia, no comprehensive study so far has been carried out to identify those socio-economic and institutional factors affecting farmer's adoption of natural resource management activities initiated by NGOs and its subsequent sustainability issue. Apart from the impacts of external

factors and forces, local socio-economic and institutional forces operating in a society are significant factors for consideration in land degradation (Chambers 1983, Blaikie 1982 cited in Alemneh *et.al.,* 1997). Land degradation problems as well as it's rehabilitation measures cannot be seen in isolation from such local cultural, socio-economic and political factors, such as farmers' attitude, education, motivation for self-improvement through self involvement and initiative and other physical factors, others like the awareness level, family size, size of the holding, the livestock resources size, households' income etc., under which local people are sustaining and supporting their lives. It is largely because of these multiple forces that the implementation of NRM policies and projects to address land degradation has generally faced serious difficulties. One problem involving the measurement of adoption level of NRM intervention by farmers is: how is the adoption of NRM tecnologies to be most precisely determined? In this case, SOS-Sahel is working with farmers who are affected by soil erosion and are willing to organise themselves to undertake conservation measures without cash /food incentives or payments. As such, the case study from Kndo Koisha area is supposed to provide an interesting and relevant insight to begin to understand some of those basic socio-economic and institutional factors that seem to be affecting the level of adoption by farmers of NRM initiative introduced by NGOs in the study area in particular, and in Ethiopia in general. Institutional factors in this case according to (Alemneh *et al* 1997:7) are to mean "capacity of local organizations, community participations and projects back-up servicies and NRM policy frameworks".

The main reason for the failure of government initiated conservation measures in the last two decades in Ethiopia has been the lack of consideration of the socio-economic aspects of the people targeted toward conservation activies. Thus, the existence of such problems stimulated

the author to raise questions like: Do the farmers adopted SOS-Sahel introduced NRM technologies? If not, why not? And if yes would that be sustained?. Adoption according to (Misko 1976:40 cited in Mulugeta 1992:1) is an acceptance and use of innovations such as structural conservation measures. In the present study it also include the growing of agronomic measures too in order to keep the structural measures good and to increase soil fertility. The NRM technologies are defined for this purpose as thaose NRM practicies and innovations percived as new by local people. As, such the above questions will be the core of this thesis. Any research attempt to seek answer for such questions needs in-depth factual data obtained from fieldwork, participant observation, and close perception and its rigorous analysis and explanation. This would help to contribute some meaningful suggestions for policy formulations functionally useful and applicable to the current and future NRM planning. As such, this study entitled 'NGOs Natural Resources Management Technologies: Their Adoption by Farmers With Evidence From Kindo Koisha Area, Southern Ethiopia.' aims to investigate pertinent socio-economic and institutional factors facilitating /hindering adoption levels of SOS-Sahel initiated natural resources management activities among the farmers.

1.3. The Objectives of the Study

Given the above background the major obejective of the present study is to look into the farmers' adoption of SOS-Sahel initiated natural resource management (conservation / rehabilitation) technologies (soil, water, and forest management), based on the field survey from Kindo Koisha Wereda, Southern Ethiopia. Hence, the specific objectives of the study will be:

- To identify socio-economic and institutional factors that have facilitated or hindered the adoption of SOS-Sahel's NRM interventions.

- To analyse whether any attention is given to the sustainability aspect of the natural resources management activities being undertaken by the project.
- To examine the NRM strategies of the project.
- To identify some indignious NRM strategies in the study area and whether such practicies were integrated to the intervention of the project.
- To recommend some policy implications based on the findings of the study as tentative solutions to the adoption and sustainability problems of the project's intervention.

1.4. The Research Questions

In general the research questions of the study will focus on issues such as;

1. Are there any traditional NRM prevalent methods in study area ? Does SOS-Sahel encourage local available NRM knowledge and practices in its intervention?
2. Do the adoption of NRM technologies vary in relation to critical socio-economic and institutional factors like participation HHs heads, attitude of the HHs heads, awarness level of the HHs heads, the land holding size, familiy labour size, livestock resources size, households cash income as well as the households' access to basic social /physical infrastructurs in the locality?
3. Is there any prospect for the natural resource management activities undertaken by the SOS-Sahel to sustain? If not why is it not sustainable? What can be done then to make it sustainable?
4. Is NGOs NRM activities recognised on National /Regional Environmental Policies level in Ethiopia?

It is believed that the answers to the above questions will help in identifying the key socio-economic and institutional factors hindering / facilitating the implementation of NGOs based land management activities by farmers in the study area.

1.5. Significance of the Study

Although attempts to manage natural resources have been central features of NGOs for many years, the subject remained only sparsely documented and poorly understood. This may not have mattered when NGOs were only minor actors in development, but in recent years they have growingly recived greater significance in the light of both their growing desire within the sector to scale up development activities and of increasing expectations among donors that NGOs do contribute to the emergence of 'sustainable development'. A wide range of factors can affect the adoption of these initiatives by farmers. However, no comprehensive study as found in the literature at hand has so far been done regarding local socio-economic and institutional factors contributing for success and/failure of NGOs initiated natural resources management activities in Ethiopia. So this study's results could hopefully contribute fruitful findings by identifying some of these socio-economic and institutional constraints affecting successful adoption of SOS-Sahel based natural resources management by the farmers. The study could also enrich the existing literature for designing sound and sustainable natural resources management strategies for NGOs and GOs operation at regional/national level in Ethiopia. For instance, the Southern Nations, Nationalities and peoples' Regional Government (SNNPRG) is at present preparing it's a Regional Conservation Strategy. Hence, some of the findings of this study related to NRM policy aspects may help for enriching this document.

1.6. Organization of the Paper

The whole paper is organized in six major parts. These are:

- Chapter one - deals with general introdction,
- Chapter two - gives highlight on the design and methodology of the study.
- Chapter three - gives brief account on currnt literature on NRM and .
- Chapter four - gives discription about the study area and the project.
- Chapter five - presents emprical results from field survey.
- Chapter six - presents summary, conclussion and recommendatons based on overall analysis of the paper.

CHAPTER TWO

2. The Design and Methodology of the Study

In order to attain the desired objective there has to be certain research methodology. As such, in this part the research methodologies applied in sampling, data collection, analysis and organisations of the paper have been discussed.

2.1. Selection of the Study Area

Kindo Koisha is selected as a study area based on purposive sampling. The main reasons for selecting this area are:

1) The author's familiarity of the setting and knowledge of local language so that to carry out easily and systematically an informal and focus group discussion with farmers to support the survey and other obtained data.
2) The project represents a typical environmental NGO in Southern Ethiopia as SNNPR, BoA and Zonal NGOs desk officials have stated it to be.
3) Accessibility as to complete the thesis on time with little research fund and time available.

2.2. Data Sources.

The study is based on field based survey of randomly selected households heads in Kindo Koisha, Milke (267 ha) and Woisha (105 ha) catchments area of Southern Ethiopia. Both qualitative and quantitative data gathering techniques were used in carrying out this study. Understanding the socio- economic and institutional factors affecting the adoption of project based land resources management dynamics by farmers requires a deep understanding of local realities. In general following the principle of methodological pluralism (triangulation) the study has used both quantitative and qualitative data sources to organise the paper.

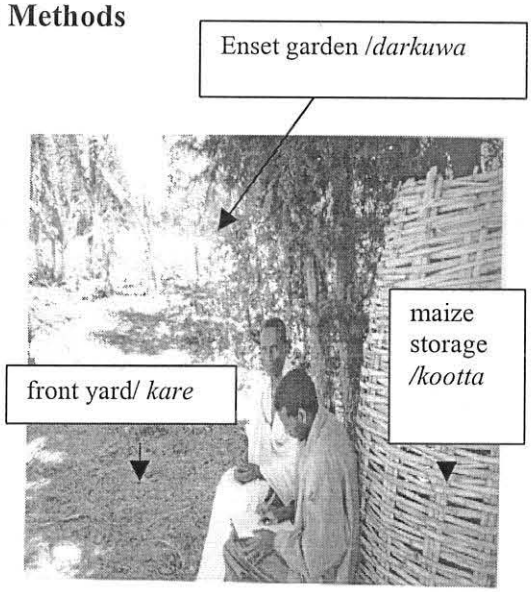
2.2.1. Primary Data Sources

Primary data sources include information's to be obtained from systematic household heads survey, interview with SOS-Sahel NRM expert, Kindo Koisha Wereda office of Agriculture conservation expert, in-depth informal group discussion with off-farm conservation site guards and informal interview with some selected key informants (see figure 1), Rapid Rural Appraisal (RRA) in two catchments (Kae Nare and Demba), other than catchments covered by survey at field level. In addition, on-farm conservation activities were observed by the research team i.e. by two enumerators and by the researcher himself, using the pre-designed observation format. Formal and informal interviews were also conducted at institutional level: North Omo Zone NGOs and Multilateral Projects co-ordinator (ZDoPED), SNNPR BoA, NGOs and Investment Desk Expert, SNNPR NGOs and Multilateral Projects Co-ordinator (BoPED), SNNPR Conservation Strategy Secretariat Task Force Co-ordinator (BoPED), Federal DPPC NGOs Desk Co-ordinator and Planning Division Team Heads, and experts from EPA and MEDaC.

The household heads survey was conducted in respondents' homes at the time convenient to them. The purpose of the survey was presented to them in form of queries dealing with land treatment activities undertaken by them in co-operation with SOS-Sahel. All the selected household heads participated in the survey and they were co-operative in giving information.

Fig 1: Some Specimens of Field Data Generation Methods

Fig1 a: Farmer *explaining about how he constructed* traditional stone terrace



1b) ***In-depth informal interview***

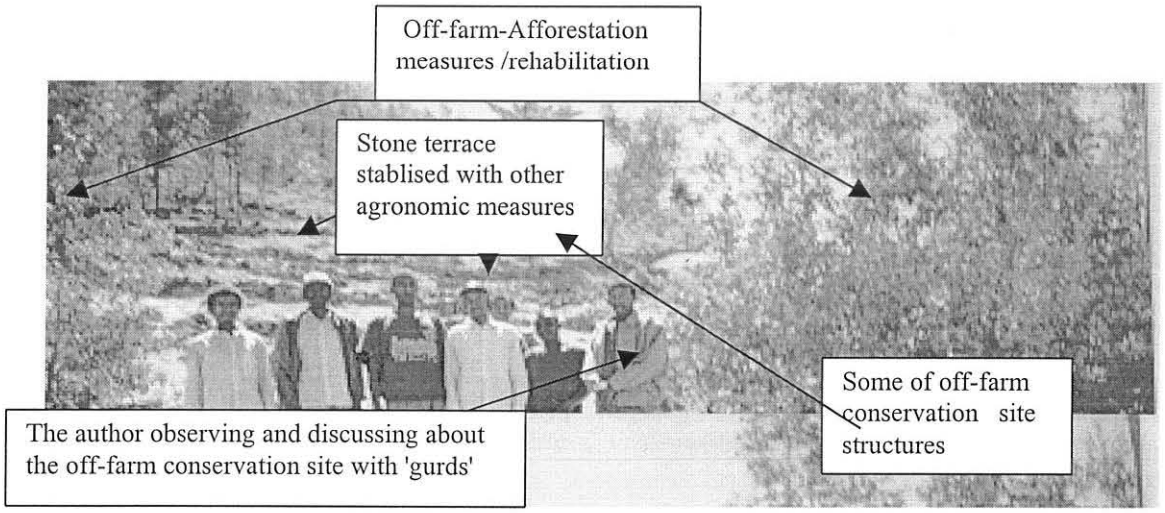


Fig 1c : *Observation and discussion about* off-farm conservation Site at Sudo Mt. in Milke catchment

Source: Photo, February 2000

2.2.2. Secondary Sources

Secondary data was also collected from published and unpublished sources such as SOS-Sahel baseline survey documents, annual progress reports and technical reports, books, journals, policy documents (National Environmental Policy, Regional conservation strategy draft (SNNPRG), Federal DPPC Disaster Prevention and Preparedness Policy and others), C.S.A publications and other relevant sources.

2.3. Sampling Procedure

2.3.1. Sampling Frame

The NRM interventions of the project under discussion are confined to eight catchments in the highland and Mid highland areas. Until up to the phaseout period of the first phase, 1998 the project has won the trust of 631 farmers (households) in these catchments. Hence these have been served as the sample frame / population of this study.

2.3.2. Sample Unit

In the first stage two catchments from the total of 8 catchments were selected by employing purposive sampling which represent 25 % of the target areas. The catchments were selected based on two criteria. Primarily the two sites were the first two areas where the community approach to watershed management was introduced. Second both of the two catchments have relatively larger population which enables to make generalisation about the total population. The two catchments represent the two agro-ecological and climatic zones covered by SOS-Sahel's NRM intervention. One being, the highland flood-prone wet zones (Woisha catchment, Doge Mashido PA) and the other being a medium elevation flood prone, relatively dry zone (Milke catchment, Bade Woyde PA).

2.3.3. Sample Size

The sample size of 92 household heads was assumed to be adequate for this study based on random sampling technique. The rationale in deciding the sample size was based on several factors of like, the homogeneity of the population, shortage of time, the cost of the survey and large number of factors to be analysed. Then, the list of beneficiaries in twin catchments was updated in consultation with conservation work group leaders. The sampled 92 household heads represent 15 % of the total population in 8 catchments and 25.3 % of the total population in twin catchments.

Table1: Sample Size of the Study

Sample Catchments	No.of beneficiaries	Sample size	No. of Sample plots observed
Milke	187	48	36
Woisha	176	44	34
Total	363	92	70

Source: Field Survey, 2000

Special adjustment was also made to include female headed households, although the nature of the study is not gender sensitive. Hence female-headed households representing 6.5 % of the total sample were included in this study. In addition, attention has been paid to select household heads proportionally to the total catchment beneficiaries from each sub-catchment. For instance, there are three sub-catchments in Woisha catchment (Laroso, Takacha and Ziga) and two sub-catchments in Milke (Bade Mareiam and Bade Makisano). A sub-sample of 70 plots were selected from the main sample plots to observe the status of NRM technologies introduced by the project and its adoption /implementation by farmers. Although observation was found as the most reliable source of information it needed technical skill, and it was tiresome and time consuming.

2.4. **Fieldwork**

The first field visit by the researcher was undertaken in between December 21 - 25,1999. During this period the researcher got chance to make preliminary observation on five households' on-farm conservation activities in two different catchments (Kae Nare and Demba catchments). In addition to this, four-draft survey instruments were pre-tested which enabled to omit some of the un-necessary questions and to include other necessary questions. Furthermore, preliminary contact was established with SOS-Sahel field staffs and detail information was obtained on Project's NRM intervention during this reconnaissance period. The actual data was collected in between Mid-January to Mid-March, 2000 by the researcher and two other assistants. The field assistants were selected on basis of their familiarity with the study area as well as by their work experience and educational background. One day orientation was also given by the author to these assistants on how to conduct interview with farmers and to record information on on-farm site observation format. They were also familarized with general key research techniques.

2 .5. Conceptual Framework and Analysis

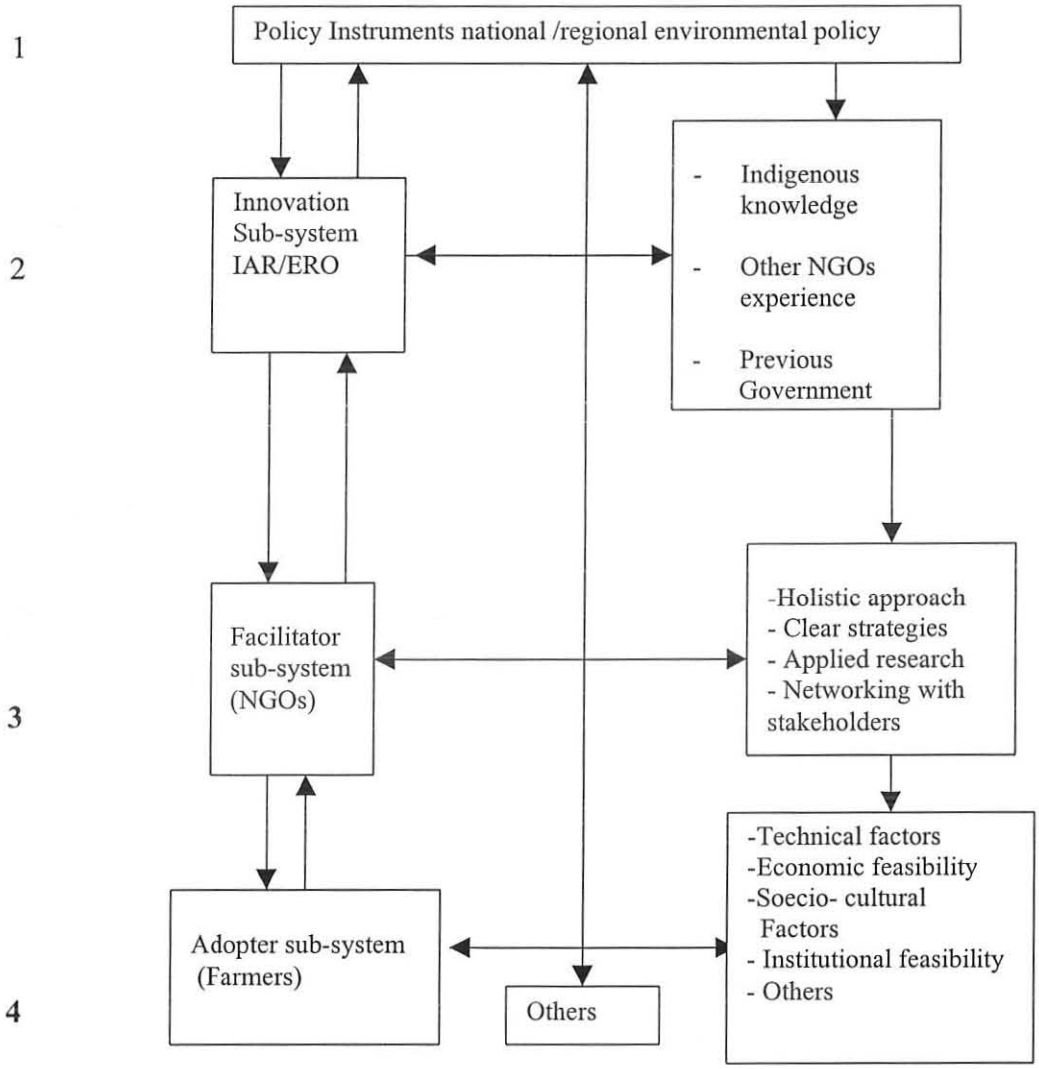
2.5.1. **Analysis**:

First the raw data was post-coded and in some cases tallied by using the tally sheet. It was followed by employing, descriptive analysis (frequency and percentage tables) and qualitative analysis to achieve the stated objectives and to test the research questions. Almost all the tables in the discussion part are based on data from the general survey. The study heavily relied for qualitative analysis on the tools of personal observation, interview materials with project's NRM expert and Kindo Koisha WOA conservation expert, and informal group and key informant discussion and RRA with farmers. Institutional data from Zonal, Regional and

Federal officials has also served the same purpose. Maps and figures were also used to support the results of analysis.

2.5.2. **The Model and Theoretical orientation**

Fig 2: Adoption and 'Sustainable' Natural Resources Model



Source: Developed by the author based on Laban (1995: 199) and Mulugeta (1992:21)

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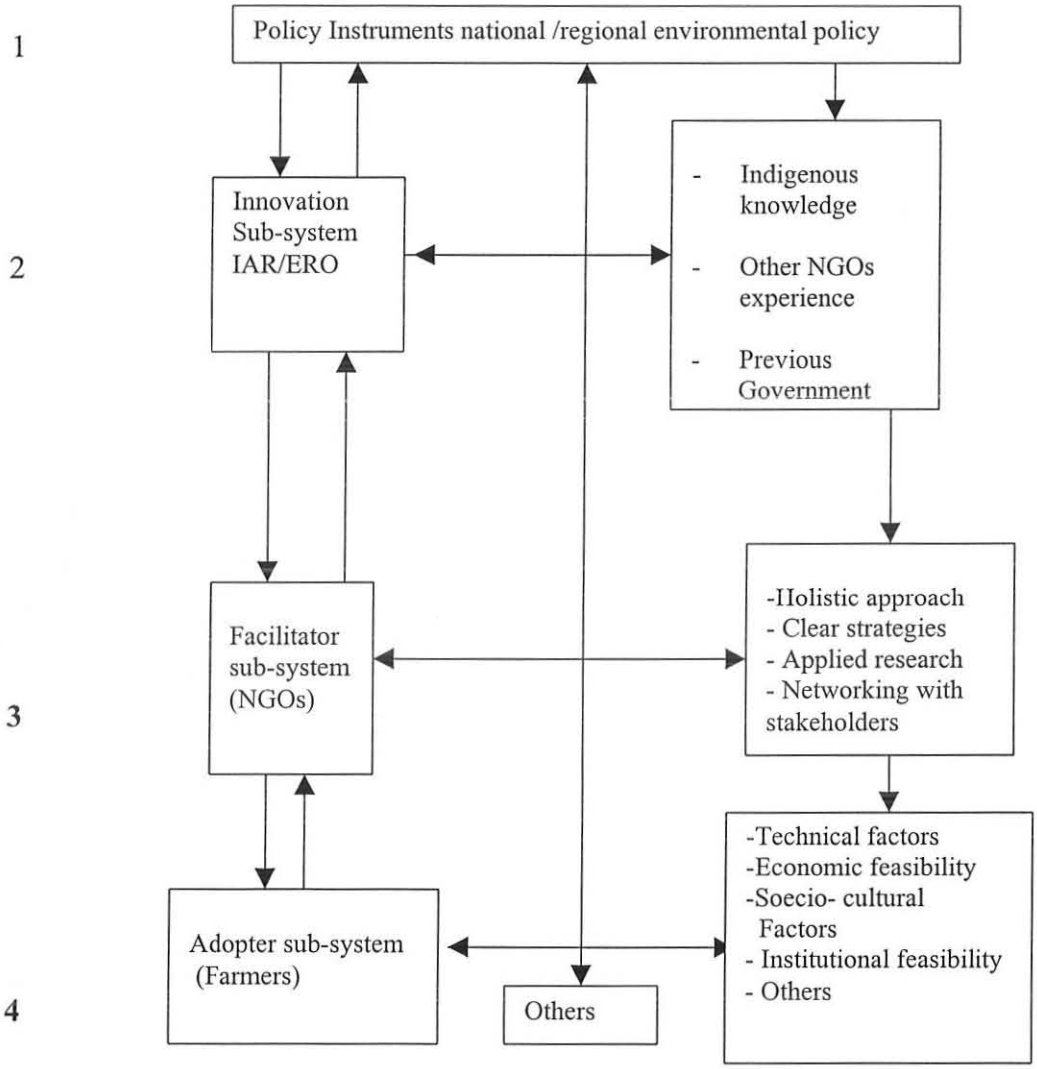
Fig 2: Adoption and 'Sustainable' Natural Resources Model



Source: Developed by the author based on Laban (1995: 199) and Mulugeta (1992:21)

At local level NRM projects are now specifically targeting rural communities in an attempt to rehabilitate local natural resources. However, such project approaches are regarded in some cases as vague in that they lack clear and sound technical and socio-economic NRM packages (Smillie 1993) in most Third World countries and in Ethiopia in particular. As documented in the literature various disciplines and stakeholders involving in NRM management present different sets of solutions to the various natural resource 'ills'. At least, three major approaches can be cited form recent literature (Biot *et, al*, 1995). These approaches are Classic, Populist and Neo-liberal approaches.

1) the classic approach assumes that land degradation problems can be solved through technical solutions. The emphasis of this approach has been based on technical 'fixes' and expert opinion and little merit has been attached to local land use practices and participation (Clay and schaffer,1994 cited in Alemeneh *et al 1997*). Until recently many soil conservation and land reclamation projects were influenced by the classic approach, which has often resulted in conflict between technology and local farming and socio-economic conditions. 2) the populist approach links prevailing poverty and environmental degradation levels. The core idea is centred around the participation of local peoples by using their knowledge and practices as a guide for policy and action (see Chambers 1983, Blakie and Brookfield 1987, Mascarenhas *et,al* 1991 cited in Alemneh *et,al* 1997). Two basic issues of poverty and environmental degradation have been inter-play as the causation of the prevailing situation in terms of time emphasis. For instance, the view that poverty leads to environmental degradation was intially promoted by World Ccommission for Environment and Development, more recently this poor environment interlock has been seen as restrictive and evidence is said to have shown that the converse is true (Smillie, 1993). A major reason among others, behind the paradigm shift is the

understanding of the appropriateness of local and indigenous conservation practices to the management of local environment.

3) neo- liberal approach is another approach that has been employed as conceptual framework of this study. Its principles are drawn from both the classic and populist approaches. The idea that technology to control land degradation is available can be suitably adapted and adopted wherever and whenever required is taken from the classic approach. The populist view contributes the notion of empowerment of the people. The argument on major causes of natural resources degradation incorporated in this neo-liberal view is centred around the institutional failures and the lack of adequate incentives for the adoption of appropriate conservation technologies among land resource users (Brohman 1996, Alemenh *et,al* 1997).

2.5.3. Measurements

In this sub-section of the design and methodology the criterion used to measure the factors considered under discussion are explained

2.5.3.1. Adoption

Results from pre-designed observation check list will be used, as there is lack of any benchmark, and farmers are seen to be unlikely to produce realistic data on the level of their adoption. 70 plots (76%) were selected for on-farm observation, out of the total sample size of the survey. Following it a simple three level quality scale (good, average and poor) pre-designed check list including 12 indicators was employed by the resaerch team, detailing the status of different technologies introduced. Obtained observations were recorded immediately after household survey interview. The observations were pre-coded i.e. good=3, average= 2, and poor=1.then based on this scale the maximum observation for each plot was 36 (3 x 12). In order to obtain mean observation for each plot again 36 cumulative score is devided to 12

which gives the highest mean observation (3) which is equivalent to good performance/adoption. The observations were tabulated and changed into percentage for both catchmnet areas. Besides, questions including expected benefits from conservation measures were incorporated in the survey, and farmers were asked to rate their opinion on the given three level scales on the benefits (Increasing, Decreasing, Remained the same). Farmers were also asked to compare their individual performance levels to those of thier neighbours in response to survey questions. Finally, farmers were also asked to rank the best implemented three measures with the corresponding reasons for each. All the above methods were used to measure the level of adoption of NRM technologies by farmers.

2.5.3.2. Participation

Responses in regard to their active participation levels in the SOS-Sahel induced NRM intervention/ programe can be operationalized by asking farmers the yes/no questions included in HHs heads questionnaire. If higher percentage of farmers respond as 'yes' for questions concerned with the planning and implementation of SOS-Sahel NRM technologies it means, there has been better participation and viceversa.

2.5.3.3. Attitude

Attitude as indicated in (Belay 1992b: 2) is " the positive or negative feelings, emotions and sentiments of farmers towards accepting or rejecting the implementation of soil conservation measures". Farmers attitudes towrds soil conservation has strong influence on their decision govrning adoptions, implementation and sustainability of conservation measures. The attitudinal trend in regard to adoption of the envisaged conservation measures can be measured by using Likert / Sumated /Agree, Disagree, I do not know?/ Scale. It has been the most widely and sucessfully used techniques to measure attitude (Ary *et al* 1975 cited in Mulugeta 1992).

12 statements describing about the expected benefits from SOS-Sahel introduced NRM technologies; 6 positive and the other 6 negative statements were included in HHs head survey questionnaire. If higher percentage of farmers show agreement for positive statements and disagreement for negative statements, then it is assumed that farmers attitude towards SOS-Sahel NRM technology is favourable/positive.

2.5.3.4. Education and Training

Each respondent was asked to indicate his/her educational level and also the training provided by the Project in the past years, and contacts made with NRM experts. It was assumed that the better the formal education, longer the period of training, and better the access to contact, the higher will be the awareness of farmers for the appropriated technology and its subsequent adoption.

2.5.3.5. Land holding size

Land holding size in terms of area of farm land owned or occupied by an individual in 'timad' (one ha equals four 'timad') is regarded as a key factor in adoption decisions. Farmers will be asked to indicate the approximate size of their plot. The assumption follows that the larger the size of the holding, the better the adoption level of especially structural conservation measures.

2.5.3.6. Family labour size.

Family labour size is viewed to be another chief component in decision-making strategies. The labour size is measured in terms of the extent of active labour size available for conservation-related work. The respondent will be asked to indicate those household members who are participating actively in labour intensive works beneficial to the households. Hence supposedly the higher the family labour size, the better the adoption level.

2.5.3.7. Livestock Resource Size of HHs

This factor is seen to be highly interrelated with other factors considered in the study of family labour size and HHs income level. Moreover it has its own independent merit. It was operationalized in terms of the size of the livestock resources, especially draft plough oxen as reported by farmers. The higher the number of livestock resources the better the adoption.

2.5.3.8. Cash Income level of HHs

Farmes were asked to indicate the cash income to the households from both on-farm and off-farm sources in the year 1998/99. Assumedly the higher the income the better the adoption.

2.5.3.9. Social Infrastructure

This paper considers households access to basic infrastructure like road, water supply, health and veterinary services. Farmers will be asked about their relative access to these infrastructures. The better access, the better the level of adoption.

2.5.3.10. Sustainability

Here the definition of German Technical Co-operation (GTZ) as indicated by Stockman (1997:1771): the project is as a sustained one "If the project-implementing organizations/target population continue the innovations achieved by the project without external assistance to a long period of time". Although the sustainability of a project can better be determined after a long period of the end of external assistance, it can also be measured by evaluating/analyzing the existence of pre-conditions for sustainability and by comparing the existing situation with empirical findings from previous case study materials. The sustainability of a project depend upon a number of functions and condition-fulifliment, for instance:

i). If the community shows positive attitude towards the intervention (Shanner *et al* 1981 cited in Bahiru 1993, Belay 1992b, Laban 1995).

ii). If beneficiaries participation is ensured to have taken place in designing and implementation of the NRM technologies (Hazelwood 1987, Oliver 1992, Deerutins 1992).

iii). If indigenous NRM practices were carefully integrated into the intervention (Bailey 1986, Van den Breemer 1995).

iv). If the technical and material capacity of the target community is up-graded (Randriamampianina and Anton, 1992)

v). If the packages and the roles of NGOs in NRM are clearly indicated in government policies (Laban 1995, Zeba 1996). Thus, if the above factors are clearly considered in SOS-Sahel's intervention the sustainability is guaranteed, if not it is under question.

2.6. The Scope and Limitation of the Study

The study is not widely based on a multiplicity of factors, process, power and decision-making structures and policies and several internal and external environment aspects. As the nature of the present study requires knowledge from multi-disiplinary fields such as Geography, Agronomy, Agricultural and Hydrologic Enginnering, Social Anthropology, Environmental Scinece, Botany, Soil Sience etc. Therfore the present study is confined to certain key socio-economic and institutional factors affecting the adotption and sustainability of SOS-Sahel based NRM intervention as operated in Kindo Kiosha Wereda. Because of the narrow focus of the study due to time, research skill and financial resource constraint, the conclusions derived remain rather tentative. Moreover, as the study is based on a field survey, conducted only in two catchments in Kindo Koisha, no claim of generalizations can be made on a larger perspective. Indeed, the strength of the study rests on the depth of the issues raised under discussion and diversity of information gathered from different prespective on the same issue, rather than in the area coverage.

CHAPTER THREE

3. REVIEW OF THE RELATED LITERATURE

The topical research literature is very vast and muli-pronged, and it is difficult to mention and review them even briefly in this brief paper. The environment is composed of living and nonliving things and the diverse interactions between them. These environmental components are subject to change, as a result of natural dynamism. There are intricate agencies of nature which keep them in constant flux and change. In several ways these changes involve distructional and constructional forces which induce agents that make the human-related and adjusted natural artifacts and processes unbalanced at different speed and magnitudes. This section deals with the various accounts of natural resources degradation, some socio-economic and institutional factors affecting the adoption of project initiated NRM technologies by the farmers, NGOs roles in NRM and overall natural resources management and sustainability issues.

3.1. Natural Resources Management, and Socio-economic and Institutional Factors

Natural resources management includes both short-term measures directed at the production of current crops and all the long-term measure for maintaining / enhancing of the productivity of the land and the creation of the assets that mature in the long run (Blaikie and Brookfield 1987). Andres (1993 cited in Abdella 1996) states that conservation measures should be directed to achieve improved production through suitable measures so as to gain more sustainable use of natural resources. Hence in order to attain the above benefits from any land resource management project, it is mandatory to identify the socio-economic and institutional variables affecting natural resources management interventions. However, as indicated in

Warford (1989), critical socio-economic variables affecting natural resources management are not clearly identified and addressed in most natural resources management projects.

The concerted concern for managing natural resources dates back to 1970s, since the emergence of alternative development approaches. However, NGOs and other groups have attempted to treat the environmental problems with simple, neat solutions. This approach is focused commonly on biological and / or technical solutions which neglect the social dimensions (Vivan, 1993, cited in Brohman 1996). As Warford (1989:7) states:

> *...if projects and policy measures are to be viable they should be based on a sound understanding of not only the physical linkages among events, but also of the equally complex economic, social and institutional linkages parallel to them.*

Though further research is needed in this direction, various authors working in the field of land management have identified some socio-economic and institutional factors that have to be considered in the adoption of conservation-oriented activities. These are, participation of local communities, attitudes of local communities, training and technical advice to target communities, holding size, livestock resources, family labour size, householdes income, and access to basic social/physical infrastrctures.

3.1.1. Participation of the Beneficiaries

The participation of local people and the incorporation of traditional conservation measures are found to be among the most important factors for the success of newly launched conservation measures. Hazlewood (1987) argues that successful implementation of natural resources management requires the active and willing involvement of farmers and local communities.

Hams (1994) also notes that local use and management of natural resources should underline the application of the participatory development approach. That means decision making power and responsibilities should be entrusted to the local population as far as possible and feasible, as the people should have an important share in the benefits of their efforts. Oliver (1992) underlines three comparative advantages of community involvement in local natural resource management: 1) higher degree of sustainability will be ensured when the community members identify themselves with conservation and management strategies through direct involvement as opposed to top-down approaches. 2) the community will observe and appreciate the desirable link between environment and development. 3) the dependency on external resources will be minimised and local people will take their own initiatives in the management of and conservation of natural resources. Moreover, the peoples' learning and experience curve would go upwards in management of not only natural resources but also other local development affairs. Deerutins (1992) based on empirical study on land management projects in Sri Lanka concluded that the successful planning and implementation of conservation measures largely depend on the participation of target population in all fields right from the beginning. According to Van den Bremeer (1995:97) :

> *Environmental problems in Africa have become so widespread and severe that any solution to them excluding consultation with and involvement of the rural population is unrealistic. Hence rural communities should be allowed and encouraged to become responsible for the sustainable management of natural resources in their own localities.*

The participation of affected community in the planning and design of NRM technologies also enables to incorporate indigenous NRM knowledge to the intervention package to make the effort more sustainable and effective. As Baily (1986) argues, it is also a fact that maintaining local practices and values through isolation from modern development processes may be neither possible nor necessary. The incorporation of community values relating to natural resources management, among others, might provide a basis for sound project design and a sustainable development process. In addition, Reilly (1992) also states that donors should not impose exogenous models, rather should rely on indigenous NRM practices and knowledge. Hudson (1992) also describes that the NRM technology introduced or followed by projects should be the development or improvement of the existing practices rather than something which is altogether new for more readily to be accepted. Hence, indigenous social organisations and practices should be seen as siginificant development vehicles, without romanticising them as they are well synchronised and adjusted with the environment over a long period of time and also accustomed to changing externalities. However, there must be awareness that indigenous technical knowledge and social organisations may no longer reflect a balance with the present-day environmental status, problems, and their intensity, and hence they must be upgraded to be suitably appplicable to the new problem solving technologies and organizational structures. Several NGOs have made such efforts in the rural development process. For instance, Jasnaoof (1997) states that NGOs are active in facilitating the participation of local communities in natural resources management projects because of their experience in integrating environmental concerns with the other aspects of rural development. However, one recent empirical study from eastern Sudan by Hassen Abdel Ati (1996) has shown that the NGOs working in natural resources management failed to utilise traditional social organisations and were mostly

engaged in centralised decision making. This constituted a major impediment to the sucessful adoption of conservation measures by local people. As far as possible, peoples' traditional knowledge, experience and expertise should be suitably adapted as far as they help in newer technologies to be made locally more applicable to solve problems, people should be kept as far aware of these adjusments as possible, so that they continue to feel that neither their knwoledge nor techniques nor suggestions are being ignored nor any thing is being superimposed on them without involving them. The recognition of CBOs is another important point that is worth mentioning here. CBOs (community Based Organizations) as indicated by (Reilly, 1992) can serve as experimental sites for public programme initiatives and have a proven ability to efficiently disseminate successful experiences at low cost through their own networks. In many parts of the world CBOs, have proven themselves as effective extension agents.

Million (1996) indicated that various land management projects intervening to improve soil and water conservation in Ethiopia adopted top-down approach. That is farmers were/are minimally involved in the soil conservation activities. Similarly, indigenous knowledge and experience were also ignored within the entire stages of identifying, planning, and implementation process of conservation projects. Regarding this the findings of Bekallu (1994) from Agaw areas of Gojjam show that the major reason for the failure of SCRP in that locality was the overall neglect of integrating the traditional conservation practices with 'modern scientific' approaches. In addition, a study done by Alemneh (1990) among the peasants of Wollo revealed that most peasants perceived 'area closure' method for rehabilitation of grazing land as another outside intrusion to their lives and were resentful of such programmes particularly, because, local people were not consulted at all during planning and implementation of this measures. Little attention was also given to the participation of women in government-based conservation movements,

ignoring the fact that it is women who as small farm decision-makers play a great role in land management in Ethiopia.

3.1.2. Attitude of Local Peoples Towards the Project Intervention

Farmers' conservation behaviour and willingness to apply alternative resources conservation techniques are largely determined by their overall atttitude and perception (Belay, 1992). In the words of William (1973) attitudes of individuals and groups towards environmental issues have been always matters of high concern. On the other hand, (Shxon 1989, cited in Bahiru 1993) states that there are contradicting views regarding farmers' decision making process. The conservationist school argues that small, poor farmers are irrational and ignorant, but on the other hand it is believed that they usually know much about their environment and make rational decisions, within their thinking capacity. According to (Shanner *et al* 1981, as cited in Bahiru 1993), perceptions, knowledge and attitudes are the main factors determining the individuals' decisions making behaviour. For instance, as indicated by Wood (1990), during the colonial era in Zambia only a few of the indigenous African farmers viewed conservation measure as any thing attractive for sound farming system. Rather African farmers perceived conservation measures as another outside colonial intrusion into their life. The reason was partly due to the discrimination in the provision of incentives and financing between African and settler farmers.

While making attempts to induce and introduce innovations and changes in indiginous peoples' behaviour patterns, working scheduls and techniques of production or consmuption styles etc, proper in-depth analysis of their social, cultural, behavioural and pscho-attitudinal patterns must be studied so as to make the induced efforts sucessful in adjusting to these patterns and

make them more easily acceptable and platable. This is more essential if the interventionist agencies are external. Peasants resistance to innovations breaks easily when the intervention measures are not only *de jure* beneficial to them but also these measures should be seen and realized *de facto* by them to be actually beneficial to their econmy, society, culture or future in a sustainable way. Their mode of life has sustained over long period of historical times in some safety first model decision-making in their productive and reproductive behaviour: they feel quite 'safe' with the well experienced and gloomed techniques, seeds, implements etc, so that production does not have to fall below the felt disaster level; any thing new creats suspicions in their mind and they would not accept the 'new' till it is essentially proven to be beneficial to them. Hence the peoples behaviorial, cultural, socital norms and value systems must be well known before innovations are introduced, and proper adjustments and adaptations must be suitably made. For instance, there is age-old pattern in role behaviour of family labour men, women and children of different age groups, what each does and can do and does not /can not do. So also time and reasons and types of work have their own patterns. For instance, NRM strategy should consider the different roles of men and women in production or the allocation of different tasks in different period in the web of communal production system (Randriamapiania and Anton, 1992). So before the intervention raising questions like: (How is the neighbourhood tie of that particular community? How is the social division of labour ? How is the gender division of labour?) could facilitate the implementation process of the new innovations introduced in the system. It is often difficult to find homogenous groups, whose members share the same interest, identical typology of role behaviour in task assignments or behaviour patterns, and all these in the same catchment area. As opposed to the past, now a day the tribal conflicts, the emergence of different religion groups and belief systems

communal obligation for common tasks are all further weakened under their own contradictions and processes and partly under the influence of modernity. However, in many areas of natural resources management, the fact that success is contingent on the willingness of ordinary citizens to accept the validity of official or any other induced policy framing is a less recognised subject. To this extent, success is not achived to the expected level. Hence the knowledge of the attitude of local peoples towards innovations in general, and modern and NGOs based local natural resources management activities in particular is critical for the success of rehabilitation activities being undertaken by NGOs. This is because this package of measures would need their full and committed support and active participation in performing the tasks and keeping them alive and sustainable in the efforts of their life- supporting system.

3.1.3. Education and Training of the Beneficiaries

There are contradicting views regarding the role of environmental education in facilitating farmers' adoption of project-based land management activities. For instance, Hudson (1992:138) states:

> *...In the last two decades it was commonly assumed that the most important thing in achieving soil conservation was to educate the farmer to tell them about erosion and erosion control and it's importance to them and thier grand children and the country. Though that is well appreciated as a whole, but the peasant farmer is well aware of the cause, the process and the results of erosion, but they are not prepared to do much about it because there are more problems to attend to.*

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Laban (1995) also support the above idea by noting that only sensitisation and information dissemination may not lead to successful conservation adoption, although it is one of the necessary condition. As opposed to the idea of Hudson (1992) above, Plup and Routely 1982, cited in Dalkoh 1993: 60) describes that "... the widespread environmental degradation in Africa has been largely attributed to the absence of environmental awareness or consciousness among the poor in Africa".

Regarding the contents and methods of training programmes for NRM, Hudson (1992) argues that for widespread adoption there must be the multiplier effect of trained farmers teaching other farmers. For this matter the technology of teaching and demonstrating should be made easier. The introduction of innovations in form of new ideas, new techniques of production, HYV (high-yielding variety seeds) new species of plants, new tools, new breeds of animals, or grain storage or other post-harvest technologies or whatever, the peasnts who are by the very nature conservationist and traditionalist, and hence naturaly resistant in adoption of innovations, must be given well articulated and structured oreintation, and if necessarry training and demonstration course prior to actual intervention measure suggested or given to them. Hence before targeting to conservation a high level awarness creation among peasants is crucial for success.

In Ethiopia in general, lack of the supplement of development education and awareness is also found to be another constraint for the limited adoption of project initiatives. Regarding this point, Mulugeta (1992) noticed that conservation movements in Ethiopia still faced with a number of much problems despite the endeavours made and the achievements recorded. Many of the projects reflect the lack of effective soil conservation education to be imparted among

the peasants who are mobilised to implement the conservation programmes. In general that supplementing environmental education to the knowledge of farmers and the other concerned groups targeted for conservation activities is, though not the only condition for success, but one of the necessary conditions for successful adoption of project based NRM activities.

3.1.4 . Land Availability

Many researchers agree that too small land holdings and unequal land holdings can affect the adoption of conservation measures (Hudson 1992, Yeraswork 1995, and Alemneh *et.al 1997).* Even when the plot sizes is very small the farmers are unwilling to apply conservation measures, especially the physical land conserving structures as they occupy the significant portion of their land (Dudal 1981 cited in Amare 1988, Alemneh 1990, Belay 1992b). Pearce 1986 cited in Warford 1989) does not accept the above findings and notes that small farmers with limited plot sizes are better than farmers with large plot sizes in adopting conservation measures. However, NRM technologies must not put land out of production and even if it does it will be only acceptable if there are balancing benefits, particularly in food production.

The scarcity of land due to population pressure is the widespread phenomenon in Ethiopia, besides the natural desire of people to remain on their accustomed and familiar family land. In terms of spatial distribution, some 88% of the population live in the highlands which constitute only 43% the country's land area. When there is scarcity of land people are forced to cultivate the little plot they have. As stated in EHLRS (1986) in areas where there is shortage of land the farmers are unwilling to allow the traditional direction of the fallowing period for their land. Yeraswork (1995) states that due to the severe reduction in the size of the average land holding the tradition of giving land fallow for a year or two has become a thing of the past.

Therefore conservation measures introduced by NGOs should consider the holding size of the beneficiaries for successful adoption.

3.1.5. The Availability of Livestock and Family labour

The scarcity of draught animals has negative implications for land management in many respects (EHLRS 1986, Alemneh 1990, Yeraswork 1995). First, because of lack of livestock resources, there is limited possibility of the use of organic manure in plots as well as spreading on the farm fields. Second, lack of animals is also related to the need for cash for survival. Cattle are the major source of income for most rural households, hence they are left with limited choice to invest on their land. The third negative effect of shortage of livestock will aggravate family labour shortage to take other necessary land protection measures. In some instances though the farmers realise the importance of conservation measures, yet they are unable to carry them out due to labour shortage. However, it should not be forgotten that over-stocking can also discourage adoption of conservation measures like area closure. Thus, NGOs undertaking conservation measures should also consider the farm households' livestock size and their characteristics. The success of conservation on private farm lands can be better ensured if the related pasture land problem is properly addressed

3.1.6. Cash Income of the Households

The success of conservation measures is usually related with availability of income of the households targeted for land management. The existence of both on-farm and off-farm income and access to low cost credit are essential financial pre-conditions for successful adoption of conservation measures (Warford 1989, Amare 1988). Laban (1995) also argue that for the farm households to invest in land rehabilitation the short term benefits associated with soil and water

conservation measures are an important motivation to make further more sustainable investments in land improvements, although considered not to be sustainable. Incentives can increase participation in land rehabilitation and can be used as negotiation tools to enhance the target groups. Direct incentives include payment in money or in kind (providing FFW) and indirect incentives such as soft credits, provision of seeds and seedlings, hand tools, etc.. In addition, as Hudson (1992) also states, the project-based NRM technology must offer a quick pay off; for instance, encouraging quick growing species (not slow growing hard woods), the technology must offer a high financial rate of return, and it should not incur farmers' high cash requirement. However, the author of this paper is sceptical to accept Laban's (1995) prescriptions of FFW/CFW as it is developing deep-rooted aid mentality among farmers and creating dependency attitude in their mind. In addition, from Hudson's (1992) illustration above of quick growing tree species cannot be taken for granted, because after growth if the tree species could not satisfy multi-faceted households wood requirements it may not be adapted by target groups.

3.1.7. Access to Basic Social (Physical) Infrastructures

Access to physical / social infrastructures like roads, markets, educational facilities, health and other institutions is highly significant for progressive agriculture, because these facilities expose the traditional peasants to new waves of information and life systems. They will be thus ready to adopt new measures which might enrich their lives, for instance, introduction of modern technology to rural areas has positive repercussions and gains for natural resources management and for the benefit of the users. For instance, the introduction of bio-gas technology will discourage the rural fuel wood consumption. The other is the establishment of hand drill water pumps and grinding mill will also save the time of children and rural women in

order to replace their labour time and energy by using them in more beneficial tasks thereby raise their participation on natural resources management projects (Machiru, 1987). Effective family planning programmes are also necessary to stabilise the rural population. In addition family planning will solve the problem of rural womens time shortage to engage in natural resources management activities so that to contribute their efforts to natural resources management and also to boost their family incomes from project incentives (Cincotta, 1994).

In general lack of success of most conservation programmes is not due to the lack of technical information as much as due to the lack of the consideration of social, political and economic dynamics of the farm households, besides the gap in technical knowledge (Kelly, 1983, cited in Amare 1988). The above discussed views are some of the few evidences from literature to support the idea that NRM measures are much more complex issues than just to be cured by the physical application of technical solutions. Therefore, identifying socio-economic and institutional constraints of NRM is very important for the success of both government and non-governmental organisations involved in natural resources management. However, despite the existence of massive literature on natural resources, management, relatively little attention has been given specifically to those points at which individual or institutional behaviour plays a key role and at the operational use of which policy interventions might be feasible.

3.2. NGOs and Natural Resources Management

Palmer (1995) states that NGOs are unique in influencing, encouraging and assisting societies throughout the world to conserve the integrity and diversity of nature as well as to ensure that any use of natural resources is equitable and ecologically sustainable. Muchiru (1987) also argues that NGOs in most African countries are actively undertaking natural resources

management by diverse strategies. 1) they oppose to the misuse of natural resources. 2) they engage themselves in restoration of law and enhancement of indigenous technologies or the development of alternative technologies that are less destructive to the environment. 3) NGOs are active in advocacting and raising public consciousness on environmental problems and call for actions and change in the existing institutions, laws and attitudes. For instance, NGOs in Africa, Asia and Latin America are found to be active in promoting community-based participatory forestry programs which contribute to environmental stability.

Researchers opposing the above idea note that overwhelmingly large number of NGOs working in the Third World were concentrating their efforts on income generation and provision of relief services (Backland, 1998). Whatever, currently more number of NGOs are shifting from their traditional role of being welfare and relief agencies to taking on a larger role in development work including local resources management. NGOs have also played a prominent role in the environmental movements from their earliest beginnings. NGOs and community groups pioneered in the creation of public awareness and political pressures that stimulated governments to act. In addition, NGOs have untapped potential to address the concern of local level environmental problems and have been identified as catalysts in successfully mobilising communities to gaining essential access to environmental resources (Lee, 1994).

According to Smillie and Helmich (1993), the official agencies have limited experience or discover tremendous operational difficulties and, as a result, the collaboration of NGOs is highly needed, as they have considerable experience of tackling environmental problems. The recognition of the role of NGOs on environmental issues, however, dates back to 1987 report of

the World Commission on Environment and Development. The report as cited in Jasnaoff (1997) urged governments to recognise and extend NGOs' right: (1) to know and have access to information on the environment and natural resources (2) their right to be consulted and to participate in decision making on activities likely to have a significant effect on the environment and their right to legal remedies and redress when healthy environment may be seriously affected. In addition as indicated in Smillie (1993) the 1992 UN Convention on Environment recognised NGOs as essential contributors to environmental protection for well over a decade. The role and participation of NGOs in projects such as resource conservation in the era of Structural Adjustment Programs (SAP) is highly required as it resulted in economic crisis, especially in SSA. Thus NGOs role in mobilising local resources management initiatives should be encouraged in such cases. However, it is only recently that governments in the Third World started to recognise that they cannot create development, especilly at their grass-roots level, on their own and understanding that their role is to create a conducive social economic and political environment within which development may take place through the co-operation of stakeholders (Smillie and Helmich, 1993).

3.3. Natural Resources Management and Sustainability

Sustainability is one of the latest concepts to have emerged in the literature and thinking of NRM. 'Sustainable development' was brought to the fore and into the common usage by the World Commission on Environment and Development (more popularly known as the Bruntland Commission) in 1987 throuh its report entitled **Our Common Future ; From one Earth to One World.** One of the positive aspects of sustainable development, as Ronald (1995) puts, is that it has application for both national and international policy frameworks for improving the wellbeing of the present and future generations.

NGOs have been recognised as one of the development actors for future sustainable natural resources management under the Commission for Sustainable Development (CSD) at the world level which was established to carry out agenda 21 of the Rio conference (Hams, 1994). But practical experience of NGOs intervention in Third World countries shows that although NGOs NRM activities were better in their implementation but lack sustainability. The reasons of these are many: 1) the failure of establishing indigenous networks and norms that will make activities to be undertaken by the project in the future sustainable (Backland, 1998). 2) treating NRM activities only as technical and administrative issue, rather than a socio-economic and political one (Pretly and Shah, 1995 cited in Ahluwalia, 1997). 3) in other cases farmers accept the unsuitable measures because the conservation programmes offer a short term sources of income and access to subsidies (Sanghi, 1987 cited in Ahluwalia, 1997).

But the question is how can the project-induced NRM intervention be sustained or made sustainable? There are different views on this in the current literature. As Sanders (1992) has noted sustainable soil conservation programmes for instance, can be designed and implemented: 1) if the causes of land degradation are clearly identified and protective measure are properly implemented. 2) if the right conservation technologies are selected and 3) if the farmers are made to be effectively involved in the planning and selection of the conservation technology. The recommendations made by Ranriamampianina and Anton (1992) seem to be more comprehensive. Accordingly, in order to sustain project-based NRM interventions NGOs /projects should:

1). produce training manuals and other literatures to target groups.

2). continuously supply seeds and seedlings for planting in ditches.

3). creating a link between research and users.

4). informing and training primary and secondary school children to generate long term impact in the area.

5). maintaining contacts with different organisations and local churches which have a considerable impact on rural population.

6). strengthening collective approach, such as creating co-operation mechanism among selected individual farmers, as it will facilitate convincing work. Even if a very high number of farmers take part, un-protected gaps such as land under fallow, communal land, pastoral land and forestry land could have a devastating effect.

However, above all stated the accountability of the local people targeted to conservation being the major factor for sustainability of NRM interventions. The principal objective of rural development programmes is to improve the wellbeing of the people concerned. But it should be stressed that accountability is also required at various levels, ranging from local government to all concerned. NGOs back-up service up to regional /central government. Accountability on the part of the local/regional/ federal governments implies the enhancement of and application of policy instruments. These include the proper institutional setting, political commitment to promoting an appropriate and conducive policy environment and translation of political practices in to national budgets (Laban, 1995).

3.4. Policy Environment for NGOs operation in NRM in Ethiopia

In the last 25 years concerns for environmental issues have seriously grown in Ethiopia. This is signified from the increase in number of government departments and authorities concerned with environmental issues. The number of NGOs integrating environmental issues in their intervention are also growing.

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For decades as stated, NGOs operation in Ethiopia was limited to relief and welfare activities. Though the 1984/5 drought gave NGOs to link the famine and drought in SSA in general and in Ethiopia in particular to natural resources degradation, it took time for them to materialise the vision. The survey made in 1977 by the Institute of Development Research (IDR) of Addis Ababa University, about 32 NGOs were identified to have interest in natural resources conservation activities. Currently as analyzed by the author of this paper, based on Christian Relief and Development Associations (CRDA) and Federal, DPPC data base, the number of NGOs undertaking natural resources management (soil, water and forestry conservation) reached 69 by January 2000. The NGO number of such types for SNNPR and North Omo Zone where this study has been conducted is 24 and 9 respectively.

In 1988 decision was made that the country should undertake a National conservation strategy (NCS), later it was renamed as Conservation Strategy of Ethiopia (CSE). The strategy was meant to create linkage of sectoral policies development to the sustainable use of the country's natural resources and to co-ordinate all natural resources-related programmes by ensuring co-operation and exchange of information. The CSE has made remarkable achievements in preparing necessary documents for the outcome of National Environmental Policy in Ethiopia. Besides this, CSE has been also strengthening the capacity of regional governments in order to develop their own conservation strategy. In addition, the country's new constitution of 1994 also has included environmental issues both as fundamental right and policy directives. But according to Tegegne (1994) no body knows what exactly NGOs were actually doing in the country until the general guideline on NGOs operation was outlined by DPPC in 1993. The overall theam of the guideline is that NGOs should integrate relief with development activities. It still lacks the specific strategies on how NGOs can contribute to natural resources management. In fact, it was

Ethiopian Forestry Action Programme (EFAP 1994 a :29) which clearly indicated and recognized the roles of NGOs NRM in Ethiopia:

> *NGOs in Ethiopia have played a major part in drought relief operations with a degree of success, including soil and water conservation and afforestation. They have strong local contacts --- promoting community participation in local level land use planning, however soil and water conservation and farm and community forestry will take time and NGOs could have a major facilitating role to play in helping with these changes.*

Furthermore in response to environmental problems, the Ethiopian government approved environmental policy in April, 1997 though its implementation process lags by far. However, in National Environmental Policy conspicuously lacks in formulating clear institutional role deserved as how and in what aspects NGOs should contribute in combating natural resources degradation in the country. In this regard (Zeba, 1996 :14)states: " making NGOs more aware of the roles they can play in reforming strategies, their role could be decisive in formulating NRM policies". For instance, in some African countries like Burkina Faso, NGOs play a decsion making role in environmental policy formulation. NGOs are represnted in the institutional framework of NRM policy through ' The Assemely of Popular Representatives (ADP)' which is responsible for voting on national law in particular fundamental legislation on the environment. It is made up of the Chamber of Dupties and Chamber of Representatives of civil society including NGOs and environmental associations). Through informal discussion with experts from EPA this author learns that the document entitled 'Institutional Responsibility for the Implementation of Environmental Policy of Ethiopia' is in progress.

As indicated above, one of the objectives of CSE is to enable the regional states to have their own conservation strategy. In this case the region (SNNPR) where this study has been conducted, a committee known as Regional Environmental Co-ordinating Committee (RECC) was organised . The RECC has delegated the task to the Regional Conservation Strategy Task Force. The task force has been also formulated at the level of concerned bureaux. Currently, the Regional Conservation Task Force has undertaken activities like defining terms of reference and collecteing baseline data from 9 zones and 5 special weredas of the region. In addition, the necessary policy documents have been prepared. The Regional conservation Task Force Co-ordinator also indicated that the policy document is ready for the approval by regional council for implementation. It seems that the forthcoming SNNPR conservation strategy document learned from the failure of national conservation strategy document as NGOs role in NRM are better reflected in the later case. Hence as SNNPR conservation Strategy is not yet finalised better reflection of NGOs role in NRM is highly required. The other thing that needs due attention is what about the NGOs NRM 'package' from technical as well as socio-economic and institutional point of view? As per informal interviews with Federal DPPC NGOs desk co-ordinator, Regional NGOs desk co-ordinator and Regional Bureau of Agriculture NGOs and Investment Desk expert, it has been realized that NGOs NRM sector project agreement are signed with expert opinion and comment on project documents. But there is no spesfic guideline that serves as reference. Indeed this may lead to subjectivity and lack of standardisation of project documents. At the same time, then above informants indicated outlining clear roles and package of NGOs in environmental policy are necessary. In the opinion of the writer of this paper the absence of NGOs clear institutional responsibility is one of the major reasons why most of NGOs introduced natural resources management initiatives in most cases do not sustain. This is

because most NGOs NRM projects lack 'full package' to make any achievable development to the problems. Hence the arrangement of such institutional co-ordination and support has been much in order.

In general, the overall debate of this research paper is to understand and explain why farmers in the study area fail to implement NGOs-introduced natural resource management initiatives or if they have adopted them to what extent it would be sustainable.

CHAPTER FOUR

4. Description about the Study Area and the Project

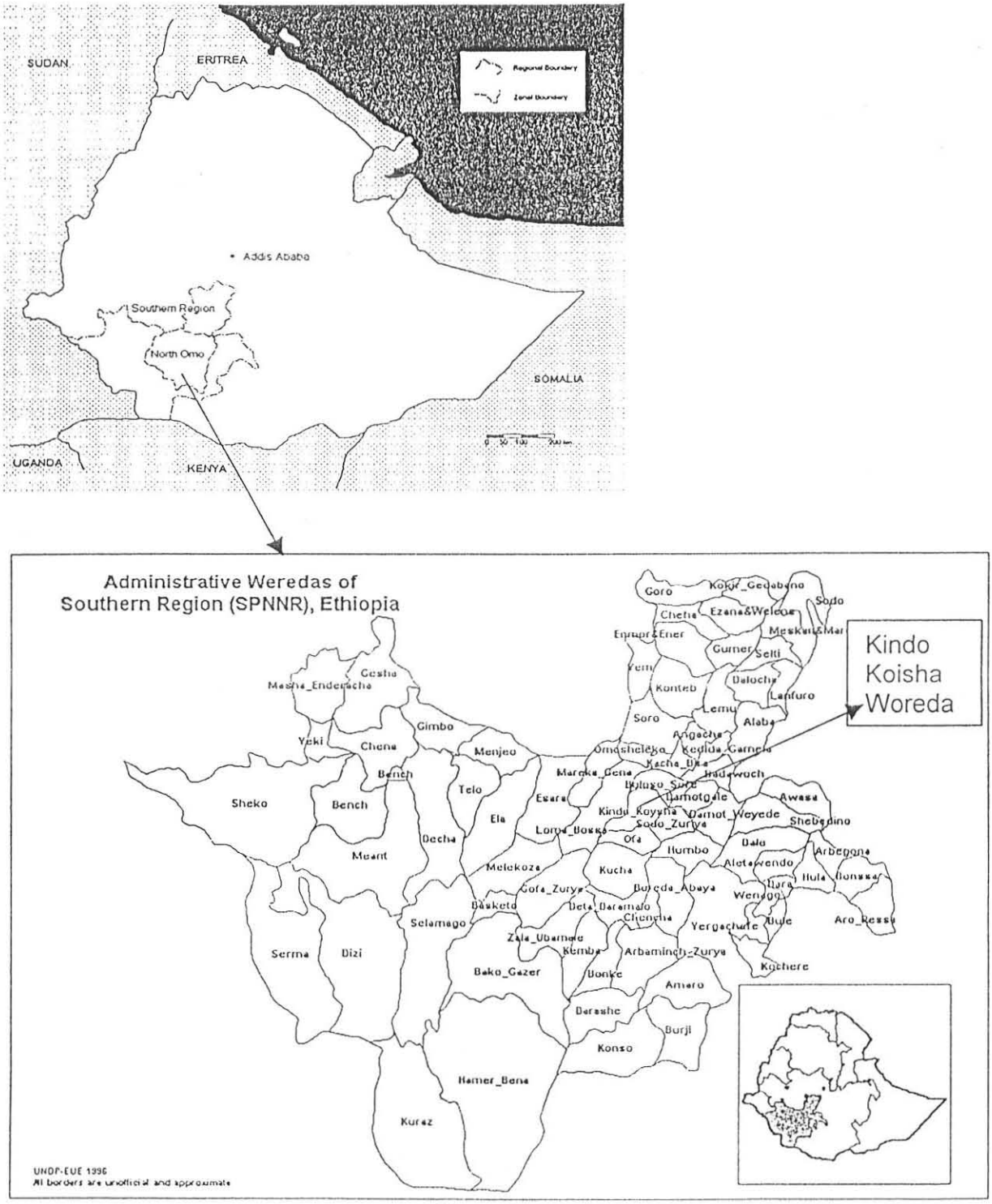
Kindo Koisha is one of the remotest weredas of North Omo Zone in SNNPR. It is one of the poorer areas of Ethiopia as revealed by general standard of living: in fact some of the informants anguishly state that in the past two decades the general standard of living has been deteriorating. The reason as described by farmers is the degradation of quality of land and related resources that further constrains socio-economic development. Increasing population pressures on resources coupled with various practices including over-cultivation (without giving land rest) and deforestation are causes behind the land resources degradation process. The following section deals with brief description about the study area and the project's NRM strategies based on the author's field survey and other available documented sources.

4.1. Physical Conditions

4.1.1. Location

Kindo Koisha is located approximately between $6^0$54'N-$7^0$12'N latitude to $37^0$18'E-$37^0$36'E longitude. The wereda town Bele is located some 450 and 212 kms to the south of Addis Ababa and Awassa respectively. The geographical boundaries of the wereda include: Bolloso Sore wereda in the North, Ofa wereda in the South, Soddo Zuria wereda in the East and Omo river in the west (see, the locaton map of Kindo Koisha). The total area of Kindo Koisha is about 680 sq.km. of which 17% falls in Dega (*Geze*), 69 % in Woina Dega (*Bargua*) and 14 % in kola (*Gara)* zone respectively.

Fig 3: Location Map Of Kindo Koisha Woreda and SNNPR



exists to support the popular belief that rainfall in Kindo Koisha has been declining. This has disturbed the age-old practised agricultural calendar of the region and has caused series of drought and crop failure, particularly in the lowlands. The erratic nature of the rainfall highly affects the crop production and in most of the recent years, the people have been on relief assistance. The lowlands agro-ecological zone is thus characterised by semi-arid climate with relatively high temperature and low and irregular rainfall. But little data is available on other climatic variables such as wind speed and direction, relative humidity and river flow. Yet as most of the riftvalley lakes region, the study area seems to have little /less than 100mm or no water surplus.

4.1.4. Natural Vegetation

The natural vegetation cover plays a major role in retaining soil and water and in modifying the extrems of local climate. In Kindo Koisha, lowlands natural vegetation cover is predominantly Savannah grass and thorn bush. The highlands were once renowned for their thick forest of indigenous species including *Cordia africana*, *Ziga* (Podocarpus gracilor), *Anka* (Corton maccrostachys) and Eritrina sp, but land pressure for agriculture and settelment and consequent deforestation have resulted in their degradation and eventual transformation of most of original vegetation into bush and grasslands. Deforestation has also contributed to a considerable acceleration in the intensity of the process of soil erosion and land degradation on the highland (Eyasu *et.al,* 1998). Natural vegetation has also been cleared in highland areas giving place to plantations by humans in the form of trees and woodlots, notably eucalyptus (Eucalytus comaldulensis) being grown on farm plots in the high and midlands of the study area as observed by the researcher of this paper and as indicated in the literature for Woliata in general (Eyasu, 1998).

Deforestation and degradation process are, therefore both widespread. An oral testimony from the informants has witnessed significant population induced deforestation and vegetation denudation that occurred during last three decades. Trees have become scarce in some high and mid-highland areas and getting even fire wood is becoming a problem unless eucalyptus trees are grown by the households. Some of the poor households without land for wood lots indicate that they are forced to divert little dung available, for households fuel, although they are quite aware of its substantial use for manuring their *darkuwa.*

Although the project intervention embarked on afforestation, on highly degraded lands (for instance on Sudo Mt.) in Milke catchment and other places but could not succed to the expected degree. For instance, seedlings on the off - farm sites experience low survival rate as was also observed by the present researcher. As off-farm conservation site guards (Sudo Mt.) stated, out of 150,000 seedlings planted during afforestation projcct initiated by SOS-Sahel, only about 85,000 survived (57 %). The reason, for this as mentioned by the informants is that some of the exogenous tree varieties introduced were found unsuitable to the environment. Fruit trees were also introduced to individual farm plots with general purposes in view including improvement of families diets nutritional value, to increasing vegetative cover of the homesteads, to serve as windbreakers and to increase family income in the long run. Farmers also reported that only one or two heads of fruit trees have survived on on-farm sites too. Nevertheless, the introduction of multi-purpose trees need be vigorously encouraged. Though to the limited extent of their sparse ground cover these are found to regulate and augment the local water supply and flow, and replenish the nutrient resources of the soil, restore soil fertility and augment the rapidly increasing wood or fodder need of the rural communities. In fact, it is found that the wanton deforestation rate of the scarce bushes by the

people will continue unless individual households' need for fuel and other construction material is fully satisfied through introduction of such multi-purpose trees to cover more ground and space in different topographic-climatic zones with higher suitability to their growth and bio-mass production. Again, as an alternative strategy, at least to the limited extent of possible capacity of supply and people' own level of consumption, introduction of bio-gas technology and improved wood stove production could be another feasible strategy as an alternative to fuel wood. Moreover, it would be better to take care of multiple problems affecting the local environmental and low regeneration process. This multiple-pronged approach to the problem is likely to enable and regulate better utilisation of fuel wood.

4.1.5. Soil

The dominant arable soils of the area are eutric nitosols that are estimated to cover about two thirds of the study area. In the lowlands the eutric nitosols are found associated with luvic phaeozomes alongside (Belay 1992 a). The volcanic eutric nitosols of the area have good physical properties, including good texture and water holding capacity. They have clay contents ranging from 35 to 55 % and they can be highly fertile. However, in many pockets, areas have soils depleted through continuos cultivation and the effects of leaching and erosion.

The estimated net soil loss in Wolaita is 75 mt / ha. on cultivated fields (Belay, 1992a). Nutrients in the eutric nitosols are concentrated in the top 20 cm while the sub-soil is very poor in nutrients. The impact of erosion on soil fertility is therefore sever. Conservation measures such as soil bunding, tied ridges and terracing which are common in other parts of Ethiopia have not been widely adopted in Kindo Koisha before the intervention of SOS-Sahel. Earlier sources indicated that physical conservation structures like bunding are not attractive to

farmers, because it makes ploughing with oxen difficult and takes large portion of land out of production (FARM AFRICA, 1992 cited in Eyasu *et .al*, 1998). But this justification may not be taken for granted, as the findings of this study shows good response to the process and farmers have reported favorable attitude towards the SOS-Sahel introduced NRM structures (see 5.3.2 part of this paper).

In non-technical popular expressions there are three main types of soil: *gobo* (red soil), *dubule* (clay loam) and *chare* (black cotton soil). *Gobo* and *dubul*e soils are easy for working where as the *chare* soils become heavy and water logged and so can only be cultivated by hand. Erosion is associated with steeper elevations, such as the highlands and Mid highland areas. Flooding is greater problem in the intermediate and lowland areas. Soils from the adjacent hills are washed down into the lower altitudes and in such cases lowland soils are denser and highly fertile.

4.1.6. Water Resources

Agriculture in Kindo Koisha is, rain-fed in nature. The mountain ranges in the area are sources of several rivers and streams that feed into Omo River and, some rivers carry water throughout the year, yet no irrigation scheme has been developed by the people so far or even by the current project. During the dry season almost all lower areas lack even drinking water. However, recently, only some small spring development /improvement schemes have been carried out by the project in Woisha catchment. In Milke catchment, however, the households covered by the present survey stated that they have acute problem of drinking water. Fetching water for household needs still remains a heavy and back-breaking almost daily drudgery, sapping their energy and time. In some cases they spend more than 30 minutes to get a single pot of water in dry seasons. In Milke catchment both animals and human-beings have

traditionally used the small natural springs that has been a major seasonal threat to the life system in the area. For instance, according to the key informants it is usual to see people suffering from intestinal parasites and associated diseases and other health dangers leading to multiple morbidity. Hence expansion of clean potable water supply scheme is necessary to eliminate these health hazards caused by clean water supply problems, as well as to ease the burden of water collection done by women. Adequate water supply in the area is also necessary for healthy growth of agro-forestry trees introduced at early stage. Construction of micro-dams in such cases could also serve as water storage that is lost to the people as it flows down stream. To the observation of the author the scarcity of water also constrains agricultural productivity in the area as it is mostly rain-fed in nature. Hence the introduction of an effective water management system including irrigation, would enable farmers to use their land alternatively, such as growing vegetables even during the dry season which would increase food value as well as cash flow. In fact, the other government based project known as Commission for Sustainable Agriculture and Environmental Rehabilitation for Southern Region (Co- SAERSR) recently started irrigation scheme at Lefi, in Bade Woyde PA, where Milke catchment is found.

4.2. Socio-economic Conditions

4.2.1. Demographic Features

According to 1994 CSA census the population of the wereda is about 140,687. The overall population densities in the wereda varies from 375 persons per/km^2 in the highlands, 281 per/km^2 in mid-latitudes, and 110 /km^2 in lowlands respectively. But densities as high as 520 persons /km^2 are expected in the highlands in smaller spatial units at some places. Thus the highlands of Kindo Koisha are one of the most densely populated areas in Ethiopia. By

contrast, the average population density for the whole of Ethiopia is 84-person per/km^2. The natural population growth rate of the wereda as a whole is also unsustainably high at 4.8% per annum which is much faster than the estimated natural growth rate of 3 % per/ year for the nation as a whole. But food production lags far behind population in Kindo Kiosha (Eyasu *et.al*, 1998). Most of 137,000 rural population are subsistence framers with over 40 % being chronically food-insecure. Human occupation of the lowlands is a recent phenomenon, which were opened for cultivation by government initiated settlement programmes in the 1970s.

Table 2: Family Size of the Survey Area

Size	Frequency (F)	% of total HHs
1 - 3	15	15.7 %
4 - 6	42	45.7 %
7 - 9	26	26.8 %
10+	9	10 %
Total	92	100 %

Source: Field Survey, 2000

The average family size is about 6 members per household across the wereda and about 72.5 % of the sample households have family size in between 4-7 members (see table 2 above). The largest size families are naturally found in resource rich households. This is directly linked to the occurrence of polygamy, but currently the dominant Protestantism has been discouraging this prevailing polygamous tradition. Nonetheless, the Protestant campaign does not seem to have succeeded to a substantial extent. The largest family sizes are seen as a reflection of their value as the traditional household survival strategy, enabling diversification of income sources including some off-farm income based on the family members labour modulation. Dependency ratio is high across all households. The majority of family members are naturally children below 10 years old. In fact, the prevailing cultural ethos in the region is found to be seemingly

in tune with the adaptation of the family size and members of children according to the economic and social needs strategies of the households under precarious resource situation in the environment. However, the strategies differ appreciably in different ecological regions, because of their differential man land ratio and resource productivity levels. This situation impacts upon the labour demands of the households on their family members or occasionally on close labour exchange groups.

Labour availability with in the family is more critical in the lowlands, where land shortages are not significant as is the case in the intermediate and highland areas. A variety of labour and other arrangements are existing, labour sharing (*hashiya*), casual labour (*angiya*), communal work (*daguwa*) have been documented. Intentionally or otherwise, these arrangements enable the population as a whole to make more efficient use of long and short-term differences in household labour power, drought power and land ownership.

100 % of the population (households) covered in the present survey belong to the Woliata ethnic group. However, other sources indicate that Dawuro, Amahara, Gurage and Hadiya ethnic groups also live in the wereda (UNDP, 1996). Protestant Christianity is the regional dominant religion. The general religious affiliation of the sample households shows Protestant (52.8 %), Orthodox (35.7 %) Muslim (7.1 %) and (4.3 %) other Christianity sects. Although the different religious sects are reported to be as discouraging the tradition of existing group works (see, Data, 1998), yet the current study shows people from all religion sects are participating in funeral and house construction parties as well as in conservation work groups.

4.2.2. Economic Conditions

Livelihoods in the area are primarily agricultural, but significant additional incomes are derived from off-farm sources. The traditional agriculture of the area is based on a mixed crop-livestock (mostly cattle) system. In this sub-topic some of the major socio-economic activities are discussed. Indeed some issues will be raised in discussion part of this paper.

4.2.2.1 Farming System

The prevailing farming system is thoroughly dominated by small scale, and still predominant, subsistance agriculture with traditional strategies of production with little change even in current times. Traditional strategy is however failing growingly because its productivity levels are not able to meet the high needs of family consumption, which are growing with the increased family size. Farmers in the subsistance, farmering cultivate small quantities of a large number of crops including enset (E*nset* ventricosum), cereals, root crops and vegetables under different conditions to fulifil their consumption strategy. The most widespread cropping pattern is to alternate maize in 'belg' season with sweet potato or teff in the 'meher' season. The major cereals in terms of area and household consumption are maize (Zea, mays) and teff (Eragrostis abssinica), but barley (Hoidium vulgarae) sorghum (Sorghum bicolor) and wheat (Triticum aestivum) are also cultivated to a limited extent. Sweet potato (Impomoea batatas esculenta) and Woilata potato (Coleus edulis) also, are major root crops found on some farms. However, cassava is now becoming an important food security crop in both midland and lowlands because of its drought-resistance and higher yield capacity. Taro and Wolita potato, which require intensive hoeing and mannuring, are important in labour use and in maintaining and augmenting soil fertility. These are usually planted to break new or fallow land for cultivation (Eyasu, 1999).

However, the introduction of cereals is a fairly recent phenomenon on dominant root-crop zone. One of the informants stated that cereal production was highly disseminated in the area during the time of WADU (Woliata Agricultural Development Unit). However this phenomenon is regarded as a ' misconceived ' strategy as it has brought both blessings and curses' to the area. "The blessings were short-term prosperity in terms of crop yield due to abundant provision and application of chemical fertiliser and income from sale of surplus grains. The curse is that the land became 'corrupted' and does not give any yield without the application of commercial fertiliser, and also the indigenous root crop-culture had been dominated by cereal production. Still the government development agents (DAs) are 'preaching' us to use chemical fertiliser and cereals to address the food insecurity problem. But, I wish the root crop culture would have been encouraged. The justification is that the annual crops and mono cropping system facilitate erosion, since the land is not kept under cover continuously. But the root crops such as taro, and sweet potato which are harvested more than once a year cover the land almost for most part of the year". The negative consequence of cereals as cause for erosion in highland Ethiopia is also discussed by other authors (see, Teferi, 1999). However this does not mean that the annuals are free from negative consequences on land as they also encourage the 'mining of the land' through double harvest of root crops such as sweet potato per annum in the study area.

4.2.2.2. Land use/ Cover

Traditional land use classification in Kindo Koisha represents one of the best illustrations of indigenous land resources management knowledge. According to the key informants and author's field observation, the farm land is classified into five broader land use categories (see figure 4 also):

1. *Kare* (front yard) - this is an open place in front of the yard of the house for special gatherings. But currently its size has been decreasing, since some families have started to include a portion of this area to crop land, while others have fenced part of the area for grass and use it for 'cut and carry' grass growing.
2. *Ketasa* (house yards) - where the house is built.
3. *katta gade* (cropland) - this portion is further classified into 5-6 categories.

I) *Darincha* - the transitional zone between the house yard and the homestead (the *darkuwa*). It is used by women to grow spices. The boundary between *darincha* and d*arkuwa* is not strictly bounded in most cases.

II) *Darkuwa* (homestead field) - it is created through systematic process of soil enrichment. It is located relatively close to the house and thus receives its refuse, kitchen ashes and smoke. The most important crops grown in this area include coffee, followed by enset (Enset ventricosum).

III) Root crop field (taro field) – in this field crops such as taro and Woliata potato and yam (*boyiya*) and cassava (*hawulaka*) are planted with heavy initial manuring and intensive hoeing. In some cases it is seen as *darkuwa* component.

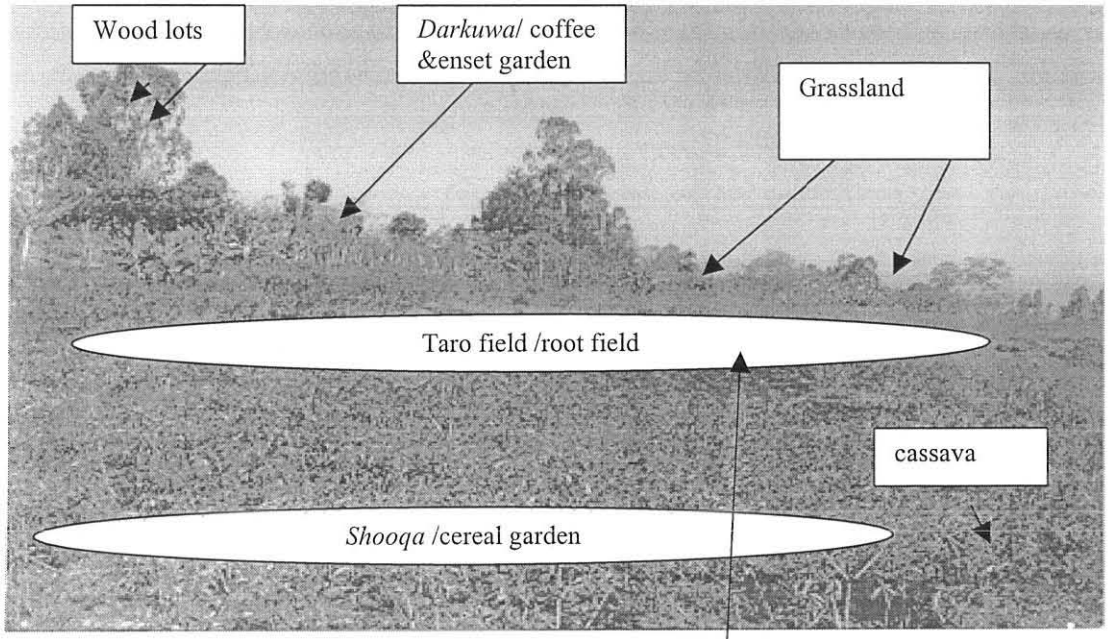
IV) *Shooqa* (out field) - it is the major component of arable land for the most share of total production. The term *shooqa* denotes that the field is far from the dwelling and does not receive any manuring. Its fertility is ensured through the use of chemical fertilisers since the WADU period. Thus significant proportion (84%) of households covered by this survey especially in the Milke catchment, used different chemical fertilisers in the year 1998/99. It is used to grow various types of cereals, grains and others, such as cassava. In case the households fail to utilise their *shooqa* component on their own, it is

given for share cropping which is the common strategy adopted to benefit from the land.

V) *Otta gadiya* (fallow land) – this is the infertile parts of the land which is incorporated to the *shooqa* through time. But none of the households covered by survey have *otta* land. It is only found in lowland areas.

4. *Matta gadiya* (grass land) – this is located in different parts of the plot. In most cases, however, it is found around the front yard (for tethering of animals and their uses) and in the outskirts of the plot (for cut and carry practices) or in between the *shooqa* and the *mitta gadiya* (wood lot), but in midlands (in some cases) and in lowlands livestock are reared in common lands. In addition some richer households have also separate grassland plots/units.
5. *Mita gadiya* (wood lot) – it is the out-most plot where people plant eucalyptus tree and other trees. *Mita gadiya* demarcates the boundary of the households. But some of the poor farmers do not have such land and other rich farmers do have separate wood lots. It's location at the outmost part of the plot as farmers explain is to minimise the negative consequences of some trees such as eucalyptus, which are said to be highly prone to deplete the fertility of the land.

Fig 4: land use /land cover in kindo koisha



4a) Homestead

4 b Sweet potato
Source: Photo, February 2000

4.3. The NRM Strategies of the Project

SOS-Sahel / UK is a British based NGO specializing in agricultural and natural resources development. It focuses on activities designed to enhance food production and livelihood security for rural people. SOS - Sahel/UK works in the Sahel regions and neighbouring countries and has been established in Ethiopia since 1990 working in two chronically food insecure areas i.e. Mekit (North Wollo Zone) and the Kindo Koisha (North Omo Zone) werdas.

Koisha Rural Development Project (KRDP) which is the concern of this study has worked with local communities to support 'sustainable' livelihoods in 21 out of 35 peasant associations (PAs) in Kindo Koisha wereda in North Omo Zone, Southern Ethiopia since 1992.

4.3.1. Approaches

The NRM activities are focusing on soil, water and forest resources management. In between 1992 and 1995 the project followed an individual farmer-based approach to NRM, working with individual farmers affected by soil erosion and were willing to undertake conservation measures. But since 1996 it has been replaced by community (catchment) approach where the communities living around the watershed are working together. The change from individual farmer to catchment approach has been necessitated, as the project NRM expert explains because 'the poorly managed upper stream/watershed is often the major sources of excessive flooding and sediment load, which result in heavy flood damage and siltation in down stream area'. Hence, it was found that the individual farmer based conservation efforts do not give adequate results, as they will be destroyed by the concentrated flood from the untreated upper plot areas. Communal efforts therefore are more likely to bring lasting results for all land holdings. As shown in the discussion part of this paper farmers also found this approach as

more convincing and promising, because it has solved labour shortage problem of many households.

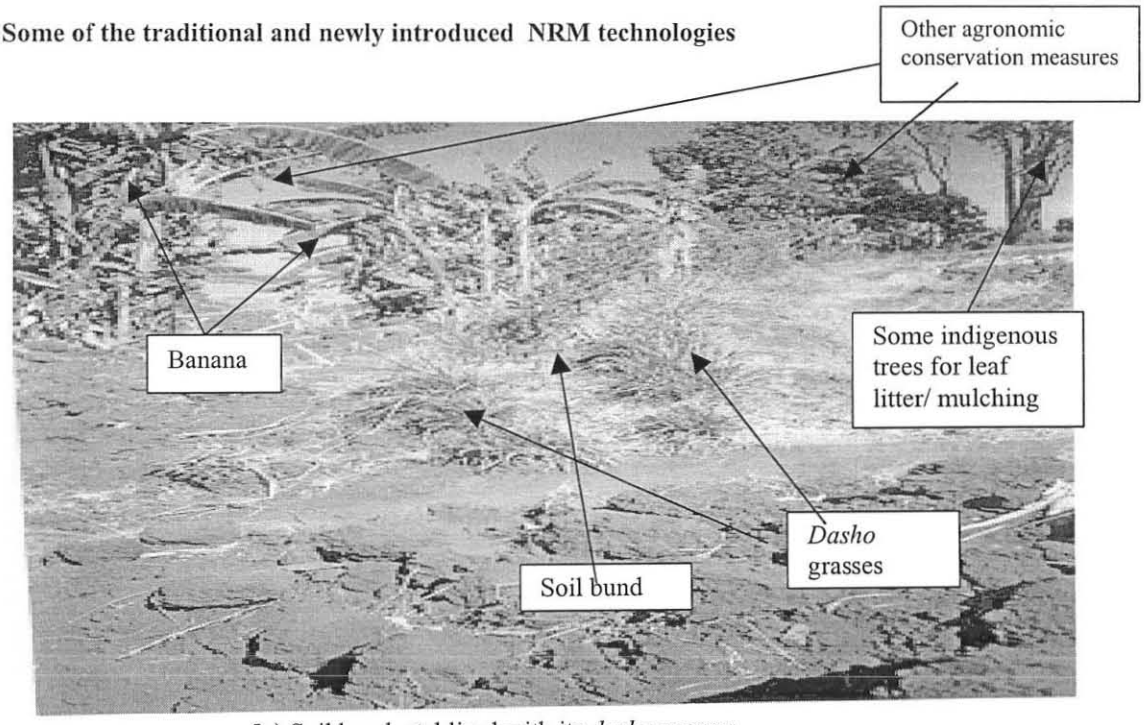
4.3.2. Incentives

SOS-Sahel used a loan-based support for planting materials such as fruit tree seedlings for which payment are made during the harvesting season when farmers are made to earn cash income. Multipurpose grasses that have both conservation and fodder value were provided free of charge. While farm tools (pick axes, flat hoes, three finger hoes and shovels) were provided on subsidized basis, given that nearly all households involved in the conservation work can-not afford the full price of these tools. FFW/CFW have been provided for under-taking off-farm conservation activities only.

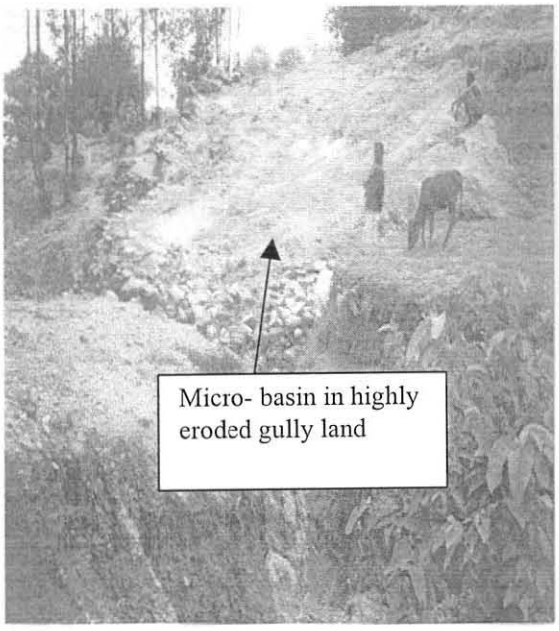
4.3.3. NRM Technologies

The NRM program was designed to integrate structural (physical) and agronomic measures with other project activities such as forage development and agronomy (see figure 6). The structural measures include: soil bunds, 'fanya juu ', bench terrace, cut-off drains, artificial waterways, micro-basin, hillside terrace chekdam and traditional stone terrace stabilization. 'Fanya juu' terrace is a swahili, with the connotation of ' throughing up slope'. It refers to the method of soil conservation where a basin is dug on the lower side of a bund and an embankment made on the upper side with soil or stone. The agronomic measures introduced include: composting, multi-purpose grasses and leguminous trees of conservation and fodder value, and fruit and shade trees (mango, avocados). In some parts of the catchemnt area closure has been made first and acacia Saligasna, Spatodia, Parcanisonia, Aculata and some other tree species were planted on degraded and gully lands.

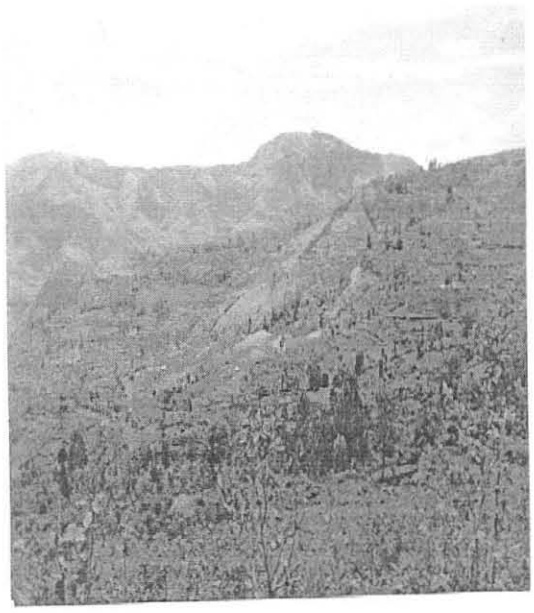
Fig 5: **Some of the traditional and newly introduced NRM technologies**



5a) Soil bund stablised with its *dasho* grasses



5b) micro-basine



5 c) one of the SOS-Sahel's on-farm intervention, Milke catchment

Source: Photo , February, 2000

CHAPTER FIVE

5. RESULTS AND DISCUSSION

In this section an attempt has been made to discuss the state of and level of adoption of NRM technologies, and factors which facilitate or impede the adoption and its sustainability issue. Field level data i.e. households survey, on-farm and off-farm observation, interview with projects NRM expert and Kindo Koisha WOA conservation expert, informal group discussion with off-farm conservation site guards and key informant discussion were mainly used for analysis. Data from other institutional sources was also used.

5.1. Indigenous NRM Strategies In Kindo Koisha

Farmers in Kindo Koisha have been practicing certain combinations of biological, mechanical and other traditional methods of NRM strategies to maintain the stability of their micro-environment and to improve soil fertility from which they obtain their livelihoods. More than 94 % of the respondents stated that their parents or they themselves have been putting different structures to conserve their land resorces before the intervention of the project. Some of these practices are discussed below as indicated by informants and also strengthened by the statements of WOA official and SOS-Sahel NRM expert.

5.1.1. Structural /Mechanical Methods

According to the informants, the structural methods in most cases receive primary importance. The rationale is that they protect the washing away of the upper soil and other agricultural inputs like biological manure, seeds and chemical fertilizers. However, farmers do criticize

physical structures /stone bund for thier inabiliy to conserve the moisture capacity of the soils. Some of the widely used physical structures are discussed below.

5.1.1.1. Drainage Ditches

There are two common draining mechanisms largely practised in the area. 1)*Kasho* which is the water way prepared at the top of the slope like cut-off drain. Its function is to drain the flood water coming from any direction, to the nearest river bank. 2) *Boeya* that is diagonal water way prepared on plots parallel to the slope, immediately after sowing the seed. The idea behind this is to protect the washing away of seeds and other inputs, as it is impossible to block erosion totally.

5.1.1.2. Stone Terracing (*Keella*): It is practised in mid highland areas (Milke Catchment) where the construction material (rock) is available. Most Farmers notice that although *Keella* is effective in protecting the soil from erosion and enhances soil fertility, its construction as well as maintenance requires physical strength, much input of family labour and perfection of construction and maintenance skill, which most households cannot afford. In addition, the *Keella* has to be shifted and maintained every three to four years for at least two reasons. The first is to control ahead of time the proliferation of dangerous running weed-like p*edha*. The second is to use the silts accumulated under *Keella*. However, one of my key informant, whose house is located in the Milke catchment in the upper most stream best describes about *keella*. Currently after the intervention of SOS-Sahel, he has constructed and stabilized around 600 meters of stone terrace in seven rows, explains the advantageous and disadvantageous of stone terracing as follows (see fig. 1a and annex 2 b also):

5.1.1.3. *Wattuwa*

This structure was seen in only a few plots in Woisha catchment, highland area. It is the level soil bund put in the middle of the form. Farmers in the area notify that it was introduced during the time of WADU (1970s). It helps also in controlling flooding.

5.1.1.4. Cultivation procedure

To enhance soil fertility and to minimise the risk of erosion, farmers also practice in both catchments different types of cultivation procedure. 1) hoeing, almost all informants in both two catchments believe in cultivation with a hoe by using a*ylliya*, a two finger pointed hoe) individually or by group (*hashiya*). *Hashiya* hoeing is undertaken when two to three people hoe in groups accompanied by cultural music he! ah! ! he! ah!. The rationale behind hoeing is not only the scarcity of draught oxen, but people believe cereals and root crops give higher and better yields if sown in hoed land, as the hocing enables to dig the soil deep and combine the upper manured soil and middle soils. 2) contour ploughing - this is practised in steep slope area. Some of the key informants, however, pointout that contour ploughing has been disadvantageous, in that it makes farmers plough a piece of land twice a day which may decreases the fertility of the soil. Farmers prefer ploughing land both vertically and horizontally within some day's interval to expose soils and weeds to the sun and for proper aeration. In case of contour ploughing both passes of the plough have to occur on the same day because they cannot leave the land after vertical ploughing for erosion. 3) early ploughing - Some informants tell that they have been also practising early ploughing. This is done to mix the leaf litter and the soil. It also helps to expose the weed to the sun and to prepare for sowing before the early rain comes, so that the soil should not get sticky as it happens in black soil areas while ploughing after rain.

5.1.1.5. Putting Fences

Putting fences around the plot is the common and long established tradition in Kindo Koisha, especially in Woisha catchment area. The rationale is to protect crop lands, wood lots, and water well from both animal and human damage.

5.1.2. Agronomic /Biological Methods

Earlier sources (see Data, 1998) and evidence from present field survey testify that farmers in Kindo Koisha too have been practising various agronomic/ biological measures both to improve soil fertility and to control erosion.

5.1.2.1. Manuring

Out of 92 households covered by this survey, about 77 %, who have various size of livestock resources practice manuring at various scales. However, due to scarcity of livestock resources all informants from both catchments ascribe that they are only mauring the *darkuwa* part of the plot. Despite the above responses, it has been identified during the field observation that it is only some households in Woisha catchment that are found effectively utilising organic manure, as the cattle are tethered most of the year on the farmers' own land and the dung is collected there. But in Milke catchment area a significant amount of dung is lost to individual farmers when the cattle are grazing in communal land pasture areas. As also all of the informants covered by the survey stated, the manure has to be buried for quick mixing with the soil, easy decay and to ensure protection from being leached away by erosion. Yet during field observation it has been visualized that the dung is damped in limited places without spreading and farmers explain that has happened due to labour shortage.

5.1.2.2. Planting and Weeding

Planting and Weeding are found to be among the common agronomic NRM practices in Kindo Koisha. The following testimony of my informants, the one who is about 100 year and the other 80 years old both are from Demba catchment (where RRA was conducted) clarifies the indigenous forest management knowledge:

Box-1

Erosion is a recent phenomenon even in this steep slope area. In the past few years including most portion of our current farm land was under dense forest and grass cover. At that time we had not to worry for erosion and its counter protective measures. Nevertheless in our culture during the old good days, the tradition was you plant two seedlings for cutting one matured tree. However, now a days due to 'modernisation' these all are vanished and at its expense deforestation has been intensified. In addition, different local plants species such as anka(Corton macrostachya, mokota (Cardiya abyssinca) and Ziga (Milletida dura) were planted for their fertility through their leaf litter and protecting erosion through root structures.

Source: Old key informants from Demba catchment (RRA)

Besides, as other informants indicated during the survey and as it has been absorbed during field work, different crops such as banana, enset (Enset ventricosum), and sugarcane are planted in the row (see fig. 2 a). *Gorxa* and *dasho* grasses were also put in the front yard and near to the house base respectively. Weeding is the common practice in both catchments.

Those who construct the stone terrace or put any form of bunding ensure that they can continuously weed the running grass like *pedha*, so that the strictures may not be encroached.

5.1.2.3. Mulching

This is done either by encouraging the growth of trees that does not harm the fertility of the soil, so that the leaves can be used, on irregular basis or leaves are collected from woodland and carried to the farm, according to most informants. The other commonly practised mulching method is *yipa* (spreading or covering) the plot by grass residue in the row after cattle feeding. However, there is doubt, about the continuation of these methods as they are less frequently seen during the field observation, the period being (Mid-February) the preparation period for 'belg' farming.

5.1.2.2. Cropping

About more than 90 % of the informants covered by the survey have stated that they have been practising various cropping methods at various scales. Inter-cropping and cover cropping are the most commonly used methods of cropping both for soil enrichment and flood control. For instance, cereals, root crops (sweet potato, taro), pumpkin and different types of legumes are combined in most cases assumed to cover the soil through their leaves, as has been observed by this author also. There is disagreement among farmers interviewed on the practical benefit of inter-cropping. Some 67 % agree in favour of it stating that inter-cropping ensures the soil coverage and protect from rains so that the soil particles may not be disintegrated and washed away by erosion. While the remaining 33 % state that crops compete, still others argue that it exhausts the fertility of the soil.

5.1.3. Other Methods

5.1.3.1. Fallowing

Leaving the land for two tothree years rest was the distinguished culture of people in Kindo Koisha in the past. But due to population pressure and land shortage this has become the tradition of the past and no household practices it as both the survey and observation have shown in this study.

5.1.3.2. Smoke from the House

Some of the key informants noticed that " the logic behind the fertility of *darkuwa*, land near to the house is the regular smoke released from the house. The justification given is that while coffee and enset (Enset ventricosum) plants far from the house dry during the dry seasons those found immediately to the house remain evergreen (see, annex 2 c).

In general it was difficult to obtain exhaustive list of indigenous NRM practice in the study area in this short period and limited coverage of this survey. Thus the above discussion clearly shows that local people in the survey area are with rich indiginous NRM knowledge. Some of the major ones can be revitalized and integrated to the 'modern' interventions, either initiated by NGOs / GOs. The present finding is reliable in that some of the measures were also discussed by previous other sources (See Data, 1998). The problem in this regard is that such useful traditional NRM Knowledge are not recorded and cataloged. Rather many if not most of the SOS-Sahel introduced NRM technologies have origin that are external to local people. Only a few traditional NRM measures have been incorporated to the SOS- Shale NRM intervention i.e. only stone terrace and *dasho grass* as indicted in 4.3 sub-section of this paper. Hence instead of imposing new models, it is suggested that some of those indigenous NRM techniques

discussed above are suitable for widespread replication by farmers. Therefore testing and modification of the most promising measures would have seem better for quick implementation as well as to ensure farmers easy co-opration, adoption of new measures and thier sustainability.

5.2. ADOPTION

Although visible benefits from conservation need long period, yet certain changes can be also observed in certain periods. Out of the 92 households covered by the survey, 70 households (76%) were selected for on-farm field observation by the research team. So the research team applied the pre-designed checklist to observe the status of on-farm conservation activities, which are assumed to be observable and measurable, in comparative manner. Research assistants as well as the researcher himself did the observation. The research assistants were asked to record or fill their accounts on the format attached at the back of the main survey questionnaire, immediately after observation. By using similar checklists, the researcher also observed the entire sample plots. Finally, the mean results of the two observations are taken for interpretation.

Table 3: The level of adoption as observed by the research team

Grade	Milke	Woisha	Total
None	-	-	-
poor	-	-	-
Average	72%	64 %	67%
Good	28 %	36%	33 %
Total	100	100	100
Mean Scores	2.16 (above average)	2.56 (nearly good)	2.31 (above average)

Source: Field Survey 2000 *N.B: 1=poor, 2= average, 3= good*

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Thus, the results of observation as indicated in table 3 show that the performance in the Milke catchment (2.16) is above average and in the Woisha catchment is nearly good (2.56) and the overall performance is above average (2.31).

In addition, about 8 questions that indicate the expected out-comes from conservation are provided to farmers, so that they should express/rate their opinion about the adoption levels.

Table 4: Farmers response on expected benefits from conservation to households

Indicators	Increasing %	Decreasing %	Remained the same %
The level of erosion	-	100	-
The soil fertility	100	-	-
The crop yield	100	-	-
The income from on-farm sources	71.4	-	28.6
The vegetative cover	92.8	-	7.2
The forage supply	84.3	1.4	14.3
The fuel wood supply	40	4.3	55.7
Access to water supply	54.3	-	45.7

Source: Field Survey, 2000.

As shown in table 4, except for facilities like the fuel wood supply and access to water supply, more than 70 % of the respondents noticed that they have seen the increasing trend of outcomes from the managed natural resources (soil, fodder and crop yield) while other things remaining more or less the same. As Belay (1992a) state yield increase from conservation in the first five years is least expected. Although this increase in yield can be, for instance, ascribed to the use of other agricultural inputs. However in this case 50% of the respondents covered by this survey in the Woisha catchment did not use any of agricultural inputs in the year 1998/99. Besides, farmers were also asked to indicate the most implemented NRM technology on their own lands with their/its corresponding reasons.

Table 5: The most adopted NRM technologies by farmers

NRM technology	Reasons given	%
Soil bund	Efficient in arresting erosion	93
Dasho grass	Its multi-purpose use (increase protective cover, reach with in 15-20 days for 'cut and carry'	58.1
Fruit and shade trees	It's multi-purpose (income, food, increases the vegetative cover)	50

Source: Field survey, 2000

Thus, it can be seen from table 5 that soil bund (what farmers refered as soil bund was later recognised as both level soil bund and 'fanya juu' terrace) is one of the most adopted technology (93 %) followed by growing d*asho (58.1%)*, and planting fruit trees (50 %). However, most respondents remained sceptical to reason out about fruit trees because only a few had visualized benefit from fruit trees. This field observation found that the problems might arise due to biological problems. As the author has consulted (Ethino-Botanists) from Biology Department of Addis Ababa University and other agronomists, if only one head remained or survived cross-pollination might not take place.

Furthermore, the informants were asked to rate his/her general performance in comparison to his /her / neighbour's based on three-point scale/questions (poor, average, good). Hence, 35% rated as good, and the rest 65 % rated as average. However, no farmer indicated his/her performance is poorer as compared to his neighbour's. More or less the results of the observation and farmers' response show similar findings. The North Omo Zone NGOs and Multilateral Projects team co-ordinator indicated the performance to be within 65-75 %

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(average). The overall performance as revealed from different direction is above average. Thus, the results from the analysis and discussion above are going to be used as a benchmark for further discussion in the other part of the paper. Why not all farmers implemented equally the measures well?, as has been observed and as they themselves have reported?. The discussion in the following section will focus on such issues.

5.3. Factors Affecting The Adoption of NRM Technologies by Farmers

The analysis of why farmers do / do not adopt new NRM technologies is a difficult subject, since such behaviour is affected by many interrelated factors. However, the present study looks in this section into some socio-economic and institutional factors on the basis of the literature part of this paper and the model adopted and conceptual frame- work used.

5.3.1. Participation

Participation of the beneficiaries in the project intervention is one of the ambiguous and controversial issues in the current literature. However, in this particular, analysis, participation is to mean the genuine co-operation of beneficiaries right from the identification of NRM technologies to the final stage i.e. selection, prioritising, designing, implementation and evaluation of the out- comes of the NRM technology. Indeed, at this juncture there are people saying community participation in Ethiopia in NRM comes out by necessity rather than by design (see Bekalu, 1994). Thus the community participation is one of the factors assumed in this study as influencing the degree of adoption of NRM technologies by farmers. Hence, the responses of the informants to survey are summarised below in table 6 also.

Table 6- Farmers responses on participation

Roles	Participants	
	Frequency	%
Planning and Design	28	28.6
Implementation	92	100
Evaluation	-	-

Source: Field Survey 2000

As it is clear from table 6, less participation of the beneficiaries has been noticed, except at the implementation stage. The informats also indicated they were given less chance to decide on the choice of SWC technologies i.e at design and planning stage. Probably this is due to the PRA technique adopted by the project in design and planning the NRM technology. In regard to participation in terms of group-work all respondents indicated that they are members of some local conservation work group and have been participating two days per week, although the work group started weakening since the 1998/99.

The response of SOS-Sahel NRM expert supports / strengthens the above result. For the question regarding the participants who planned the land treatment plan, he indicated that the project and WOA staff planned it. He also described that conflicts were common between the technical interest of the project and the interest of farmers during the implementation of physical conservation structures. Conflicts arose usually on terrace spacing at the beginning of the project, farmers being not happy with construction and closely spaced terraces due to labour shortage and more use of land in view of that land-holding scarcity. The problem was resolved through training and awareness creation, using other agronomic conservation measurers and in some cases using bigger and widely spaced terraces to avoid too many terraces taking the land out of production. But such technical solution has both benefits and drawbacks i.e. the result is

less effective in terms of reducing soil erosion, but can be eventually highly accepted by the farmers. Contrary to the responses of the beneficiaries and projects NRM expert, the WOA conservation expert observed that farmers were actively participating throughout from designing to implementing of the introduced NRM technologies. Conflicts in response may be due to even lack of the participation of the respondents /stakeholders (in latter case, WOA).

In general, it is clear that from what has been stated above there was less involvement of beneficiaries in the design of SWC technology. However, had the compromise been reached at the planning stage, the project would have easily woned the trust of the farmers and bunds and terraces would have been placed in the manner they can control erosion effectively form technical point of view. Lack of beneficiaries participation and following of top-down approaches were also some of the major reasons for the failure of conservation movements in Ethiopia (See Belay 1992 b, Bekallu 1994, Million 1996). Other authors also argue that community participation enhance the impact and sustainability of project intervention (Herbinger *et al,* 1999). In general the introduction of NRM technologies with full awareness of local people targeted will help in overcoming problems facing at the adoption stage, and ensure sustainability, although beneficiary participation is not as a panacea for all the problems facing natural resource management intervention.

5.3.2. Attitude of Beneficiaries Towards SOS - Sahel NRM Intervention

In order to assess the attitude of target communities toward SOS-Sahel NRM technologies as indicated in 2.6.3.3 section of this paper twelve statements (six positive and the other six negative) based on Likert/ Sumated scale were designed by the author and informants were

asked to express their attitude according to their own choice. Their agreements and disagreements are summarised below in table 7 a and table 7 b.

Table 7a: Beneficiaries' attitude towards Positive expectations from the project Intervention

Statements (**positive**)	Agree		Disagree		No Response	
	F	%	F	%	F	%
I am interested in SOS-Sahel SWC tech.	92	100	-	-	-	
SOS-Sahel NRM technology in general is efficient	92	100	-	-	-	-
I am willing to continue SWC technology.	84	91	8	9	-	-
Maintaining Conservation structures is my responsibly	76	82.8	16	17	-	-
Grasses are as beneficiary as crop production	71	77.1	21	22.8	-	-
Conservation structure protect washing away of fertiliser	92	100	-	-	-	-
Mean	85	92	7	8	-	-

Source: Field Survey: 2000

Table 7 b: Beneficiaries attitude towards negative expectations from the project Intervention

Statements (**Negative**)	Agree		Disagree		No Response	
	F	%	F	%	F	%
The structures are too technical to construct alone	32	34.8	60	65.2	-	-
Traditional NRM methods are better than SOS-Sahel introduced ones	4	4.3	88	95.7	-	-
The structures take land out of production	-	-	92	100	-	-
The conservation measures did not bring tangible benefits to the household	1	1.4	91	98.6	-	-
I have accepted land treatment in expectation of some other extra benefits like FFW	12	13.1	80	86..9	-	-
Newly introduced tree varieties are with limited purposes	3	3.3	82	89.1	7	7.6
Mean	9	10	82	89	1	1

Source: Field Survey 2000

The mean results from table 7 a for positive expectations from the intervention show that more than about 85 % of the respondents show agreement for positive statements. At the same time for negative expectations from the intervention in table 7 b the mean result show about 89 % of the respondents also have shown disagreement for negative statements. No wide variation was seen in responses. In other case, 100 % of the respondents agree that traditional conservation practices in the survey area need improvement / refurbishment somehow and 98 % of the respondents put SOS-Sahel based NRM technologies as the more important compared to traditional measures. The reasons given for agreement include the traditional conservation measures were with limited purposes and inefficient in arresting erosion. In general, the local people have seen positively the technologies introduced by the project, especially soil bund, although it is exogenous to local people. The other evidence strengthening the above discussion was observed during the field visit, when all of the households covered by observations were found working maintaining some of the structures that had been destroyed. The project's NRM expert and WOA conservation expert were asked to give their accounts of how the technologies were perceived by the community. According to project's NRM expert the communities' attitude towards NRM was found to be both positive and negative for different reasons and altogether the participants had a critical view point. The positive attitude is in that structures protect soil erosion, control flood and conserve moisture, etc and grasses put for conservation also serve for multi-purpose advantages. On the other hand rationale for negative attitudes are: 1. terracing takes land out of production (farmers indicate however that the loss is insignificant) 2. terracing is tedious and hard job . 3) erosion can occure always between terraces and soil bunds. The WOA conservation expert states that the attitude of the community towards SOS-Sahel NRM intervention is as the whole positive, because they have seen certain

benefits such as in some places bare land has been covered by grass due to the treatment in the upper part of catchments and root crops such as sweet potato has shown yield improvement as farmers report.

Previous researches done on the adoption of NRM technologies by indigenous people identified positive co-rrelation between positive attitude and successful adoption of technologies (see Mulugeta, 1992, Bahiru 1993, Belay 1992 b). Actually if the attitude of the community towards the intervention is positive, the sustainability will be high. Certain previous studies from other local areas have shown the attitude of community towards 'modern' NRM interventions being negative (see Bekallu 1994 for Agaw areas of Gojjam and Alemenh 1990 for Wollo, Belay 1992b for Gununo areas of Woilata). However, in the case of the present study, although higher number of farmers have shown positive attitude, farmers might have hidden their real feelings or might have benefited due to the efficiency of NRM technologies introduced by the project.

5.3.3. Education /Training Of Household Heads

There are contradicting views regarding the significance of education / training in adoption of NRM technologies. The optimisic argument in this regard is 'how did the ecology of those traditional people remain stable until recently or since the consevistionist started to bring their technical fix ?' (See Bekallu, 1994, Danial 1990, Hudson 1992). Others who stand on pessimistic side of these groups state that the widespread environmental degradation and the subsequent failure of those projects to combat desertification and natural resources degradation could be ascribed to the lack of awareness /absence to supplement of environmental education of the target community

Table 8: Education level of the Informants

Educational Level	F	%
Illiterate	50	54.3
1-6	25	27.1
7 and above	17	18.6
Total	92	100

Source: Field Survey, 2000

As has been shown in table 8 more than 54 % of the beneficiaries are illiterate. During the survey for question 'whether SOS-Sahel based NRM technologies were simple to implement' the respondents were clearly split into two categories. 46 % of the informants with some level of formal educational background and from previous illiterate groups the youngsters argue that they have faced no difficulties in implementing various NRM measures. Whereas those illiterate and old aged noticed that handling of NRM technology and its associated implementation procedure needs 'modern' knowledge. As a whole, all of the informants agree that the supplement of environmental education and technical training and advice on NRM technologies is necessary for successful implementation. In fact, the project in this regard trained 3-5 people from each catchment for 5 days in different SWC technologies and NRM management concepts. Those who participated in training program were given chance to make inter-cross visit to Konso, the area where traditional soil conservation practice has shown success as a case in Ethiopia. The catchment team leaders were also provided with the training manuals with the intention of farmer to farmer dissemination of training impact.

There is significant difference between the plots of those who have participated in training and other ordinary farmers. For instance, from the present field observation it has been noticied that in terms of both qualitative and quantitative scales, various NRM technologies were well implemented by the catchment team leaders in both catchments. Also, the structural measures

like micro-basins, 'fanya juu' terraces were mostly seen in the catchment leaders plots. The reason for the absence of those structures on ordinary farmers' plots is that such structures are too technical to construct. Majority of illiterate farmers on their own stated that thier technical difficulty about creating such structures. They stated that they could not construct thier structures / soil bounds if these structures collapse unless guided by team leaders. The reason given is that the construction of such structures need consideration of enginering/technical aspects such as measuring and maintaining slope (gradient, reading meters and other device) that need literary and numeric knowledge. That is why Randriamampianina and Anton (1992) earilier stated that the NRM technologies introduced to ordinary farmers should be easy for implementation. It is evidenced from the present study that some kind of training arrangements for higher and successful benefits of the beneficiaries is necessary. In this case the multiplier effect i.e. farmer to farmer dissemination of technical know has not worked, as all the structures has been constructed in guidance of the team leaders. The contention here is, what would happen if those team leaders leave that area for particular reason? The findings of the present study confirm several previous studies in other areas (see, Belay 1992b, Mulugeta 1992). As a lesson, involving several members of the beneficiaries seems to be more necessary even if this exercise in training will incur the project high cost, the beneficiaries however, should be thus able to handle NRM technologies by themselves. Additional training is also requested by more than 50 % of the respondents during the survey. Training can be facilitated by other alternatives, such as arranging short term training within the catchments, by making those trained people to train others instead of 'spoon feeding'. The other possible means is targeting both primary and secondary school children and environmental education clubs, (as eventually the children can assist their parents during no-school days and after schools). Providing work

guide / manuals and other literatures not only to catchment team leaders but also other farmers who can read and write could also widen the impact.

5.3.4. Land Holding Size

Increasingly positive argument developed in the related flourishing literature is that any NRM intervention designed to address the land degradation problem of small farmers should take into account the land holding size as a very important variable (see 3.1.4 section of this paper). According to UNDP (1996) survey, the average holding size in Kindo Koisha is around 0.25 ha. Other sources indicate it to be on lower size (see Data, 1998). However, the average holding size of the households covered by this survey is 0.5 ha and the figure varies from 4.4 ha in Woisha catchement (highland) to 0.55 ha in Milke catechment (midland).

Table 9 - Holding Size of the Survey Area

Size (ha)	Milke		Woisha		Total	
	F	%	F	%	F	%
0.1 - 025	11	22.2	15	34.1	26	28.6
0.26 - 0.5	24	50	18	40.1	42	45.7
0.6 - 0.75	7	14.4	7	16	14	17.1
0.76 - 1	4	8.3	4	9.1	8	8.6
1.1 - 1.5		-	-	-	2	2.8
1.6 - 2	2	5.1	-	-	-	-
2+	-	-	-	-	-	
Total	48	100	44	100	92	
Average	0.55		0.44		0.5	

Source: Field Survey, 2000

Appriciable scarcity of land is prevalent in highland areas of Woisha catchment where 76 % of the households covered by this survey own less or equal to 0.5 ha. The percentage of households with the same figure in Milke catchment is 72 % (see table 9). Indeed, during field observation better performance was seen in Woisha catchment where the land constraint is serious. Although it was assumed in this study that farmers with larger holding size would be better in adopting new technologies the reverse was found to be in the actual field true at the aggregate level (catchment level). Hence, this leads us to question again the previous findings that attested yet there is direct relation between land holding size and the degree of adoption. In this case, it is only the major plots (near to the homestead) that were found to be treated. No households interviewed indicated that they have treated as well any other than their major plots. The field observation by the research team has also confirmed that those farmers with small size of plot have readily and willingly put different kinds of physical structures in 'proportion ' to their neighbours. This is because they have to exert more because of the relative scercity of land on their part.

All of the informants seem to have similar idea regarding relationship between the holding size and the degree of adoption. It was rationalized that what matters is not the loss of land by structures, rather the safety and effectiveness of the structure in arresting further degradation. They did not deny that certain portion of the holding is occupied by the structures, but the loss of the land is insignificant as compared to the benefits in the form of higher yields after the adoption of new NRM measures. In fact, the other evidence strengthening the above discussion is that very few only 2.9 % of farmers in Woisha catchment destroyed the physical structures for loss of crop land. The reasons given by others who have destroyed the structures 8.3% of the total households surveyed is for the encroachment of weed (*pedha)* and for shifting the

structures. Nevertheless, almost all of those who have destroyed partially were maintaining again and stabilising the structures as was observed during field work.

The project's NRM expert and WOA conservation expert also support the above findings from general survey. Their assertion is that the initiation to adopt conservation measures does not directly correlet in any way to the size of holding. The WOA conservation expert adds " the small size of land rather encourages farmers because, it is the one with smaller polt that would be threatened in the loss of land". So the findings of this study does not coincide with some of finding of other authors (See Belay 1992 b, Amare 1988, Yeraswork 1995) which asserted that physical conservation structures were not attractive to farmers with small plots. Also, similar finding was made in other parts of the Third World, for instance, in South East Asia (see 3.2.4 section of this paper for details). The discrepancy between findings of the present study and those in some of the previous studies in Ethiopia might have occured due to two main reasons. The first is that in areas where the previous studies were conducted, the farmers might have destroyed the structures without actually visualizing their impacts in the long term or the studies might have been conducted before the full adoption of technologies by majority farmers. The second more convincing justification may be in relation to how the vertical row has been placed. From conservational point of view, physical structures / bunds / have to be placed in every vertical meter of the slope (see Herbinger *et.al*, 1999). But as visualized from the field observation and as the NRM expert indicated, the most widely adopted technology (soil bund) is put widely in the interest of the farmers. The finding also shows that the technical fix should consider local physical (the slope, gradient) conditions and land holding constraints, immidiately to be accepted by farmers.

5.3.5. Family Labor Size

The availability of family labour is one of the most important pre-condition for successful implementation of conservation measures by farmers as experience has shown in different parts of the world. Almost all informants indicated that they depend on family labour for both agricultural activities and conservation tasks although there are other types of labour arrangements such as casual labour (*angiya*), labour sharing (*hashiya)* and communal work (*dagua*). The existence of such kinds of arrangements has been also reported by other previous authors (see Eyasu 1998, Data 1998). About 64.1 % of the informants responded that they do face labour shortage to undertake both different types of farming activities and conservation work.

Table 10- Family labour size (Active)

Size	F	%
Only heads	42	45.7
Heads + 1-2	36	38.6
Heads + (3+)	14	15.7
Total	92	100
Average	2.4	

Source: Field survey 2000

N.B active labour here as reported by farmers include those who engage in labour intensive activities

For the question 'for what type of activity do you give more attention or emphasize in case of labour shortage ?'. About 58.6% stated that they do prioritize conservation activity. However, as shown in the table 10, more than 45.7 % of the households labour supply is limited to only household heads. The rest 38.6% of the households have either 1or 2 additional labour size. It is only less number (15.7 %) of the households which have either 3 or more labor hand in addition to the heads. The average active family labour size is 2.4 for the households covered by this survey. Among the major reasons explained as a cause for labour shortage include out-

migration, most household members being under-aged children, unfavorable attitude of younger generation to work on farming related tasks and poor health due to malnutrition and the like. For instance, 67.5 % of the households covered by this survey stated that either one or more mature male/female children have migrated to urban areas for search of casual job. Though, migration can be cited as positive in terms of reducing population pressure on the land, on the other hand, it is hindering the households' initiation to undertake labor-intensive conservation activities such as stone terracing and soil bund building. The other reason, though less reported, is the schooling of the children. Two cases from key informants, one from Milke catchment and the other form Kae Nare catchment more signify the importance of labour in relation to NRM adoption level.

Box-2

I my self largely engaged in constructing these stone structures, through working both day and night, yet it was done later with the co-operation of neighbours that I have fulifilled the task. Still tasks like upgrading, stabilising and frquent mentainance need additional labour. But all of my schildren are young.

Source: Farmer from Milke catchment (see annex 2 b also)

The other case is form Kae Nare catchment where RRA was conducted. The catchment is one of the first two catchments where the project started NRM intervention through individual approach in 1992.

Box- 3

As you can see, I put soil bunds of 30-40 meters in 3 rows. But, since last year, I have been seriously sick and all the bunds were silted. Now they have turned from cheking structures to other devastating structures. Nobody helps me, as all of my children are young. The responsibility of catchemnt group is until you put the structures for the first time.

Source: Farmer from Kae Nare catchment (RRA)

In fact, the project initiated the launching of organizing conservation work-group known as 'catchment group' after the failure of individual approach since January 1996. The conservation work group co-operates among group members while for the first time constructing the structures. Yet maintaining stabilising and renewing the structures are the houschold's responsibility.

The project's NRM expert and WOA conservation expert had differing opinion about the relationship in the adoption of new technologies and the family labour supply. The information obtained from the project's NRM expert supports the findings from general households survey discussed above. Accordingly, he states that he hears compliants regarding labour shortage among target groups in relation to the adoption of NRM, certainly there were households who became reluctant to adopt conservation measures. The reasons are many: 1) many household members engaged in off-from activities including daily labour so that they could address to their day to day needs. 2) many households have no active labour to go beyond their regular crop production and off-farm activities and 3) some households still have no able-bodied

labour at all. On the other hand, the WOA conservation expert states that the farmers in the wereda do not face labour shortage unless in case of disability. However, the existence of labour shortage is found to affect other activities also. For instance, farmers declare that they are not able to carry and spread their compost or even digging compost pits. Labour shortage for digging the pits and carrying compost were mentioned as constraint by all informants. Labour shortage is also acute among poor households because they rent out their labour, even without having enough for their own. The finding of this study strengthens the conclusions of several previous studies that households labour supply and adoption of NRM intervention positively correlated (see Belay 1992 b, Amare 1988, Mulugeta 1992).

The other problem in relation to the role of labour supply of households in NRM strategies though less recognized and discussed in earlier studies is lack of the recognition of female households' contribution. Only a few (4%) female headed families covered under this survey were participating in on-farm NRM activities. There are several reasons mentioned related to culture, moral aspects, lack of physical strength, and social division of labour and motivation. However, women practice every kind of agricultural activities in the study area except ploughing and sowing. The prejudice is that if females plough or sow, 'seeds do not germinate, even if they do, they would not give good production'. Contrary to this during field visit it was observed that females were working in Employment Based Safety Net Program (EBSNP) in road construction which is initiated by the project as additional income generating mechanism. But it is puzzling that same labour input has not been replicated in the project's intervention strategies on their own farm?

In general the observation during field work has shown that those households which have implemented conservation work (physical) are those not reporting labour shortage. Hence, the project should encourage the NRM intervention technologies that can be undertaken by individual farmers. In addition, other socio-cultural factors inhibiting household labour contribution should be also discouraged through awareness creation.

5.3.6. Livestock Size

Livestock is part and parcel of the agricultural system in Kindo Koisha. Locally draught oxen ownership and livestock size are important criteria to differentiate households into socio-economic groups. Physical assets such as conditions of the house and the size of crop grown and trees were not considered as criteria for wealth ranking (Eyasu and Scoones, 1999). It is the head of the cattle and livestock which count for property ownership. Cattle are indeed a great asset, kept for multiple purpose such as sources of draft power, biological fertiliser (manure), cash income when sold, source of food and as status symbol. As informants stated the condition of livestock raising are getting difficult; many animals were sold or lost due to disease during the last few years. Although about 90 % of the informants indicated that they have livestock resources though the size is very small.

Table11: Livestock Resources in the Survey Area

Number / type	0	1	2-3	4	Total	Mean
	%	%	%	%		
Oxen	47.1	50	2.8	-	41	0.6
Others	14.4	15.7	40	32.8	215	3.1
Total					256	3.6

Source: Field Survey, 2000

As highlighted in tables 11, about 47.1 % of the households do not have draft oxen. Similarly 50 % of farm families have only one ox and only 2.8 % of the households have 2-3 oxen. Even among those who have a single ox, the majority stated that they have acquired it through joint ownership arrangements. Access to livestock resource is important for land fertility management in the study area. Significant difference has been observed between the fields of farmers with cattle and that of farmers without cattle resources. According to most of the informants, the absence of cattle means, the *darkuwa* which is important for the growth of perennial crops such as enset (Enset ventricosum) and coffee will become *lada* which means infertile. This again further deteriorates farmers' source of income, productivity and means of sustenance. Two reasons were frequently mentioned for such a limited size of cattle resources in Kindo Koisha. The first and the basic reason is lack of communal or private grazing land and grassland for 'cut and carry'. Tethering the animals for the purpose of feed and fodder in front yard and along road side is the common culture in the highland (for instance, Woisha catchment) areas of Kindo Koisha. Thus, 85.7 % of the informants stated that they have critical shortage of feed even for that limited number of cattle, usually in between October and April, and in some instances throughout the year. Nevertheless, about 85.5 % of respondents stated that they have introduced different types of grasses (*dasho* and elephant grasses) as part of the multiuple strategy, such as using them as conservation structure, and practice 'cut and carry' system for feed and fodder, even in dry seasons. Such grasses are grown over soil bunds for stabilisation and can reache in 15 to 20 days for 'cut and carry' purpose (see fig. 5 a also). Quite naturally, those with livestock resources were more interested in the mentioned grasses. Thus, Belay (1992a: 117) argues that the livestock constitute a very important component of

the farming system in Wolaita there is no doubt, NRM measures that combine soil conservation structures with grass production will be highly accepted.

Table 12: Farmers Rank (analysis) of Advantage and Disadvantage of Livestock in Relation NRM.

Advantage	%	Disadvantageous	%
For manure use	59	Overgrazing	56.4
For increasing income	26	Destruction of Con. Structures	14.3
For Labour (ox)	22	Demand High cost for veterinary	10
For Food	10	No Problems	7.1
Yipa (residue)	15		

Source: Field Survey:2000

As shown in table 12 the farmers' analysis of the advantages of livestock resources are many, apart from their significance in relation to NRM: they serve as sources for manure, cash, labour and food items like meat and milk for healthy diet. This aspect also supports the previous finding by others in the study area (see Data, 1998). The WOA Conservation expert also stated that 25-35 % of the households own different forms of livestock, which they can afford, and which have several advantages. However, he adds that one disadvantage is farmers have spet time and energy in practising 'cut an carry' scheme to get feed and fodder for them. This plea however, does not convince the author mainly because this is not at all a cogent plea. Again, though the degree varies in two catchment areas covered under this survey and other two catchments where RRA has been conducted, informants emphasised that the absence of draft oxen did hinder in adopting the NRM technologies in different ways. The major reasons mentioned include; adding human labour burden in the absence of cattle (ox), leading to the scarcity of mannur, and inhabiting additional cash income that is availed from animals.

Furthermore, the informants complained the project for not addressing their cattle shortage problem especiallyt draft oxen.

However, the project's NRM expert argue, that the project has been addressing pasture problems through forage and vegetation oriented soil conservation practices by for instance, forage development on farm boundaries and in back yard areas where the land is not used for crop production to couple the advantageous of livestock resources. However, addressing only pasture problems cannot alleviate household's livestock resource problem. In such cases arrangement of credit for purchaising oxen would solve the draft oxen shortage and could further address multi-faceted problems of farmers resulting from its absence. This can be facilitated by either through SCs of the project or by arrangement with other financial institutions.

The other issue in this regard is that of improving the veterinary services to ensure the health condition of the existing livestock resources. Informants even in highland areas observed that there is incidence of trypanosomiasis. The informants in both catchments also stated that they have to travel 3-4 hours (Bele, Wereda town) to get veterinary services and even that is not ensured in most cases most of the time. This problem of lack of veterinary service has been also indicated by other source (see, UNDP, 1996). Although it has been reported by both WOA conservation expert and project's NRM expert that the project has strengthened veterinary services, the service has not yet expanded to the areas where this survey has been conducted.

5.3.7. Households Cash Income

A body of recent literature describes that adequate amount of both on-farm and off-farm cash sources are necessary not only for good life, but even for the minimal purpose of successful adoption of NRM technologies (Aamare 1988, Laban 1995).

Table 13: The average annual cash Incomes of HHs (in Birr)

Income	Catchments				% of total HHs	
	Milke		Woisha			
	F	%	F	%	F	%
0 - 99	12	25	1	2.3	13	14.1
100 - 199	8	16.6	10	22.7	18	19.6
200 - 299	6	12.5	9	20.4	15	16.3
300 - 399	8	16.6	5	11.4	13	14.1
400 - 499	7	14.6	5	11.4	12	13
500+	7	14.6	14	31.8	21	22.8
Total	48	100	44	100	92	100

Source: Field Survey, 2000

As indicated in table 13, the annual total cash income of 77.2 % of households is below 500 Birr. The average annual total cash income is about 386 Birr for the survey area. Thus, income constraint is much more obvious and visible in the two agro-econologicl zones (catchments). In woisha catchment, about 23.5 % of households annual cash income is below 100 Birr and only 14.7% of households cash income is above (500+) birr. In contrast in Milke catchment households with cash income below 100 birr constitutes only 2.8 % whereas those with more than 500 Birr constitute about 30.5 %.

The income variation in between two catchments also further reflected in the use of agricultural inputs that the farmers undertake. In Woisha catchment, only 50 % of the households covered in this survey were using different varieties of inputs, most frequently, chemical fertiliser, and improved seeds. The rest 50 % were found to be non-users. The

reason behind as they explain is economic i.e. due to the absence of income for pre-payment and uncertainly of the return from agricultural inputs. Although other factors such as land/holding size and habtual non-use cultures were mentioned. However, in Milke catchment 91.6 % of the respondents were found to be users of chemical fertilizer. The finding shows that there is direct relation between holding size and income.

Table 14- source of cash income of households covered by survey.

Source	Milke		Woisha		Total	
	F	%	F	%	F	%
Only on- farm	23	48	26	59	49	53
Only off-farm	18	38	15	35	34	37
Both	7	14	3	6	9	10
Total	48	100	44	100	92	100

Source: Field Survey. 2000

As shown in table 14, about 53% of the households obtain their income from only on-farm sources, 37 % from off-farm sources and only 10 % from both on-farm and off-farm sources. About 59 % of the informants stated that additional off-farm income is necessary to invest in their land such as, improvement and adopt means to raise productivity, using agricultural inputs, for purchasing seedlings and hand tools. In addition they need to meet the childerns' school fee, stationaries, government taxes and levy etc. and to purchaise clothes and other HHs demands. However, little effort has been done by the project in this regard. Local credit and saving scheme can alleviate such problems, indeed most of these off-farm incomes generating services and industries are governmental and broad sociatal responsibilities. But it is only 4 % of female-headed households covered under this survey that were targeted to local credit scheme. The following case signifies the importance of local credit in relation to NRM.

Box-4

I got Money from SOS-Sahel to engage in spinning and local sprit making. Through time I bought one cow on joint basis. Now that cow provide me milk, which my children use for healthy work and small amount of manure and residue to maintain the fertility of the soil

Female Household Head, Milke catchment

Source: See annex 2 d for details

The findings of this study show that most households in study area depend mostly on on-farm cash income. In some other study made by others earlier there are evidenes of farmers depending on some off-farm incomes. For instance, as (Data, 1998) states income from off-farm activities is important. Most farmers earn income from off-farm activities in addition to the sale of agricultural products. However, the poor even depend more on off-farm income especially in years with a bad harvest.

Thus, improving and diversifying the off-farm income through the provision of credit scheme and other means such as skill improvement in local crafts and marketing of these goods should be part of the package of NRM initiatives of the project if possible and feasible. The following testimony siginifies how the lack of access to off-farm income means in the local area affects the adoption of the project's NRM intiatives.

Box-5

I put these five rows of soil bund before three years. But due to the absence of cash needs of the household I was forced to migrate to Birayle areas of South Omo to earn cash by engaging in private investors cotton plantation. When I come back after one year as you can see all the bunds are silted and no longer able to check erosion and conserve moisture. In addition the structures are encroached with dangerous pedha weed. Now it will incur me high amount of labour. Had it been maintained and stabilized on time it would never have turned to this status

Source: Immigrant farmer in Demba catchement (RRA)

The current Ethiopian government financial policy discourages NGOs involvement in credit scheme (see Hailu, 1999). But other types of arrangements such as contact with formal financial institutions (micro-enteprises) for instance, Omo Micro-Finance which is operating in the wereda can be the other alternative to meet and up-grade the cash requirements of the farmers targeted to conservation. In Kindo Koisha there are now big weekly and small daily markets. If poor households are provided with certain initial capital and given training in entrepreneur capacity building, they can engage in petty trading, diversify handcrafts and can get additional income that enable them to invest on their land.

Both the project NRM expert and WOA conservation experts have similar argument to what has been discussed above in relation to cash income. The WOA conservation expert observed that it is a usual practice to see those poor household members /heads migrating in search of off-farm activities, but those with better income are stable. The NRM expert argues that the

poor have always to prioritise their immediate needs rather than engaging in something like conservation which brings benefit in the long term. Hence this author also believe, prior targeting of those undertaking conservation activities for the benefit of local credit scheme and other cash income generating means could help as to attract others who are reluctant to implement conservation measures and to increase the replication of the NRM technology. In fact, during the slack agricultural periods, there is EBSNP (road construction) on FFW/CFW basis that is thought by the project to be an off-farm income source for poor households. But in this case those targeted for conservation may or may not participate on EBSNP.

5.3.8. Access to Basic Social/Physical /Infrastructures

Current research findings have shown that access to basic social infrastructure facilitate the quick adoption of technology by farmers (see 3.2.7 part of this paper).

Table 15: Access to some Basic social infrastructures in the study area

Infrastructures	Milke		Woisha		Total	
	F	%	F	%	F	%
Grinding Mill	15	32	15	34	30	33
Road (feeder)	31	65	33	75	64	70
Clinic	26	55	29	65	35	60

Source: Field Survey, 2000

Kindo Koisha is one of the best areas to illustrate where the poor infrastructure development impedes livelihood in general. As indicated in table 15, major basic physical infrastructures are in short supply. However, currently, the problem of road seems to have shown improvement, due to two road project interventions. The first is the Soddo-Chida road, which crosses the wereda and connects some of the PAs to Wereda town and some of the PAs to each other. In other case SOS-Sahel itself has constructed more than 200 kms of feeder road which connects PAs to each other and to wereda town, Bele through EBSNP (see fig 6). Most respondents

have appreciated these achievements in this respect. In Kindo Koisha a large proportion of the population live in the mountains area far away from the main road. Informants observed that they faced enormous problems and expenses in transporting agricultural inputs to their village as well as carrying their own agricultural products to the market for sale prior to the improvement of the road infrastructures.

Fig 6*: feeder road and road side checkdams*

Source: Photo, February 2000

In addition the introduction/ improvement of health services is also necessary, as malaria is becoming common in mid-highland areas including Milke catchment. The existence of health service will facilitate also the diffusion of family planning service that can eventually minimise the increasing population pressures on resources. The project however, has no health sector component in its intervention activities. But as the issue has implication for its NRM intervention, strengthening capacity /collaborating with other organisations, working in that area could be advisable.

5.4. Sustainability of the Project's NRM Intervention

The concept of sustainability is very important concept in NRM interventions as the benefits from such projects / programs need long period of time for full gestation and accomodation in peopls' farm behaviour. So, based on field survey, other formal and informal discussions at field level and institutional level, and review and analysis of policy documents, the sustainability aspect of the project has been summarized as follows.

About 78.6 % of the beneficiaries covered in this survey express their commitment to continue the NRM intervention (to make it part of their production system) even if no incentive would be provided continuously / after the withdrawl of the project. All of those farmers interviewed through RRA in other twin catchments have also shown interest to continue the project's NRM intervention. All the informants and project officials tell that the beneficiaries have been provided incentives in the form of hand tools on subsidized basis and seeds and grass-strips etc. However, they were provided with CFW/FFW only for off-farm conservation activities. But significant variation comes to appear when they were asked about the means as to how would they continue the NRM technologies in the future (see, table 19 below).

Table 16: Farmers Response on How to Continue SOS-Sahel Intervention

	F	%
- By using experience gained and own tools	39	42.8
- If technical and material assistance will be available	20	21.4
- If the conservation work group persists	10	11.4
- Only maintaining the existing structures	3	2.8

Source: Field Survey, 2000

As can be seen from table 16, more than 78.6 % of the respondents expressed that they would like to continue the intervention. But there is variation on how they would continue. About 42.8 % of the respondents expressed that they would continue to undertake conservation measures through the experience gained and by using their own tools. The other 35.7 % put different forms of pre-conditions like 'if tools, technical assistants, material assistants --- etc could continue'. Most of those who requested FFW/CFW were found to be from Milke catchment, where there was off-farm conservation activity on FFW/CFW basis. The other, 21.4 % expressed that they would not continue at all unless the project continues in providing incentives. The reasons given by the latter group is like lack of tools, training and weakening of the catchment conservation work group. Farmers were also asked to suggest what would have been the best alternative to sustain the project interventions.

Table 17 : Farmers Best Suggestions to Sustain NRM interventions

Suggestions	F	%
• Provision of hand tools and implements	30	32.6
• Technical advice and additional training	16	17.3
• Incentives in the form of FFW/CFW	14	15.2
• Strengthening the infrastructures and the veterinary services	10	10.8
• Strengthening catchment work group	5	5.4
• Co-operation between project and local government	4	4.3
• Continuous provision of trees, grass-stripes etc.	4	4.3
• Introduce local credit scheme / cash ,oxen/	4	4.3

Source : Field Survey, 2000

As presented in table 17, provision of tools and implements (32.6%), technical advice and additional training (17.4%) and support in the form of FFW /CFW (15.2%) were the major responses in terms of priority order. These responses imply that lack of tools is the major resource limitation in the study sites, even if hand tools were provided by the project on subsidized basis. In addition the project had tried to initiate local supply of improved farm tools through blacksmith support program, however that was failed. All farmers complain that the tools that they have been provided now become non-functional and that shortages of tools hinder their efforts, but they frequently cannot afford to purchase these items which are scarcely available in the local market. Finally some of the more interesting alternative suggestions given by farmers for the sustainability of SOS-Sahel NRM interventions (see table 20). Almost all the reasons are some how referring to outside /external support in the form of handouts (aid mentality).

In addition the evidences from informal discussions on both on-farm and off-farm conservation activities also support the results of the general survey. During informal discussion issues related with sustainability of both on-farm and off-farm conservation activities were raised. Issues raised include such as the relation between on-farm conservation activities and off-farm conservation activities, whether the guards would continue to protect the conservation structures on the so-called communal land, whether the beneficiaries have both technical and material capability to undertake the same measures by self initiation after the project phaseout etc. Guards posed various responses. Regarding the existence of the relation between on-farm and off-farm conservation activities the informants agree that in the catchments like Milke (their own) where the lower and the middle parts are settled by farmers, the un-treatment of upper and top hills would devastate the on-farm conservation activities at the middle and down

stream. Hence the effectiveness of structures on the individual farm plots depend on the strength of off-farm conservation activities in such cases (see, annex 2 a). One of the key informant whose house is in the uppermost stream of Milke catchment gave also the same analysis (see also, annex 2 b). When the catchment 'communal land' guards were asked about 'whether they would continue in protecting the 'communal land' some inconstancies have been observed among their responses. Those who participated in inter-cross visits and attained training argue that they would continue in taking care of it. The justifications given include, in Konso one individual farmer's land is not less than the off-farm conservation site (Sudo Mt.), hence it is possible to take care of it. Some guards openly said that they could not continue to protect, at least for three reasons: 1) they noted that no authority is vertued to punish those who are disbanding the mutual agreement, although there is an agreement that if guards present the case of those who violate communal rule to the PA, it will punish them. 2) the culture of cooperation, mutual trust, willingness for self-initiation or for common cause /work, is becoming very loose. 3) the guards must have been provided with some kind of incentives as the protection work was diverting them from their own private but main agricultural activity. While they were assigned the task of taking care of the off-farm conservation sites they were promised to participate in FFW/CFW without passing screening process with other community members. Besides, there was also an agreement to use grasses and some tree products after thier regeneration. For the time being however, FFW/ CFW has ceased functioning, and it will take time to see other expected benefits. So the question here is: is it justifiable to give such arduous responsibility to only 6 persons and that too without any direct payment or other benefits to them ? By definition if it is communal land (but to me it is no one's land), why was some other kind of arrangement made in the manner that the whole community take

responsibility by times, or in the form of collective responsibilty and share the benefits on equal basis,?. Previous authors and the experience from other countries prescribe tenure security as the ensuring mechanism to sustain such activities on communal resource management. In addition the present author also suggests that ensuring even the usufract right can alleviate the problem and can sustain the activities. Still the other question might be raised: to what extent are these catchment area leaders able to stimulate and guide the community? To what extent are they regarded as the representatives of the community interest?

The responses of officials of the project, as well as local and federal government, widely varies on the issue of sustainability. The project's NRM expert believes that the initiative of the project will sustain (i.e. farmers will institutionalize it) after the phase-out of the project as the necessary capacity building essential has been achived both for the community and to the WOA. Hence there would be successful horizontal (farmer-to-farmer) dissemination of technologies with time. The WOA conservation expert also supports the above idea, and states that farmers would undertake the intervention further by using their own tools, the additional back-up service undertaking, for instance, such as planting seedlings being provided by WOA.

However, the North Omo Zone NGOs and Multilateral Projects co-ordinator, SNNPR BOA NGOs and Investment Desk Expert and Federal DPPC NGOs co-ordination officer, disagree with the previous optimistic arguments. It is common to see the usual failure of the NGOs NRM management activities with the phase-out of the implementing project. The Zonal NGOs desk official cites the case of KRDP's intervention itself, as how the level of farmers enthusiasm and commitment one or two years back to the cause and task has almost different, as there have appeared visible symptoms of weakness in activities and other earlier interventions within North Omo. The justifications about such happenings given by the Zonal

official is that short term benefits such as subsidized hand tools for private land treatment and CFW/FFW for communal land treatment played a grater role during implementation rather than in the long term results from conservation. For instance, the intervention of CONCERN Ethiopia in Damot Gale Wereda, the whole effort has been collapsed after its withdrawal (this problem was also cited by BoA expert). CONCERN Ethiopia, an NGO initiated NRM both on private and communal land following the 1984/85 drought. The disagreement of the Federal DPPC officials with the previous positive arguments on the sustainability of SOS-Sahel's NRM intervention is that in the last two decades NRM intervention by different NGOs in Northern Ethiopia, especially South Wollo and North Shoa has failed because of the stoppage of external assistance. The Federal officials also make some other comments from strategic point of views that are threatening sustainability: 1. lack of needs identification / mismatch between local demand and project intervention. 2) lack of stakeholders' participation (genuine participation of community and concerned sector offices) in designing, implementation and evaluation of project initiatives. 3) lack of technical safety and efficiency of technologies introduced i.e. when the technical measures are introduced without ensuring the suitability and appropriateness to local situations. 4) absence of clear phaseout strategy. Most NGOs in Ethiopia do not have clear phaseout strategy in the sense how to hand over the interventions after the termination of the project. The same point was also raised by Regional NGOs and Multilateral Projects co-ordinator.

As such, it is clear from the above and earlier discussions in other sections of this paper, that arguably local communities in the study area did have concrete ideas about the long term benefits of conservation and adopted the measures at various scales. However, still it needs time to make them capable of caryingout the initiatives by themselves as they try to shift the

burden to external bodies. The heavy and primary emphasis on external support means that the majority of the beneficiaries has hardly realized that their initiation and involvement is the best solution for long term benefits from conservation. In general, taking series note of the following will be instrumental for enhancing the sustainability of SOS-Sahel's intervention in the study area:

1. Farmers did not develop self-confidence / self-reliance, both technically and materially. Most farmers requested further or even continous material (tools, and FFW/CFW) and technical (training) provision.

2. The conservation work group in both catchments seems to started to weaken. The majority of the farmers reported that in the last one year, almost no group conservation work was carryout after the project stopped the technical back-up. However, there are as many as households /farmers who did not get chance for putting structures on their own plots, because they were involved in group work performing the task of construction done in other farmers plots. In addition, during the RRA those farmer who were targeted during the individual approach (before 1996) also stated that it is practically impossible to carry conservation work unless there is co-operation among catchment members.

3. The multiplier effect, that is farmer-to- farmer replication of NRM technology could not occure. As those farmers close to the current beneficiaries but not targeted by the project, showed positive interest in NRM technologies adopted by their neighbours, yet they never have been imitated the technology. This leads to question that the adoption of technology is linked with some other additional benefit.

4. The WOA that is supposed to take the back-up service after the withdrawl of the project is not in a promising position in its current status to provide the necessary support for the farmers. For instance, it fails to run the nursery site and also no other technical assistance was provided in the last one year. Farmers do not have other alternative means to get tree seedlings and the technical assistance in case they need. In such cases, the development of tree seedlings by the individual farmers/ group nurseries could have solved the problem.

5. Only few locally known technologies such as stone bund and *dasho grass* were incorporated in the intervention of the project. The dominance of externally induced technology means that some time farmers may resist, while they observe certain defects instead of correcting it, distruction might be chosen.

6. Lack of clear NGOs roles and responsibility in NRM policy / strategy designed by national /regional government as how the 'package' of NGOs intervention should look like. That would enable NGOs to design and implement sound NRM packages from its on-set, which may ensure and enhance sustainability.

CHAPTER SIX

6. SUMMARY, CONCLUSION AND RECOMMENDATIONS

The present study has attempted to examine the adoption and sustainability of project induced NRM technologies by selecting two catchments from SOS-Sahel /UK's intervention area in Kindo Koisha wereda. 92 household heads were selected randomly from 363 householdes organized in two catchments to undertake different consetrvation activities. Therfore, the summaries of the major findings, conclusion and recommendations of this study are presented in order.

6.1. Summary and Conclussion

Kindo Koisha wereda the present study area in Southern Ethiopia is one of the areas where environmental / ecological land degradationas expressed through degree of deforestation, degradation of the soil and impoverishment of both ground and surface water and as a consequence of the entire renewable resource system led to appriciable social erosion. This situation combined with fast population growth rate seems to be an impeding the desired and attempted process of socio-economic development. This emerging situation, therefore, calls for a planned, co-ordinated and integrated interventionist approach to development process launched in the area. In fact, those development actors fighting poverty, of the environmental resources as well as of the people should start from the scratch i.e. by addressing various environmental problems on which the livelihood of most rural people in the study area is based.

As such, the country as a whole has thrown such a daunting challenge. In fact, the country has attracted world attention, among many such regions in the developing world; hundreds of NGOs, national and international have come this country since 1970s and 1980s critical period,

attempting to make some herioc efforts of relief and development. These NGOs latter have recognised the relation between resource depletion and human hardship and suffering and the fact that environmental improvement and human development are not antagonistic to each other. SOS-Sahel, an international NGO, specialising in addressing agricultural issues and NRM handling strategy 'package', is one of such NGOs intervening and operating in the study area since 1992. The project was intiated to minimize the threat of soil erosion and land degradation in the study area after the recoginition of the existance of soil erosion problem. Then the project has introduced both structural and agronomicc conservation measures. It followed individual farmer based approach up-to 1996 thruogh 'Participatory Lnad Use planning (PLUP). Latter it changed to community based ' Farmer Led Integrated Watershed Management (FLIWSM)'.

The NRM technologics are well adopted by the farmers although there is variation in qualitative as well quantitative terms from framer to farmer. For instance, soil bound, *dasho* grass and fruit trees weres implemented almost by more than 93 %, 58 % and 50% of the farmers covered under this survey respectivelly.

From NRM strategic paint of view the SOS-Sahel's successes of winning the trust of the beneficiaries/ communities without FFW/CFW for managing their private land can be cited as a good local level experience for co-ordinating framers to manage their own land and can serve as new innovation to discourage the vicious circle of 'FFW/'CFW-NRM interrelated dilemma / interlock' in Ethiopia. It is long ago that people start to think that 'if there is no FFW/ there will be no conservation activities'. The other positive element as compared to previous government based NRM interventions in the study area is, the NRM technologies of the project

The other thing that can be mentioned as the unique finding of this study is the age of the farmers. The age of the farmers gives rise to certain type of behaviour, which often remain unidentified. During the survey those who complain for the difficulty of various SOS-Sahel introduced technologies were found to be old aged.

Small land size is found to be encouraging farmers to undertake conservation measures in this particular case, coupled with the flexibility of the project in putting the structures from technical fix. This has been signified from better adoption of technologies in Woisha catchment as compared to Milke catchment where the land scarcity is sever in former case.

The availability of livestock resources is found to be very important to strengthen NRM activities. Farmers report the presence of livestock encourages NRM in various ways such as providing organic fertiliser, milk and milk products for healthy labour and additional income from sale of cattle and cattle products. The most important, however is the presence of draught oxen, which highly substitutes labour shortage. During field observation significant variation is visualized also between the plots of farmers with livestock and non-owners of livestock. However, little effort has been done on the side of the project to increase the livestock size of the households at manageable size. For instance, 47.1 % of the households do not have draft oxen. Moreover, conservation measures with fodder value were frequently seen in the plots of those farmers with livestock resources.

The study area is one of the places where excess labour is assumed to exist for both agricultural and conservation activities from the general demographic condition characterises the study area. However, 64.1% of informants noticed that they are in short supply of family labour for NRM. One of the major reasons in addition to others to the failure of individual approach

initiated by the project before 1996 was labour constraint. Although, labour supply problems of the farmers is addressed through the formation of conservation work group that can be cited as remarkable achievement, yet the weakening of the catchment work group is also one of the threatening factors of further initiations.

Off-farm cash incomes sources are seen as vital for undertaking NRM activities. 59 % of farmers noticed that their capacity to generate a net cash income was declining and also other significant number of farmers reported that they are compelled to sell calves, heifer, and oxen, which largely inhibited the application of organic fertiliser and facilitate the shortage of draft oxen which aggravate family labour demand. But only female-headed households were targeted to local credit scheme. Although, the project have initiated EBSNP as an additional income for the local people through road construction, it is not necessarily that those targeted to conservation who participate, but those are entitled as the poorest by the PA.

The interwoven and complex nature of environment (renewable resources) as discussed in this paper has been less recognised by the intervention of the project. For instance, the intervention in relation to water and forest management are not clearly addressed. Although, water is serious problem in the area except small well improvement, other mechanisms such as micro-dam construction has not been done to conserve water. The low survival rate of agora-forestry/ fruit trees can be linked to this missing gap. In addition the problem in relation to fuel wood shortage had not been addressed either by introducing agro-forestry trees or by other technological intervention such as improved stove or bio-gas technology. Although the project has intiated communal afforestation it will yield little benefit in solving individual households

fuelwood shortage as such there is no clear usufract right policy in the study area in particular and in Ethiopia in general.

The improvement of physical infrastructures such as road, health and veterinary services have direct relation with successful adoption of NRM intervention. For instance, farmers reported that the introduction of feeder roads in last two years has shorten the time for importing agricultural inputs and exporting agricultural products and to make contact with technical experts. This enabled farmer to save their time to invest in conservation related activities. On the other hand the absence of health facilities for human and animals in both catchments impedes farmers initiation through disease which discourages healthy labour. In fact the project has strengthened the veterinary service as indicated by both project NRM exert and WOA conservation expert. However, farmers in the study area complain for their livestock suffering from trypanosomiasis. They are loosing small cattle resources, which will further aggravate labour problem and income sources. However, the service is limited lowland areas.

The findings of current study shows the replicability and sustainability of NRM initiatives of the project on both on-farm and off-farm can be ensured if there could be possibilities for provision of necessary technical and material back-up by concerned sector offices (WOA). Thse include additional training, strengthnining the conservation work group, provision of hand tools, provision of seedlings etc. Besides, the most important thing is the designing of clear institutional package for environmental NGOs since the needs identification up to handing over the NRM either by regional/national environmental policy. Finally the clearity of ownership right or benefit (usufract) rights from the efforts on the so-called communal land is necessary.

In general as discussed in detail in different parts of this paper the project's NRM intervention is with some strengthens and also with shortcomings indicated elsewhere in this paper. To sum up that the NRM technologies introduced by the project were well adopted by farmers, although its sustainability remained under question. The environmental rehabilitation activities of the project played a catalytic role in changing the NRM trend in the study area.

6.2. RECOMMENDATIONS

The adoption of newly introduced NRM technologies in the study area at present sifnifies that addressing multi-dimensional socio-economic and institutional constriants of farmers targeted to conservation besides the technical feasibility of conservation measures. The solutions seem to be complex and may require multi-sectoral approach in planning and implementation of NRM projects. In light of this the following recommendations are forwarded:

1. The project's strategy not to link FFW/CFW for on-farm conservation site is appreciable and also the project should not try to change such successful beginnings. But as hand tools are found to be major resources constrains, better supply of such measures at implementation stage as well as ensuring access to further supply of hand tools is highly recommended.

2. As this study has shown that the study area is with rich traditional NRM knowledge especially agronomic ones. However, the highest credit is given for physical conservation measures by the project such as soil bund. Agronomic measures have advantageous over mechanical structures, as they are less technical and can be undertaken by individual farmers, pay-off immediate return as well as do not occupy much space. Then carefully selecting and integrating such measures to 'modern' intervention could ensure the sustainability of the project as it is highly adapted to the changing condition of the past.

3. The participation of the majority of the beneficiaries has taken place at the implementation stage of the project's intervention. Steps may therefore be taken to encourage smaller farmers to contribute their part in all aspects and phases of planning, managemnt and evaluation of the attempted NRM interventions. That would enable individual farmers to take part in decisions with in their own constraints and to identify solutions to the problems might occur. Besides, it is also important to develop trust on project.

4. The catchment group leaders were trained on NRM technologies handling and also participated in inter-cross visit. However, the assumed horizontal impact of such advocacy work has proved little success. Therefore, in the future interventions much attention has to be given for training issue, especially those illiterate and old aged groups of the community. Targeting both primary and secondary school environmental clubs and contact with local church leaders could help for wider dissemination of the NRM technologies. The work manuals should also be provided to ordinary farmers who can read and write and inter-cross catchment visits should also be arranged to share experience without going far. Furthermore, other thing in this regard might have been raised is creating a system for supplementing continuos development / basic education to the project area will be highly appreciated.

5. In NRM, community approach seems much better than individual effort. Therefore, both the project and WOA should convince the community to strengthen the conservation work group until the labour intensive work is over and to manage the communal land intervention through common effort.

6. Economic returns from conservation activities are long term in nature. However, the poor always look for short-term benefits to support their life. This leads people to manipulate their

environment in search of other economic and social benefits. In addition outward migration of household members is linked to this truth in the study area. Hence the need for other means of survival of life (off-farm activities) have been vital. Hence to enable smaller farmers to adopt conservation measures and increasing additional cash income to invest on their land arrangements such as local SCs through and contact with local financial institutions and up-grading local crafts through skill training should br arrenged by the project.

7. The improvement of basic social infrastructures has direct implication for better adoption of NRM technologies. Although what has been done by the project in terms of feeder road construction is appreciable, similar trend should be also applied to develop health, veterinary services and other appropriate technologies.

8 . To allivate acute water problem previaling in the area besides natural springs improvement the project should develop effective water harvest/manegement system from streams and watershed for multiple purposes by constructing micro-dams.

9 . The demand for wood, for its various purposes especially in the highlnads is higher than the supply. Thus in order to minmize of wood shortage and mis-utilization of cattle dung and crop residue, besides to the communal plantation, the project shuold introduce agro-forestry trees to individual farming practices as well as modern wood fuel saving devices such as modern fuel wood stove and bio-gas technologies. In relation to forestry individual /group nurseries should be intiated by the project.

10 . In order to sustain the project's NRM interventions the Wereda Office of Agriculture should be prepared to provide the necessary technical back-up service through its DAs and

find way /means to solve farmers constraint of tree seed-lings and hand tools as well as group work parties in the phase out of the project. Prior to that the project should develop the culture of using the government DAs during various stages of NRM technology planning and implementation.

11 . The local government/PA should take the responsibility of cooridinating the communties to manage and protect conservation structures in the so-called communal land instead of giving the responsibiliy only to the off-farm conservation site 'guards'.

12 . EPA at the Federal level and the concerned body in SNNPR should outline clear NGOs institutional packages in NRM policies/strategies and that should become part of the project agreement. Besides, the usufract right of community from conserved communal land should be clearly reflected in these national /regional conservation strategies.

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Annex-1

ADDIS ABABA UNIVERSITY

M.A. PROGRAM IN REGIONAL AND

LOCAL DEVELOPMENT STUDIES

Household Heads Survey Questionnaire

The objective of the Questionnaire: This instrument is designed for the purpose of gathering information regarding SOS-Sahel based NRM programs in Kindo Koisha district, Southern Ethiopia. You are kindly requested to provide accurate information as much as possible. The final paper that will be written based on the information you have provided is intended to serve for an academic purpose.

Instruction: Use 'X' mark for questions with various alternatives

PA _____ Catchment _____ Agro-ecological zone_____

Date of Interview _____Enumerator_____ Code No____ Time Spent _____

Personal Data

1. Age _____ 2. Sex _____

3. Educational Level 3.1 .Illiterate____ 3.2. If literate grade completed ___

4. Ethnic Background 4.1. Wolaita _____ 4.2 others _____

5. Religion affiliation

5.1 Protestant___ 5.2. Catholic____ 5.3 Orthodox ____ 5.4 . others _____

6. Birth place 6.1. Kindo Koisha 6.2 Other places _____

I. **Major Issue – Local knowledge**

7. Did you or your parents put any soil conservation structure traditionally?

1/ Yes / / 2/ No / / 3/ I don't know / /

8. If your answer to Q.7 is yes, what were such measures?

_____ _____

9. Is your farm plot treated with SOS-Sahel based conservation measures currently?

1/ Yes / / 2/ No / /

10. If yes to Q 9 when did SOS-Sahel start it's operation on natural resources management in this area?

1/ 1-3 years / / 2/ 4-6 years / / 3/ 7 and above years / /

11. How was the level of soil erosion on this (sample) plot before the introduction of SOS Sahel based natural resources management activities?

1/ Slight soil erosion / / 2/ Moderate soil erosion / / 3/ Severe soil erosion / /

12. With what type of conservation measures is it treated /state /

12.1. Physical _____

12..2. Biological _____

12..3.Others_____

13. Are such newly introduced conservation measures from among traditionally existing ones?

1/ Yes / / 2/ No / / 3/ I don't know / /

14. If your answer for Q.13 is No which are not? /state/

_____ _____ _____

_____ _____

_____ _____

II. **Major Issue**: **Adoption**

For Questions 15-22 below rate one out of three households socio-economic conditions for the year 1998/99

NO.	Indicators	Increasing	Decreasing	Remained the same
15	The level of erosion on your main plot			
16	The soil fertility in main treated plot			
17	The crop yield from the most treated plot			
18	The household income from farm sources			
19	The vegetative cover of the farmstead			
20	The forage supply of the household			
21	The household energy supply			
22	The household's access to water supply			

23.How do you compare your performance to your neighbours?

1/ good 2/ average 3/ poor

III. **Major Issue – Participation**

24. Have you been given chance to take decision concerning on-farm soil conservation measures?

1/Yes / / 2/ No / /

If your answer for Q.24 is yes then on which of the following activities?

	Yes	NO
25. Identification of conservation technologies	_____	_____
26. Selection of conservation technologies	_____	_____
27. Prioritising of conservation technologies	_____	_____
28. Implementation of conservation	_____	_____

29. others _____

IV .Major Issue- Attitude- for Q 30-41 below rate either 'agree (AG)', 'disagree (DAG) or I don't know (I DK) (use 'X' mark)

No.	Indicators	AG	DAG	IDK
30	I am interested in SOS-Sahel based conservation technologies			
31	SOS-Sahel based conservation structures are efficient in arresting soil erosion			
32	I will continue the adoption of SOS-Sahel based conservation technologies			
33	Maintaining conservation structures is my own responsibility			
34	The newly introduced grasses are equally beneficial to crop production			
35	The conservation structures control the washing away of fertilizer from crop land			
36	Technically I feel competent of maintaining the conservation structures			
37	Traditional way of managing the land resources is better than the new SOS-Sahel based one			
38	The structure takes land out of production which is very important to satisfy the food production of the family			
39	The conservation measures do not bring significant benefits to the household			
40	I allowed the treatment of my crop land by the expectations of extra benefits (like food for work)			
41	SOS Sahel introduced tree species are with limited purpose			

42. Do you believe that the traditional conservation measures need improvement ?

1/ agree / / 2/ Disagree / /

43. If you agree to Q 42 then by what type of conservation technologies should they be replaced?

_____

44. If you disagree to Q 43 above, why?

_____

45. In your opinion which one of the conservation measure/s have you implemented well /please state/

Conservation Measures Reason

_____

_____

46. How do you rank SOS Sahel based conservation technologies in relation to traditional one?

1/ Most important / / 2/ second important / / 3/ Least important / /

V. **Major Issue - Training / Technical assistance**

47. Are SOS Sahel based conservation technologies simple to implement?

1/ Yes / / 2/ No / /

48. If No to Q 47 how?

_____

49. Have you received any kind of training on natural resources management practices?

1/Yes / / 2/ No / /

50. If your answer for Q49 is No then how did you implement?

_____

51. If your answer for Q50 above is yes who provided such training?

Content Organization length of the period

_____ _____ _____

52. Has technical assistant visited your plot during the last 1 year /

1/ Yes / / 2/ No / /

53. If your answer is yes to Q52 from where?

1/ SOS-Sahel / / 2/ Woreda Office of Agriculture / / 3/ Others please specify ____

54. If your response to Q53 is from SOS how many times has such a visit taken place in that period?

1/Every week / / 2/ Once in a month / /

3/Once in six month s / / 4/ Others _____

55. Was the advice useful in implementing the conservation measure ?

1/ Yes / / 2/ No / /

56. If your answer to Q55 is No why?

VI. **Major issue -Land holding size**

57.What is the major occupation of the household?

1/ Crop farming / / 2/ Livestock / / 3/ Mixed farming / / 4/ Other _____

58. How many plots do you own? _____

59. What is the total size of your main holding 'timad' (approximate)? _____

60. Do you plough up and down in the treated plot?

1/ Yes / / 2/ No / /

61. Has the size of treated plot decreased? 1/ Yes / / 2/ No / /

62. If Yes to Q 61 then by how many 'timads'?

1/ By ¼ of a 'timad' / / 2/ By 1/3 of a 'timad / / 3/ By ½ of a 'timad / /

4/ By ¾ of a 'timad' / / 5/ others_____

63. .Did you destroy the physical conservation structures in this (sample) plot?

1/Yes / / 2/ No / /

64..If yes to Q 63, for what reason?

1/ because of the habituation of moles in the conservation structure / /

2/ because of difficulty of up and down ploughing / /

3/ Because of only slight erosion in this plot / /

4/ because of higher loss of crop lands in this plot / /

5/ Because of encroachment of grass in this plots / /

6/ Others _____

65. How do you use the major part of the rest of your main (sample) holding?

1/ For grazing ____ 'timad'. .2/ Fallow land_____ 'timad' 3 / Others _____'timad'

VII. **Major Issue - Livestock Size**

66. Do you have currently livestock ? 1/Yes / / 2/ No / /

67. If yes for Q67 indicate type and number

Type	No.	ownership style
Ox	_____	_____
Cow	_____	_____
Heifer	_____	_____
Calf	_____	_____
Goat	_____	_____
Sheep	_____	_____
Equines	_____	_____
Others	_____	_____

68. Do you apply manure as part of land management ?

1/ Yes / / 2/ No / /

69. If no to Q 68 why not ?

_____

70. Do you have shortage of pasture or feed for livestock?

1/ Yes / / 2/ No / /

71. If yes to Q70 which are the critical months?

_____

72. Do SOS-Sahel introduced any type of grass as part of conservation measures?

1/ Yes / / 2/ No / /

73. If yes what type is it?

1/ local grass / / 2/ new grass type / /

74. How do you see large livestock size in relation to natural resources management?

1) Advantageous

_____ _____

2). Disadvantageous_____

3).Both _____

75. Do you practice cut and carry of grass method from conservation structures?

1/ Yes / / 2/ No / /

76.. Do you allow livestock to graze on the conservation structure after crop harvest?

1/ yes / / 2/ No / /

77. Have you received any training on pasture management?

1/Yes / / 2/ No / /

78. Was the advice useful?

1/ Yes / / 2/No / /

VIII. **Major Issue- Labour Size**:

79. How many people live in your household? _____

Age	No of households members
1/ 0-5	_____
2/ 6-17	_____
3/ 18-60	_____
4/ 60+	_____

80. Do you feel that you have enough labour for both crop production and conservation?

1 /Yes / / 2 / No / /

81. If No to Q 80, which of the activity is given priority in case of labour shortage ?

_____

82. If your answer for Q81 is No then how do you overcome shortage of labour?

1/ causal/ hired labour / / 2/ labour sharing / / 3/ others _____

83. Who else from the permanent members of the household participates in the conservation activities other than you?

1/ mature male children / / 2/ mature female children / /

3/ women / / 4/ others _____

84. If female households member do not participate, why?

_____

85. Is there any one from your households who has migrated in search of casual job?

1/ yes / / 2/ No / /

IX. **Major Issue – Household's Income**

86. What was the average annual income of the household in Birr for the year 1998/99?

a). On-farm income sources (please indicate the income from it's sale if any)

Crop sales

Livestock sales

Livestock products

Others

b). Off-farm sources

Petty trading

Crafts

Remittance/gifts

Casual /work

Others

87. Which of the following agricultural inputs did you use in the year 1998/99 ?

1/ chemical fertilizer / / 2/ improved seeds / / 3/ fungicides / /

4/ pesticides / / 5/ Veterinary drugs / / 6/ others _____

88.. If you did not use any of the above inputs why not?

89. Is any one from your household who is member of any local credit scheme?

1/ yes / / 2/ No / /

90. Do you believe that undertaking conservation activities needs additional off-farm income?

1/ Yes / / 2/ No / /

91. If yes to Q90 then for what purpose ?

X- Major Issue- Access to Basic Social Infrastructures

92. .How far do you travel to get drinking water?

Dry season ____hrs.

Rainy Season ___ hrs.

93. Are you applying any irrigation scheme?

1/ Yes / / 2/ No / /

94. If yes how do you get water ?

95. Is SOS-Sahel provided you with any water supply?

1/ Yes / / 2/ No / /

96. For which of the following do you have access?

1/ Primary school _____ minute 24/Veterinary service ____ Minute

3/ transportation _____ minute 4 /Bio-gas / / 5/ Clink _____ minute

6 / the nearest market _____ minute 7 /Grinding Mill _____ minute

XI. Major Issue- Sustainability

a). Incentives

97. Did SOS-Sahel provide you any incentive for the implementation of conservation measures?

1/ Yes / / 2/ No / /

98.. If yes to Q 97 which of the following?

1/cash / / 2/ Food for work / / 3/ Subsidized implements / /

4/ tree seedlings / / 5/ others_____

99. In the event the project stops support would you continue on carrying out conservation measures?

1/Yes / / 2/ No / / 3/ I don't know / /

100. If yes to Q 99, how would you continue ?

_____

101. If No to Q 99 why not ?

_____

b). Local institutions

102. Is there any local conservation work group in your village of which you are a member?

1/ yes / / / No / /

103. How did that work group come into being /

1/ From existing local organisations / / 2/ newly created / /

3/ other _____

104. What has this work group achieved up to now? _____

105. How is the work group mobilized for any particular collective labour day(s)?

_____

106.Who usually participates in work groups

1/ only me / / 2/ casuals / /

3/ if other household members, specify _____

107.Does participation in work groups has any obligation?

1/Yes / / 2/ No / /

108. If yes to Q107 what are such obligations/ please state/ ?

_____, _____ , _____

109. Do you have any idea that WOA and SOS-Sahel co-operate in conservation activities?

_____

110. Is there off-farm conservation activity in this village?

1/ Yes / / 2/ No / / 3/ I don't know / /

111 .If yes to Q 110 who initiated it?

1/ SOS-Sahel 2/ PA / / 3/ Wereda agriculture office / / 4/ others _____

112..If there is any off-farm conservation activity?

113. Which type of lands is treated with such measures / please state/?

_____ _____ _____

_____ _____ _____

Concluding remark

If any thing you would like to add in relation to our discussion?

_____

Thank You

Annex - 2- Informal Discussions in Survey Area

2a- Group discussion With off- farm conservation Site Guards

Committee Members

1. Ato Tekle Moja ,
2. Ato Faltasa Gebre
3. Asale Tantu
4. Ato Mogiso Moja,
5. Dagaga Dadino,
6. Abebe Aldaye

Q1. What is your role in off-farm conservation activities?

Answer - We were selected by the catchment members and our responsibility is to protect the trees planted and the conservation structures constructed, so that livestocks and people should not damage it. We were monitoring different conservation activities during the active work period whether the trees germinated, the structures were properly constructed and if any problem occurs we report it to the project officials.

Q2. When did the off-farm conservation on this site start?

Answer - The off-farm conservation activities in this site (Sudo Mt.) started during the WADU time in 1970s. There was also intervention latter during the Dergue time. In previous two cases it was carried out by FFW. Due to lack of the success of all those endeavours, now in 1998 SOS-Sahel initiated new intervention was started through hillside terracing and afforestation (around 150000 tree seedlings were planted) of which about 85,000 survived while the rest died. As compared to the previous two interventions the SOS-Sahel is intervention is comprehensive and the activity of protection and advocacy is better. It seems the community has become aware of the resource degradation, but the problem still is the off-farm conservation work has been carried out by CFW basis. Thus in the future if the terrace collapses the reconstruction and those trees died /destroyed due to different factors it may become a problem. Although, we are taking care to it for the time being, for many reasons it is not guaranteed: 1) we do not have the authority to direct or punish those people who for instance graze their cattle or practice cut and carry or cut trees, though there is common understanding that the common land resources should be reserved. 2) unless some solution is found or the PA itself takes care of it taking the whole responsibility is beyond the capacity of we six peoples.

Q3. Have you been provided with incentives for protecting the off-farm conservation activities?
Answer - When we started or took this responsibility, the promise was that we were to participate in FFW/CFW without passing any screening process, while other community members did. In addition we were promised to use grasses and other tree benefits after its regeneration from communal land. It is the community members who selected us and in that premises till now we are protecting the off-farm conservation activities like our own plot.

Q4. Do you believe that only you (guards) can mange in protecting this off-farm conservation site?
Answer – For the time being only we are taking care of it. But that is not guaranteed. We hope other members of the catchment could help us. SOS-Sahel told us that tree seedlings and necessary back-up services would be provided by the WOA. But that has not been materialised in the last one year for unknown reasons.

Q5. In your opinion is there any relation between the on-farm and off-farm activities?
Answer – In catchments like ours there is direct relation i.e. if the upper stream has not treated the seeds, fertilisers and upper fertile soils on farm plots will be easily washed away by concentrated flood from the upper stream. For the time being we can witness the difference before and after the treatment. Now whatever is sown is not washed away as in earlier times. For instance, after the cut-off drain construction we have seen grass growing there in the open places. So we really encourage that the work should be continued and we will be greatly disappointed by the withdrawal of the project without finalising some already started activities.

Q6. What does the PA do in relation to the off-farm activity?
Answer– In most cases the kebele co-operates in that if any body from community violates the mutual agreement, the PA promised to punish those who violate the regulation. In addition, there is community development day (two days per week), in that case we were allowed to work on conservation-related activities while the other non -targeted people to conservation engage in other communal activities. Even it is at the instance of the PA that the off-farm activity has been initiated. First, the community presented the request to the PA by informing

about the untreated open lands are affecting their on-farm conservation activities. The PA negotiated with the project to start the activity. As a result the off-farm conservation work was started through FFW.

Q7.Do you think the community will continue participation after the discontinuity of various incentives of the project in case if the conservation structures collapse?

Answer - There is significant variation in the response of the informants. The first group stated that although for the time being the guards as well as the community are protecting the structures, but for the future we are suspicious whether people would continue without incentives. During the construction we have been provided FFW. Even though the community believes on the practical advantages of protecting the common land, the community has problems such as food shortage. So FFW/CFW served as an incentive. Still the community believes that taking care is their responsibility. But unless the incentives would continue they are sceptical that the people would take care of it. The second group stated: first and foremost we have organised and started the work by our initiative. The project has provided us tools and other necessary work materials. Even for the future we assure that the community will take care of it otherwise the life of the people is under danger. For instance after construction, four hill terraces collapsed, then at that time the community maintained and constructed that by self initiation. The destruction of terraces in the hill means the destruction of life of people living around and below the hill. As they have observed during the inter-cross visits in Konso one farmer's in the lower area land is not less than one at the Sudo Mt. off-farm conservation site.

Q8. What are the most prevalent problems and successes of off-farm conservation activities in this site?

Answer - In its operation the project has passed through both success and failure. The success is that before three years this Mt. Had been suffering from gully erosion due to deforestation. However now after afforestation the threat to the down stream is declining. Now some how it has been covered by trees and several kilometres of structures such as cut-off drain, hillside terracing and chekdams were constructed. Among the problem that can be mentioned include, for instance, some of the trees died after regeneration. There are also structures, which were

destroyed after construction by gully erosion. We have reported the number of trees that have regenerated and the failed ones to the project officials at the right time. The project officials also promised to replace the trees that have failed and the structures that collapsed. Unless those trees and structures are replaced that open sites may facilitate the destruction of remaining structures. So we strongly comment that the problem has to be realised. In fact, the tree planting had a problem from the beginning. That is the trees were planted much apart leaving large open spaces. Other problem for instance , is that the trees planted during Dergue period did not give us benefit ('tid'). But now, although, SOS-Sahel asked us as what types of trees have to be planted and we asked for eucalyptus and other types of trees that pay-off immediate benefits. Still the problem is that there are some exotic trees most of which being died.

Q9. Then what are the best alternatives to sustain the activities in your opinion?

Answer - Among the Wolaita (they refer to their nationality) people believe in some one advocating one thing .i.e there is a need of continuous strengthening and follow up but, there is lack of self- initiation. Hence unless there would be continuos technical and material assistance, the common concern and unity may be slow to come, and the conservation work group will even come to cease now. So the external support is necessary for strengthening the activities. The second group departed from the above argument and stated that in Konso one farmer's plot is more than this all communal land which private owners manage by themselves. However, we want to stress the Biblical phrase ' the king is not trusted in his home land ': Otherwise the project/some government body will take the back-up service and the community may not strictly follow the rules and regulation and the guidance of catchment leaders already set. As such external assistance is necessary.

2b- Informal Discussion with Ato Aca Dakamo

He is a farmer in Doge Mashido PA in Milke catchment. His house is close to the Sudo Mt. in the upper -most part. He has currently constructed about 600 meters of stone terrace in 7 rows. I had informal discussion with him and latter inscribed the notes from the tap-recorder.

Q1. How do you manage to build these structures?

Answer _ In most cases I myself largely engaged in constructing the stone terrace by working day and night. Constructing stone terrace is the most labour-intensive task. But later after the introduction of catchment /community approach the other members of the catchment helped me.

Q2. Would you explain if you notice any difference on your farmland before and after the construction of these structures?

Answer – Yes, there is a great difference. As you can see, my house is located close the Sudo Mt. For long period of time I have been suffering from concentrated gully erosion from these hillsides. Whatever I sowed used to be washed away. Let alone crops, even grasses did not grow on this plot for a long period of time. Now I have at least seen temporary benefit after the construction of structures. However, it is the cut off- drain that was put at the top that highly reduced the erosion hazardes in addition to stone terrace. So now fertilizers and seed at least remain on farm plot. Also in last two to three years there is yield increase.

Q2. Is there any relation between on –farm and off-farm activities near your plot in your opinion?

Answer- yes there is direct relation. What gave me relief is that not only the stone terraces on my own plot but, rather the cut-off-drains on top of the hills and additional hillside terraces constructed at the bottom of the hill are beneficial. Unless the off-farm conservation activities are continuously stabilised my effort alone could not yield long term benefit.

Q3 Do you think that the community would continue to participate in off-farm conservation activities after the withdrawal of the project by self-initiative?

Answer – I don't think that because it was already started by FFW and it seems people might expect that. So incentives would be necessary.

2-c Informal Discussion With Ato Asale Tantu

He is one of conservation work group / team leaders in Milke catchment. He is about 45 and has passed grade 7. I conducted informal interview with him on some issues related to land use/cover and cropping calendar.

Q1 Would you tell me the traditional land use pattern here ?

Answer - yes, the traditional land use system is as follows:

A . Front yard (*kare*) – it is used for recreational and social purposes

B. *ketasa* – house yard where the house is situated

c. *Darkuwa* (homestead field) – this is the most important part of land in Wolaita, it is created through systemic enrichment by manure and refuse. Mostly used to grow enset and coffee.

D. Root fields – taro land in most cases the root crops such as taro and sweet potato are grown.

E. Shooqa- this is relatively wider part of the plot and used for cereal and grain production

F. *Otta gade* – is fallow land but, currently due to population pressure it has been greatly minimized. In earlier times banana and other less harmful trees were planted to enrich its fertility through use of leaves.

G. *Matta gade* –grassland for 'cut and carry' purpose as there are no communal lands in Wolaita.

H. *Mitta gade* –this is wood lots, in most case it is the reach household do have such lands.

Q2 would you tell me the most important crops grown in Kindo Koisha and the cropping seasons.

Answer - yes, there are two most important cropping seasons especially in highlands and Mid highlands. The first one is *gaba* ('belg' season) from March to May . The most important crops grown in this season include; *whohe* , d*ono*, sweet potato, taro, wheat and maize. The other season is *Silla* from July to December and crops like teffee, maize, and different types of beans are grown.

2 - d, Informal Discussion with W/ro Aykale Takiso

She is a female household head in Bade Woyde PA in Milke catchment. Her age is about 55 and I asked her about both her participation on off-farm and on -farm conservation activities and the importance of additional income sources to undertake conservation activities.

Q 1. Do you participate on SOS-Sahel based conservation activities?

Answer: I participate in conservation work group representing my household. Otherwise the catchment groups will not volunteer to engage in my plots. In fact, there is a prejudice about female participation in physical work like conservation. The long rooted prejudice is that 'the land would not germinate and even if it germinates it will not yield good'.

Q 2 How do you see the importance of off-farm income in relation to NRM activities.

Answer – it is very important to carry out the conservation activities. Otherwise, the households will become reluctant and go out for search of casual job. For instance, I was the member of women SCs and got some amount of birr to engage in petty trading and cotton spinning. Hence, through that process, I bought one cow on share basis .Thus, as you can see now my *darkuwa* is getting its little manure/refuse and my children get little milk for healthy labour. So additional income source is necessary to engage in NRM activities.

Annex - 3
(Observation Guideline for Sample Plots)

Date of Observation_____ PA_____ Agro -ecological Zone_____

Catchment _____ Household code_____

For questions 1- use the following codes

0- For the activity that cannot be observed due to its absence

1- For the activity that is made practical at low level

2- For the activity that is made practical on the average

3- For the activity that is made practical very well

_____ 1. The over all conditions of physical conservation structures

_____ 2. The over all condition of biological conservation structures

_____ 3 .The quality of physical conservation structures

_____ 4. The availability of newly introduced grasses around the homestead

_____ 5. The coverage of physical conservation structures in relation to the total size of the holding

_____ 6. The present status of newly introduced trees

_____ 7. Surplus grain (crop) stored around the home stead

_____ 8. Households initiation to protect the conservation structures (such as putting fences , maintenance etc.)

_____ 9. The presence of private pasture land around the plot

_____ 10. The classification of land for different purposes.

_____ 11. The presence of compost in the main plot

_____ 12. The spread of manure in the plot.

Thank You

Annex -4 : Summary of Accomplishment of Catchment Based Soil and water Conservation ,Year 1st January 1996- 30 December 1997

No	Activities	unit	Catchment								Total
			Borkoshe	Demba	Gamache	Kae Nare	Ladisa	Milke	Onagato	Woisha	
1	Soil bund construction	Km	0.69	2.75	1.43	1.o52	2.433	12.69	3. 832	7.232	32.134
2	Soil bund mentainance	"	-	0.78	0.98	0.4	-	4.247	0. 219	0.82	7.446
3	Cut off drain construction	"	1.17	-	-	0.425	0.4	1.63	2.11	-	1.17
4	Stone bund construction	"	-	-	-	-	-	0.215	-	-	0.215
5	'Fanaya juu' terrcae	"	-	-	-	-	-	-	-	0.25	0.25
6	Bund stabilization with	"	-	-	-	0.483	1.646	7.272	1. 385	5.794	16.58
	grasses	"	-	-	-	0.162	0.905	-	-	-	3.013
	. Vetiver	"	-	-	-	0.321	0.743	1..306	0.64	-	5.238
	. elephant grass	"'	-	-	-	-	-	3.429	0.745	-	1.05
	. phalaris aquatica	"	-	-	-	-	-	1.05	-	-	1362
	. Dasho grass (local name)	"	-	-	-	-	-	1.362	-	-	0.215
	.. Lucaenea leucocephala	no	-	-	-	-	-	0.215	-	-	-
7	.Planting fruit trees behind	"	-	180	300	66	355	-	432	500	3413
	soil bunds	"	-	180	300	50	-	1580	-	500	1677
	. Avocado	"	-	-	-	16	156	300	191	-	719
	. Mango	"	-	-	-	-	159	350	194	-	40
	. Kasmir	"	-	-	-	-	-	40	-	-	977
	. Banana	Km	-	-	-	-	40	890	47	-	0.34
8	Grass strips	"	-	-	-	-	-	-	0.34	-	0.34
9	Chekdams	mt		-	-	17..5	-	-	0.34	-	17.5
10	Compost preparation										
	participants	no	-	-	-	1	-	-	-	2	3
11	Conservation of communal lands (EBSN)										
	. hill side terracing	km	-	-	-	-	-	32..22	-	-	32..22
	. chekdams	"	-	-	-	-	-	1..91	-	-	1.91
	. Roadside retention wells	"	-	-	-	-	-	o.22	-	-	0.22
	. Microbasins	no	-	-	-	-	-	3320	-	-	3320
	. Pitting	"	-	-	-	-	-	24552	-	-	24552
	. Cut-off drains	km	-	-	-	-	-	4.589	-	-	4.589
	. Seedling plantations	no	-	-	-	-	-	27872	-	-	27872

Source: SOS-Sahel Report, 2000

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented for a degree in any other University and that all sources of material used for the thesis have been duly acknowledged.

Name Genjo Giya

Signature

Place: Addis Ababa University

Date of Submission: June, 2000

The thesis has been submitted for examination with my approval as a University advisor.

K.N. Singh

K.N. Singh (professor)

June, 2000