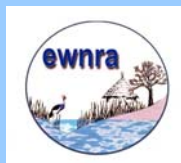


# ETHIO WETLANDS AND NATURAL RESOURCES ASSOCIATION

An Impact Study of Wichi Integrated Wetland - Watershed  
Management Project, Mettu Woreda, Illubabor Zone of Oromia  
Regional State

Conducted By  
Ethio Wetlands and Natural Resource Association with the  
financial support of SIDA through SLUF



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## **ACRONYMS**

EWNRA: Etho Wetlands and Natural Resource Association

PRA: Participatory Rural Appraisal

SIDA: Swish International Development Agency

SLUF: Sustainable Land Use Forum

# 1. INTRODUCTION

## 1.1. Project Description

Etho Wetlands and Natural Resource Association implemented integrated wetland and watershed management project in Wichi micro watershed, Metu Woreda, Ilu Abba Bora Zone of Oromia Regional State with the financial support from SIDA through SLUF. The project has been implemented from January 2005 to December 2008 including an extension project lasting for fifteen months. The overall goal of the project is improving the economic and environmental values of Wichi wetland and its surrounding watershed and thereby contributes towards food security and livelihood enhancement of the local communities. Under this general goal, the project aim to achieve seven specific objectives:

- Reduce the level of land degradation resulted from soil erosion, overgrazing and deforestation,
- Reduce wetland and wetland resources degradation,
- Improve land productivity in the watershed through implementing biophysical soil and water conservation, and compost preparation and application
- Increase livestock productivity through improving grazing management and on farm forage development,
- Improve income and livelihood of the community through diversification of livelihood opportunities (skill building trainings, revolving fund supply, diversifying homestead productivity through honey, vegetable and fruit production),
- Build capacity within the community on natural resource management
- Empower the beneficiary community through strengthening their traditional organization with watershed committee and bylaw

Specifically, the extension to Wichi integrated wetland-watershed natural resource management project aim to ensuring safe water supply to communities and then achieving millennium development goal, promote sustainable natural resource management and

improve the livelihood of local communities through diversifying income sources at household level, which has the following five operational objectives:

- Improve access of the community to safe water, personal hygiene and health
- Build capacity within the local community and partner government staff
- Undertake biophysical soil and water conservation
- Diversify livelihood opportunities of the communities
- Initiate and strengthen community-based institutions for sustainable natural resource management.
- Raise local awareness on wetland-watershed management through dissemination of environmental education and communication materials, reproductive health issues (family planning, HIV/AIDS prevention and control) and personal hygiene and environmental sanitation

## **1.2. Project Components**

The project has four major components. The first one is natural resource management component, which includes supporting biophysical soil and water conservation and tree planting as individual woodlot and rehabilitation of the degraded lands. The second component is livelihood diversification and income improvement through promotion of fruit production as agroforestry system, home garden vegetable production, micro credit service and improved apiculture. The third component is clean water supply and sanitation services through installation of hand pumps at wetland fringe and spring development. The fourth component is awareness raising, capacity building and community empowerment, which are cross cutting issues for all components of the project. Moreover, sharing best practices or achievements of the project through various information dissemination means has been one of the vital aspects of the fourth component of the project.

### **1.3. Beneficiaries of the project**

The direct beneficiaries of the project are community members within the Wichi watershed who has been involved in the biophysical soil and water conservation activities, compost making, vegetable and fruit production, forage production, beekeeping, micro credit service and participate in various training programs. The partner government organizations at woreda level are also beneficiaries of the project as the capacity building component of the project involves training of the technical staff of those organizations. In addition, communities of adjacent villages, those who live in the downstream and all who have acquired knowledge from the intervention have directly or indirectly benefited from the project. For instance, people in the nearby villages are using wetland plants such as reed from Wichi wetland that has been rehabilitated by productive interventions of the project in the watershed. Uninterrupted water availability is also another tangible benefit to the downstream dwellers in the project area.

### **1.4. Project input and outputs**

The total financial input of the two-phase project including local contribution is 1,285,306 birr (817,793 birr is allocated for the first phase while 467,515 birr is allocated for the second phase i.e. extension to Wichi integrated wetland and watershed management project). This financial input is used to cover expenses of various material such as purchase of farm tools used for soil and water conservation, materials and supplies used for water scheme construction, modern beehive, nursery operating cost, vegetable and forage seeds, revolving fund for micro credit service, training costs, printing of extension materials and the project overhead costs.

The major outputs achieved during the four years of project implementation along with the major components as indicated on the final reports are as follows:

- **Natural resource management:-** 946.36km of different types of physical structures (890.8km bunds, 29.5 water way and 26.06km cut off drain) constructed, covering 2353 hectares of land. About 200,000 bundles of Vetiver grass planted to reinforce the

physical structures. More than 255,000 tree seedling planted as individual woodlot and rehabilitation of degraded lands, 82kms of forrage seed distributed to demonstrate onfarm forrage development, 233 farmers involved in demonstrative compost preparation and a total of 698m<sup>3</sup> compost prepared and used as organic fertiliser.



- **Livelihood diversification and income improvement:-**34100 fruit tree seedlings were distributed for planting to more than 1400 people, 71.25kgs of vegetable seeds distributed to 400 households, 80 modern beehives distributed to 40 people on credit basis to start modern beekeeping, 63 women were organised under micro credit group, training was given for 30 members of the micro credit group on financial management and 30,000 birr provided as revolving seed fund.





- **Clean water supply and sanitation:-** 8 hand pumps were installed and 2 springs were developed to enable more than 4500 people get access to clean water supply. Nine water and sanitation committees were established and 63 members of the water and sanitation committee were trained on water scheme operation and management. In addition, 60 people trained on sanitation and hygiene and 60 people trained on reproductive health.



- **Awareness raising, capacity building and community empowerment:-** more than 400 community members were trained on natural resource management, beekeeping, fruit and vegetable production, agroforestry and institutional management. In addition, about 50 government staff were trained on natural resource management and environmental impact assessment. 600 copies of bilingual extension booklets were prepared and distributed to raise the awareness of wider public.



## **2. EVALUATION OBJECTIVES AND METHODOLOGY**

### **2.1. Concept and Approaches of Project Evaluation**

Program/project evaluation represents a systematic and objective assessment of ongoing or completed projects or programs in terms of their design, implementation and results. Evaluations usually deal with strategic issues such as program/project relevance, effectiveness, efficiency as well as program/project impact and sustainability.

Project evaluations can be carried on the process of project implementation referred as formative evaluations or process oriented evaluation, which involves a systematic collection of information to assist decision-making during implementation stages of a project/program. There is also type of evaluation that takes place at and/or after completion of project, which is known as summative evaluations (impact evaluations), looking at the actual accomplishment of project/program against its stated goals.

Therefore, impact evaluation should be carried out only after a program or project has reached a sufficient level of stability. The main question that impact evaluations try to answer is whether the intervention or project has made a difference for the target groups. There are different ways to find out and prove if the intervention or project has made a difference. Those ways are referred to as evaluation models. There are many evaluation models among which the pretest-posttest model and the comparison group model are the two commonly used models.

The basic assumption of the pretest-posttest model is that without project interventions, the situation that existed before the implementation of the project will continue as did before. As a result of the intervention, the situation will change over time. Therefore, we measure the situation before the project starts and repeat the same measures after the project is completed. The differences or changes between the two points in time can be attributed to the project interventions. To increase the validity of this model, we have to control some biases that might result from the application of the model. For example, the pre and posttests should be the same; measures should be taken from the same groups, etc. In addition, to establish a

strong link between project interventions and project impact, the model should take into account other biases that might occur between the two points in time. Some of those biases might be out of the project control, i.e., social, political, economic, and environmental factors.

The pretest-posttest model is relatively easy to implement. It can be implemented with the same group of project beneficiaries (does not require a control or comparison group). It does not usually require a high level of statistical expertise to implement and is able to assess progress over time by comparing the results of projects against baseline data. However, the model lacks scientific rigor. There are many biases that might take place between the pretest and the posttest that could affect the results, and therefore, weaken the direct link between project interventions and project outcomes or impact. In other words, changes in the situation before and after project implementation might (at least in part) be attributed to other external factors.

The comparison group model assesses project impact through the comparison between project results on two comparable groups at the same period of time where the first group represents beneficiaries of the project and the second represents a group that has not benefited from the project. To control for design biases, the two groups should have the same characteristics. Difference between the two groups could be attributed to the project interventions. This model has relatively strong scientific rigor. It is able to link project impact with project interventions or to attribute outcomes to the intervention. The implementation of this model is relatively easy when naturally existing comparison groups can be found. However, practically it is difficult to find a comparison group. Furthermore, working with two different groups might increase the research burden and increase the cost of evaluation.

## **2.2. Evaluation Objectives**

The baseline study conducted prior to the project implementation has attempted to understand the environmental and socio-economic situations of Wichi watershed. Therefore, the aim of this impact study is to assess impacts of the project implementation on the natural environment and the socioeconomic situation of the target community.

## **2.3. Methodology**

The evaluation model used in this case is the pretest-posttest hence it uses the findings of the baseline study as a benchmark to assess the achievements of the past four years project intervention. Combination of structured questionnaire survey and PRA methods were used to gather necessary information for the evaluation purpose.

### **2.3.1. Data Collection Instrument**

A structured questionnaire was used for the survey purpose, which was divided into two parts. Part one which contains seven sections is non-specific questions (annex 1). Seven key issues were addressed under part one of questionnaire survey that include general household profile, resource ownership, livelihood sources, income and expenditure, natural resources management practices, capacity building, food security and clean water supply and sanitation.

Part two of the questionnaire survey that divided in to two sections (annex 2) contains specific questions targeting households involved in modern beekeeping and micro credit services. It is important to treat the farmers involved in modern beekeeping and women involved in micro credits service separately hence they few in number and are not evenly distributed across all the five intervention kebeles.

Participatory assessment method was used to generate qualitative information supplementing the structured questionnaire survey. Selected PRA tools, mainly group discussion and ranking were used as qualitative data collection tool (annex 3). One session PRA study was conducted at two sites in Tulube and Adele Bise Kebeles where a total of 18 informants (15 male and 3 female) attended the PRA sessions. Issues explored by the PRA study include impacts of the project intervention on the natural environment, income and livelihood, awareness, local capacity and community empowerment.

### 2.3.2. Sample size and Sampling procedure

The five kebeles sharing the Wichi watershed where the project implemented is considered as study area. An attempt was made to obtain list of household in the five kebeles those who live within Wichi watershed. A list of 1788 households obtained from development centers of the respective kebeles was taken as a sampling frame of the study. Then, ten per cent of the households registered in the list were selected using randomising table, which yielded 183 households. In addition, 18 of the 40 men involved in beekeeping and 20 of the 63 women involved in micro credit scheme were randomly selected for interview (table1).

Table1: Sampling frame and sample size

| Kebele     | Non specific questionnaires survey |                   | Bee keepers |        | Micro credit group |        |
|------------|------------------------------------|-------------------|-------------|--------|--------------------|--------|
|            | Sample Frame                       | Sample size (10%) | Total       | Sample | Total              | Sample |
| Ale Buya   | 497                                | 50                | 14          | 7      | -                  | -      |
| Burusa     | 310                                | 31                | 10          | 5      | -                  | -      |
| Tulube     | 365                                | 37                | 9           | 4      | 13                 | 4      |
| Boto       | 106                                | 11                | -           |        | 20                 | 7      |
| Adele Bise | 510                                | 51                | 4           | 2      | 27                 | 9      |
| Total      | 1788                               | 183               | 37          | 18     | 60                 | 20     |

The random selection methods employed helped to ensure even distribution of respondents across the kebeles with appropriate gender balance. Within the sample of 183 households, 161(88%) are male headed while 22 (12%) were female-headed households.

### 2.3.3. Data collection and analysis

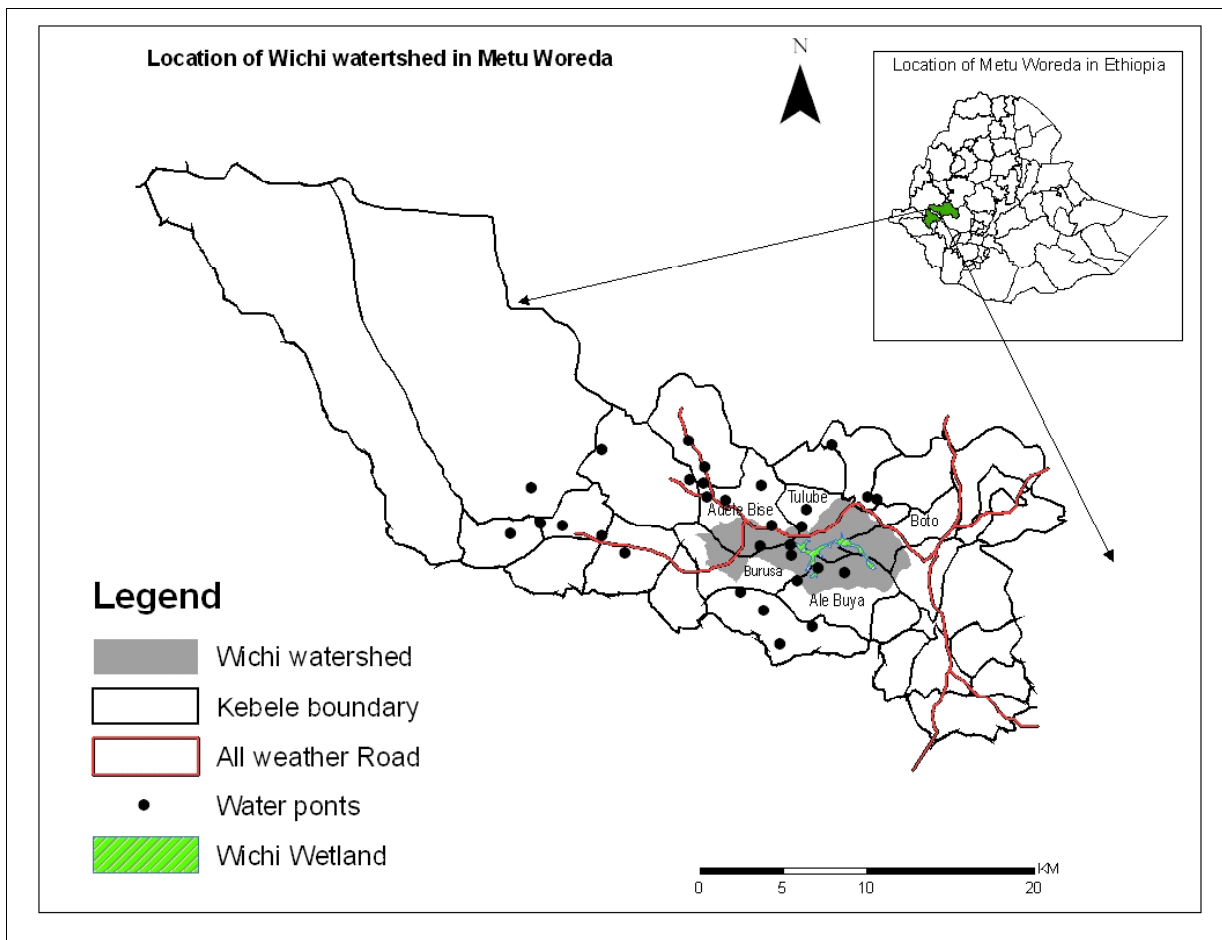
The development agents working in the respective kebeles were recruited as enumerators of household survey. One-day orientation was given on the questionnaire developed and the survey procedure before being deployed for the survey. The field data collection was supervised by two EWNRA's field staffs and one staff delegated from the main office in charge of the entire study. Data collected was first entered into statistical software called SPSS (Statistical Package for Social Scientists version 15) and analyzed using simple descriptive statistics including cross tabulation of variables with due consideration of gender.

### 3. BACKGROUND OF PROJECT AREA

#### 3.1. Location

Wichi watershed is found within Mettu Wereda, Ilu Abba Bora Zone of Oromia regional state (see figure1). The watershed is located at  $8^{\circ}15' - 8^{\circ}19' N$  and  $35^{\circ}40' - 35^{\circ}45' E$  stretching across five kebeles namely Ale Buya, Tulube, Boto, Burusa, and Adele Bise, covering total area of 8149 hectares. The Wichi watershed is located in the central part of Metu woreda. Wichi wetland with total area of 364 hectares is located at the middle of the watershed, stretching from Tulube and Boto kebeles in the southeast to Adele Bise in the northwest.

Figure 1a: - Location of Metu Woreda in Ilu Aba Bora Zone of Oromia Regional State



#### 3.2. Land form and land use

The landform of Wichi watershed is characterized by steep slope which is highly susceptible to water erosions. Over 64% of the total area of the watershed is within slope category of above 8% out of which 49% is above 16% slope. The smallest proportion (4.5%) of the total area of the watershed, particularly that occupied by the wetland is within slope category of less than 3%.

Agricultural land predominate the land use of the watershed. Data obtained from woreda agriculture and rural development office at the onset of the project show that 54% of the total land within the watershed is agricultural land used for cultivation annual crops followed by coffee forest accounting about 23% of the total area of the watershed

### **3.3. Population**

The total population of the five kebeles sharing Wichi watershed is estimated to 13086 (7059 male and 6027 female) of which about 53.9% are living within the watershed. The total number of households living in the watershed at the beginning of the project intervention is estimated to 2881 out of which nearly 10% are female-headed households.

### **3.4. Infrastructures**

There are 8 primary schools within the five kebeles sharing Wichi watershed of which 5 are first cycle primary schools and 3 are complete primary school. There are also 2 clinics, 5 health posts, 5 development centers, and twenty-two potable water supply schemes from 20 hand pumps and two developed spring. The total length of road network within the watershed is estimated to 36 kms of which 19km are all weather roads while 17kms are dry weather roads.

### **3.5. Crop production**

Maize is the widely grown food crop within Wichi watershed followed by sorghum and Teff while coffee is the main cash crop.

### **3.6. Natural Resource Degradation**

Local elders witness that in the old days, Wichi watershed was predominantly covered by natural forest. The wetland was also full of water, which was not easily accessed for use

except reeds (*Cyperus spp*) harvesting for thatching just from the periphery of the wetland. Grazing on the wetland was also minimum for the reason that there was no shortage of grazing on the uplands and the wetland was also difficult to access. Recently, significantly changes were observed both in the wetland and the surrounding watershed such as deforestation and expanded cultivation, expanded grazing in the wetland, drainage for cultivation and soil erosion and siltation.

The underlying cause for the changes in land use system in the watershed is ever increasing population, which in turn increased demand for cultivation, forest products, and grazing lands. Shortage of agricultural lands and declining of productivity in the upland resulted from sever soil erosion further expanded cultivation and grazing in Wichi wetland. Soil erosion from the surrounding watershed increased siltation within wetland. Consequently, both the wetland and the surround upland become degraded which worsen the livelihood of local communities. Intervention of EWNRA during the past four years through implementing integrated wetland-watershed management approach has brought some positive changes. Soil erosion from the upland reduced and thereby land productivity improved. The human and livestock pressure on Wichi wetland reduced as a result the wetland started rehabilitating (see figure 1b)



*Wichi Wetland and part of the watershed (2005)*



*Wichi Wetland and part of the watershed (2008)*



## 4. FINDINGS OF THE EVALUATION STUDY

### 4.1. Findings of the Questionnaire survey

#### 4.1.1. Household Profile

The questionnaire survey covered five kebeles sharing Wichi watershed and 183 households within the five kebeles. Out of the total surveyed households 12% are female-headed households (table2).

Table 2: Surveyed households

| Name of the Kebele | Gender of head of household |        |       |       |
|--------------------|-----------------------------|--------|-------|-------|
|                    | Male                        | Female | Total | %     |
| Adele Bise         | 47                          | 4      | 51    | 27.9  |
| Burusa             | 26                          | 8      | 34    | 18.6  |
| Ale Buya           | 44                          | 6      | 50    | 27.3  |
| Boto               | 10                          | 1      | 11    | 6.0   |
| Tulube             | 34                          | 3      | 37    | 20.2  |
| Total              | 161                         | 22     | 183   | 100.0 |

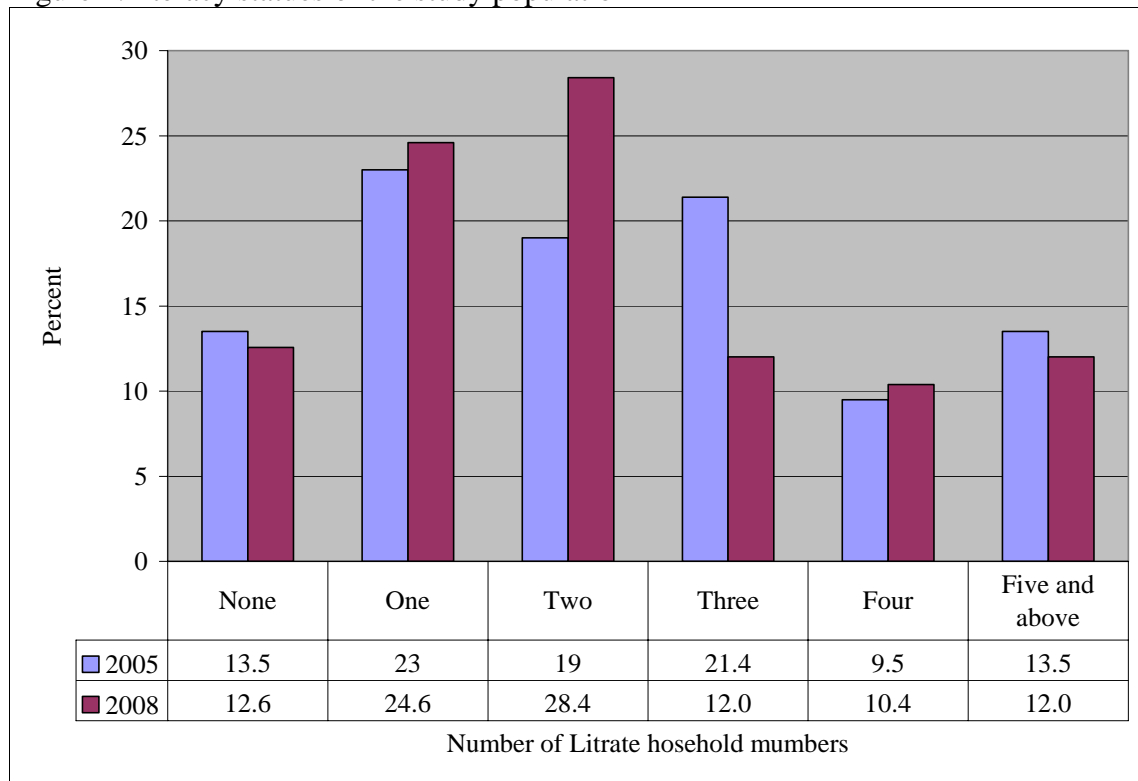
The study found slightly declining of family size in the Wichi watershed. The average family size in the year 2008 is 4.87 people per household as compared to 5.26 in 2005. In general, the largest proportions of households have family size ranging between 4-6 people.

Table 3: Family size of the study population

| Family size per household | 2005 (%) | 2008 (%) |
|---------------------------|----------|----------|
| 1 – 3 person              | 29.4     | 20.2     |
| 4 – 6 person              | 38.1     | 51.9     |
| 7 – 10 person             | 30.2     | 17.5     |
| Above 10 person           | 2.4      | 1.6      |
| Not reported              | 8.7      | -        |
| Total                     | 100.0    | 100.0    |
| Average                   | 5.26     | 4.87     |

There are no significant changes in the overall literacy status within Wichi watershed during the past four years. However, the average number of literate person per household increased slightly from 2.30 people at the initial year of the project intervention to 2.33 people in year 2008 (see Figure.2).

Figure 2: literacy statuses of the study population



There is significant variation between male and female-headed households with respect to literacy status. For instance, for 22% of female-headed households, none of the household member is literate as compared to 11.2 for their male headed counterpart and the five and above number of literate household member is nil for female-headed households as compared to 13.7% for their male counter part.

#### 4.1.2. Resource Ownership

##### Dwelling house

The material used for dwelling house construction is one of the indicators of the economic status of households. Roofing material is taken for comparison of the housing of communities in the Wichi watershed. The roof thatching materials widely used in the area are corrugated iron sheet, wetland grass (locally known as *chafe*) and other types of grass. The better off households are usually those who construct their dwelling house with corrugated iron sheet. The study found that percentage of households who live

within house roofed with constructed iron sheet increased from 42.1% in 2005 to 61.2 in 2008 while those who live within housed thatched with chafe grass declined from 57.9% to 38.8% during the same period (see table 4). This implies improvement in the economic status of the community that enables them to afford for corrugated iron sheet. However, wetland grass is still very important for significant proportion of households in the area. Furthermore, even those households who construct their main dwelling houses with iron sheet are still using *chafe* grass for thatching of kitchen, granary, and temporary guarding huts.

Table 4: Roofing material of the main dwelling houses

| Roofing materials     | 2005 |        |       |      | 2008 |        |       |       |
|-----------------------|------|--------|-------|------|------|--------|-------|-------|
|                       | Male | Female | Total | %    | Male | Female | Total | %     |
| Iron sheet            | 46   | 7      | 53    | 42.1 | 100  | 12     | 112   | 61.2  |
| Wetland grass (chafe) | 62   | 11     | 73    | 57.9 | 61   | 10     | 71    | 38.8  |
| Other type of grass   | 0.0  | 0.0    | 0.0   | 0.0  |      |        |       |       |
| Total                 | 108  | 18     | 126   | 100  | 161  | 22     | 183   | 100.0 |

### **Livestock holding**

The size and composition of livestock holding is an important indicator of the economic status of rural communities hence they are disposable asset of families on top of their role as a draft power to perform agricultural activities. When their cash income is improved, rural communities usually invest on livestock resources particularly on milking cows and heifers that enable their stock keep growing.

The study reveals that regardless of number and type, 91.8% of the households in Wichi watershed own livestock in 2008 as compared to 87.3% in 2005. The proportion of households who own the essential types of large livestock such as farm oxen and milking cows increased particularly for female-headed households (table 5)

Table 5: Livestock holding of household in Wichi watershed

| Type of livestock | 2005 |        |       | 2008 |        |       |
|-------------------|------|--------|-------|------|--------|-------|
|                   | Male | Female | Total | Male | Female | Total |
| Oxen              | 73.7 | 53.3   | 70.9  | 72.0 | 63.6   | 71.0  |
| Cow               | 62.3 | 46.7   | 59.8  | 72.7 | 63.6   | 71.6  |
| Bulls             | 49.5 | 6.7    | 43.6  | 49.1 | 63.6   | 50.8  |
| Heifers           | 50.5 | 26.7   | 47.3  | 54.0 | 54.5   | 54.1  |
| Calves            | 48.4 | 53.3   | 49.1  | 52.2 | 36.4   | 50.3  |
| Sheep             | 63.8 | 50.0   | 62.2  | 67.1 | 59.1   | 66.1  |
| Goat              | 4.2  | 0.0    | 3.6   | 6.8  | 0.0    | 6.0   |
| Mule              | 8.4  | 0.0    | 7.3   | 5.6  | 0.0    | 4.9   |
| Horse             | 11.6 | 6.7    | 10.9  | 3.7  | 0.0    | 3.3   |
| Donkey            | 9.6  | 0.0    | 8.3   | 8.7  | 0.0    | 7.7   |
| Chicken           | 74.5 | 50.0   | 71.7  | 76.4 | 77.3   | 76.5  |

### Land Holding

Regardless of the size, 96.2% of the surveyed household own land in the year 2008 as compared to 97.6% in the year 2005. Average land holding size in the year 2008 declined to 1.8ha from 1.99ha in the year 2005 and the proportion of land less households raised from 2.4 in 2005 to 3.8 while those hold 3hectares and above declined from 18.3 to 13.7% in the same period (table 6).

Table 6: Size of land holding in Wichi watershed

| Land holding (in ha)   | 2005 |        |       |      | 2008 |        |       |       |
|------------------------|------|--------|-------|------|------|--------|-------|-------|
|                        | Male | Female | Total | %    | Male | Female | Total | %     |
| Land less              | 2    | 1      | 3     | 2.4  | 5    | 2      | 7     | 3.8   |
| Less than 0.5 hectares | 13   | 2      | 15    | 11.9 | 23   | 2      | 27    | 14.8  |
| 0.51 to 1.0 hectares   | 19   | 3      | 22    | 17.5 | 39   | 7      | 46    | 25.1  |
| 1.1 to 2.0 hectares    | 31   | 9      | 40    | 31.7 | 49   | 7      | 56    | 30.6  |
| 2.1 to 3.0 hectares    | 22   | 1      | 23    | 18.3 | 20   | 2      | 22    | 12.0  |
| 3.1 hectares and above | 21   | 2      | 23    | 18.3 | 23   | 2      | 25    | 13.7  |
| Total                  | 108  | 18     | 126   | 100  | 161  | 22     | 183   | 100.0 |

Analysis of the average size of land allocated for different uses revealed significant increment of land allocated for plantation woodlot, which increased from 0.003ha in 2005 to 0.194ha in the year 2008.

#### **4.1.3. Livelihood Sources**

A livelihood is defined as the means of earning an income to meet one's needs. Livelihoods comprises of activities required for meeting needs such as work in the formal and informal sectors; assets including human capital (skills, knowledge, creativity and adaptive strategies); social capital (governance structures, decision-making power, institutions, culture and participation), natural capital (land, water, air, and forests), human-made capital (buildings, roads, crops, livestock) and entitlements. An increase in real value between two time periods, economic effectiveness or the use of minimum inputs to generate a given amount of outcome, non-declining values of natural capital, availability of diversified livelihood opportunities, social equity and ability to cope with and recover from vulnerability are indicators of sustainable livelihood.

The study attempted to assesses some components of livelihood mainly activities people engaged in for meeting their needs, the diversity of livelihood opportunities and the real share of each opportunities between the two time period. Accordingly, upland cereal crop and coffee production are the major sources of livelihood for the largest proportion of the population in Wichi watershed. For instance, 69% and 64.5% of the surveyed households ranked upland cereal crop production at first place in the year 2005 and 2008 respectively while 22.2% and 18.0% of the surveyed households put coffee production at first place during the same period. Coffee production is the second major source of livelihood as witnessed from the responses of surveyed households where 57.1% and 45.9% ranked it at second places in the year 2005 and 2008 respectively. While livestock production is the third major source of livelihood where 31% and 48.1% of the respondents put it at third place in the year 2005 and 2008 respectively (table 7a).

In general, male headed households have more diversified sources of livelihood basis as compared to their female counterpart both during the year 2005 and 2008 thought improvement has been observed in the later year.

Table: 7a. Sources of livelihood by rank

| Rank         | Source of livelihood              | 2005       |            |            |            | 2008       |            |            |            |
|--------------|-----------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|
|              |                                   | Male       | Female     | Total      | %          | Male       | Female     | Total      | %          |
| First        | Cereal crop production (upland)   | 77         | 10         | 87         | 69.0       | 104        | 14         | 118        | 64.5       |
|              | Coffee production                 | 22         | 6          | 28         | 22.2       | 29         | 4          | 33         | 18.0       |
|              | Livestock production              | 2          |            | 2          | 1.6        | 8          | -          | 8          | 4.1        |
|              | Daily labor                       | 3          | 2          | 5          | 4.0        | 6          | 1          | 7          | 3.6        |
|              | Cereal crop production (wetlands) | -          | -          | -          |            | 2          | -          | 2          | 1.1        |
|              | Fruit production                  | 1          | -          | 1          | 0.8        | 2          | 1          | 3          | 1.6        |
|              | Petty trade                       | -          | -          | -          |            | 1          | -          | 1          | 0.5        |
|              | Vegetable production (upland)     | 1          | -          | 1          | 0.8        | 5          | 3          | 8          | 4.4        |
|              | Others                            | 1          | -          | 1          | 0.8        | 3          | -          | 3          | 1.6        |
|              | Not responded                     | 1          | -          | 1          | 0.8        | -          | -          | -          | 0.6        |
| <b>Total</b> | <b>108</b>                        | <b>18</b>  | <b>126</b> | <b>100</b> | <b>161</b> | <b>22</b>  | <b>183</b> | <b>100</b> |            |
| Second       | Coffee production                 | 61         | 11         | 72         | 57.1       | 75         | 9          | 84         | 45.9       |
|              | Cereal crop production (upland)   | 21         | 5          | 26         | 20.6       | 30         | 4          | 34         | 18.6       |
|              | Livestock production              | 7          | -          | 7          | 5.6        | 22         | 3          | 25         | 13.7       |
|              | Cereal crop production (wetlands) | -          | -          | -          |            | 11         | 2          | 13         | 7.1        |
|              | Vegetable production (upland)     | 1          | 1          | 2          | 1.6        | 5          | -          | 5          | 2.7        |
|              | Vegetable production (wetlands)   | -          | -          | -          |            | 3          | -          | 3          | 1.6        |
|              | Daily labor                       | 7          | -          | 7          | 5.6        | 1          | -          | 1          | 0.5        |
|              | Beekeeping                        | -          | -          | -          |            | 1          | -          | 1          | 0.5        |
|              | Petty trade                       | -          | -          | -          |            | 1          | -          | 1          | 0.5        |
|              | Others                            | 3          | -          | 3          | 2.4        | 2          | 1          | 3          | 1.6        |
|              | Not responded                     | 8          | 1          | 9          | 7.1        | 10         | 3          | 13         | 7.3        |
| <b>Total</b> | <b>108</b>                        | <b>18</b>  | <b>126</b> | <b>100</b> | <b>161</b> | <b>22</b>  | <b>183</b> | <b>100</b> |            |
| Third        | Livestock production              | 33         | 6          | 39         | 31.0       | 77         | 11         | 88         | 48.1       |
|              | Coffee production                 | 11         | -          | 11         | 8.7        | 20         | 2          | 22         | 12         |
|              | Crop production (upland)          | 4          | 1          | 5          | 4.0        | 11         | -          | 11         | 6          |
|              | Vegetable production (upland)     | -          | -          | -          |            | 11         | 2          | 13         | 7.3        |
|              | Fruit production                  | 3          | -          | 3          | 2.4        | 6          | -          | 6          | 3.3        |
|              | Crop production (wetlands)        | 18         | 2          | 20         | 15.9       | 4          | -          | 4          | 2.2        |
|              | Vegetable production (wetland)    | 5          | 3          | 8          | 6.3        | 3          | 1          | 4          | 2.2        |
|              | Daily labor                       | 7          | -          | 7          | 5.6        | -          | 1          | 1          | 0.5        |
|              | Others                            | -          | -          | -          |            | 3          | -          | 3          | 1.5        |
|              | Not responded                     | 27         | 6          | 33         | 26.2       | 26         | 5          | 31         | 16.9       |
|              | <b>Total</b>                      | <b>108</b> | <b>18</b>  | <b>126</b> | <b>100</b> | <b>161</b> | <b>22</b>  | <b>183</b> | <b>100</b> |

As one of the objectives of the project is diversifying the livelihood basis of the local communities, it is worth to evaluate the diversity of livelihood basis at the completion of the project against the initial year of intervention. Findings of the study reveal that more diversified livelihood sources were reported by the year 2008 as compared to the year 2005. Furthermore, some livelihood sources, which were not reported and/or have limited contribution, have been appeared and/or their contribution increased in the later year. Petty trade, vegetable production, fruit production and beekeeping are good examples to be mentioned (table7b). On the contrary, the share of some other activities like daily labor shows declining trend which implies people in the watershed started spending their time on their own activities. According to the local circumstances, it is true that people get involved in charcoal making, fuel wood selling and daily labor when their household economic status get worsen.

Table 7b : Sources of livelihood by rank

| Source of livelihood              | 2005            |                 |                 | 2008            |                 |                 |
|-----------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                   | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> |
| Cereal crop production (upland)   | 69.0            | 20.6            | 4.0             | 64.5            | 18.6            | 6.0             |
| Coffee production                 | 22.2            | 57.1            | 8.7             | 18.0            | 45.9            | 12.0            |
| Livestock production              | 1.6             | 5.6             | 31.0            | 4.4             | 13.7            | 48.1            |
| Daily labor                       | 4.0             | 5.6             | 5.6             | 3.8             | 0.5             | 0.5             |
| Cereal crop production (wetlands) | -               | -               | 15.9            | 1.1             | 7.1             | 2.2             |
| Fruit production                  | 0.8             | -               | 2.4             | 1.6             | -               | 3.3             |
| Petty trade                       | -               | -               | -               | 0.5             | 0.5             | -               |
| Vegetable production (upland)     | 0.8             | 1.6             | -               | 4.5             | 2.9             | 7.2             |
| Vegetable production (wetlands)   | -               | -               | 6.3             | -               | 1.6             | 2.2             |
| Beekeeping                        | -               | -               | -               | -               | 0.5             | -               |
| Others                            | 0.8             | 2.4             | -               | 1.6             | 1.6             | 1.6             |
| Missing/not respond               | 0.8             | 7.1             | 26.1            | -               | 7.1             | 16.9            |
| <b>Total</b>                      | <b>100</b>      | <b>100</b>      | <b>100</b>      | <b>100</b>      | <b>100</b>      | <b>100</b>      |

#### 4.1.4. Livelihood Diversification and Income Improvement

Home garden vegetable production, fruit production as agro forestry system, micro credit services for women group, improved beekeeping and contracting out seedling production to local communities are among the livelihood diversification and income improvement schemes implemented by the project. The livelihood diversification and income improvement interventions of the project are both through provisioning the means and developing the skill how to practice them. The provisioning of the means include distribution of 34100 fruit tree seedlings, 71.25kg of vegetable seeds, 80 modern beehives and 30000 birr seed money as revolving fund for women micro credit members. These provisioning were accompanied by skill trainings on how to practice and manage the activities that involved training of 28 farmers on vegetable and fruit production. The baseline study found limited practices of vegetable and fruit production within the communities. Result of the impact study shows a significant increase in the adoption of vegetable and fruit production among the communities in the watershed. The percentage of household involved in home garden vegetable production increased from 29.4% in 2005 to 73.2 in 2008 and similarly those involved in fruit production increased from 3.2% in 2005 to 60.1 in 2008 (table 8).

Table 8:-Involvement (%) in home garden vegetable and fruit production in Wichi watershed

| Practices                               | Response | 2005  |        |       | 2008  |        |       |
|---|----------|-------|--------|-------|-------|--------|-------|
|   |          | Male  | Female | Total | Male  | Female | Total |
| Home garden vegetable production        | Yes      | 30.6  | 22.2   | 29.4  | 74.5  | 63.6   | 73.2  |
|   | No       | 61.1  | 61.1   | 61.1  | 24.2  | 27.3   | 24.6  |
|   | Missing  | 8.3   | 16.7   | 9.5   | 1.2   | 9.1    | 2.2   |
|   | Total    | 100.0 | 100.0  | 100.0 | 98.8  | 90.9   | 100.0 |
| Fruit production as agroforestry system | Yes      | 3.7   | 0.0    | 3.2   | 63.4  | 36.4   | 60.1  |
|   | No       | 92.6  | 83.3   | 91.3  | 35.4  | 54.5   | 37.7  |
|   | Missing  | 3.7   | 16.7   | 5.6   | 1.2   | 9.1    | 2.2   |
|   | Total    | 100.0 | 100.0  | 100.0 | 100.0 | 100.0  | 100.0 |

Beetroot, cucumber, carrot, pepper, onion, cabbage, garlic and tomato respectively are the major types of vegetable while avocado, mango, papaya and banana respectively are the major types of fruit produced by those households who have been involved in the



practice (table 9). The survival rate of fruit tree planted is also fairly good. The study found that about 68.2% of avocado, 65.8% of mango, 68.5% of papaya and 91.2% of banana planted by farmers during the past four years have been survived.

Table 9: Type of vegetable and fruits produced during the past four years of project implementations

| Type              | Household involved by gender |        |       |      |
|-------------------|------------------------------|--------|-------|------|
|                   | Male                         | Female | Total | %    |
| <b>Vegetables</b> |                              |        |       |      |
| • Beetroot        | 105                          | 12     | 117   | 87.3 |
| • Cucumber        | 90                           | 12     | 102   | 76.1 |
| • Carrot          | 72                           | 10     | 82    | 61.2 |
| • Pepper          | 71                           | 4      | 75    | 56.0 |
| • Onion           | 42                           | 6      | 48    | 35.8 |
| • Cabbage         | 16                           | 2      | 18    | 13.4 |
| • Garlic          | 14                           | 3      | 17    | 12.7 |
| • Tomato          | 14                           | 1      | 15    | 11.2 |
| • Others          | 7                            | 0      | 7     | 5.2  |
| <b>Fruits</b>     |                              |        |       |      |
| • Avocado         | 88                           | 5      | 93    | 84.5 |
| • Mango           | 60                           | 5      | 65    | 59.1 |
| • Papaya          | 48                           | 4      | 52    | 47.3 |
| • Banana          | 17                           | 0      | 17    | 15.5 |
| • Others          | 14                           | 1      | 15    | 13.6 |

Improved apiculture is another dimension of livelihood diversification and income improvement scheme introduced and/or supported by the project. The improved apiculture was recently introduced to limited numbers of farmers (40 innovative farmers) drawn from four kebeles (Adele Bise, Burusa, Tulube and Alebuya). Most of those farmers (72.2%) involved in improved apiculture are those who have previous experience of traditional beekeeping.

Due to the recent introduction of the technology, it is difficult to assess impacts of such an activity. For instance, 83.3% of the surveyed households reported that they have received modern beehives and started improved beekeeping in the year 2008. The number of hives distributed is also small (80 hives) just for demonstration purpose. About 88.9% of those involved in beekeeping own two modern beehives. Only 50% of the hives

received are entered by bee colony i.e. the remaining are still empty and farmers are waiting bee colony and most of the farmers involved not yet started harvesting. The average amount of harvest per hives for those who have started harvesting is 30kg (ranging from 15kg to 50kg). Therefore, very few of those farmers involved in improved apiculture started earning cash from sale of honey and beeswax in Wichi watershed during the past four years. Although all of the farmers involved reported that they have received necessary training on apiculture and close technical follow-up, there are a number of challenges facing which require urgent solutions as listed in table 10 below according to order of importance.

Table 10: - Challenges faced the apiculture business and solutions required

| <b>Challenges faced</b>  | <b>Solutions required</b>  |
|--|--|
| <ul style="list-style-type: none"> <li>✓ Bee attacking pests (particularly ants)</li> <li>✓ Shortage of wax with desired quality</li> <li>✓ Lack of the necessary accessories</li> <li>✓ Shortage of bee colony</li> <li>✓ Out migration of Bee colony</li> <li>✓ Bee disease</li> <li>✓ Inadequate number of hive distribution</li> </ul> | <ul style="list-style-type: none"> <li>✓ Supply necessary accessories of modern beekeeping (smoker, queen excluder, wax printer, honey extractor and cloths)</li> <li>✓ Supply bee wax of desired quantity and quality</li> <li>✓ Additional beehive distribution</li> <li>✓ Bee attacking pest control</li> <li>✓ Follow-up and close technical support</li> <li>✓ Additional skill training</li> <li>✓ Controlling bee diseases</li> <li>✓ Operating fund support</li> </ul> |

Micro credit service to women group is another dimension of project intervention addressing livelihood issues aiming to enable women engaged in small business so as to improve their income and diversify their livelihood basis. The micro credit service started in 2008 and about 63 women were organized under micro credit group. The micro credit service covered three of the project intervention kebeles (Adele Bise, Tulube and Boto). A total of 30000 birr was provided as seed fund to be revolved among the gradually expanding micro credit groups. The study found that all of the surveyed women have received the first round loan and 35% were applied for second round loan ranging from 1000 to 3000 birr to engage in fattening of big animals. However, none of them granted the loan due to failure of full repayment of the first round loan either by themselves or their

colleagues. It is interesting to note that 90% of the surveyed women reported that the business they started with the micro credit service is absolutely successful and 45% reported livestock are the family asset built with the micro credit service.

Women involved in micro credit serve are also facing a number of challenges requiring immediate solution. Inadequate amount of initial credit, lack of additional credit, lack of continuous education about saving and credit and lack of office respectively are the major challenges reported. Granting of additional credit, provision of continuous training, education and technical support to members and office facilities respectively are the solutions proposed by the surveyed women for the challenges they are facing in connection with the micro credit services.

#### **4.1.4. Income and Expenditure**

Obtaining an accurate data on income and expenditure level of households through questionnaire survey is not an easy task in the rural setting. This is firstly because of the difficulty of recalling the amount earned and spent through out a year. Secondly, people usually tend to under report income while exaggerating expenditures preempting such sensitive question with tax and other contributions. Therefore, findings of the survey are just a rough indicator in this regard.

#### **Income**

Average annual income obtained from different sources is estimated to 2926.5 birr (ranging from the minimum 60 birr to the maximum 23250 birr). The main source of cash income for the households in Wichi watershed is sale of coffee. An increment has been observed on the amount of income earned from different sources (table 11) where significant increases were observed on the income earned from sale of construction wood from plantation, fruits, handcrafts, vegetables, honey and beeswax, and petty trade. The increment of income could be partly attributable to the general increase in the price of agricultural commodities in Ethiopia during the past years. However, the percentage changes of average income obtained from some items are so high, which could not only

explain by price change rather than improvement of the overall income of the community in the area. Furthermore, the income sources in the year 2008 are spread over wider sources as a result of increasing of the share of income obtained from sale of seedling, vegetables, fruits, and petty trade as compared to the year 2005. Such an increment and diversification could be attributable to the impact of the project intervention in the area of improvement diversification of income sources of the community.

Table 11: Average income earned from different sources by the surveyed household

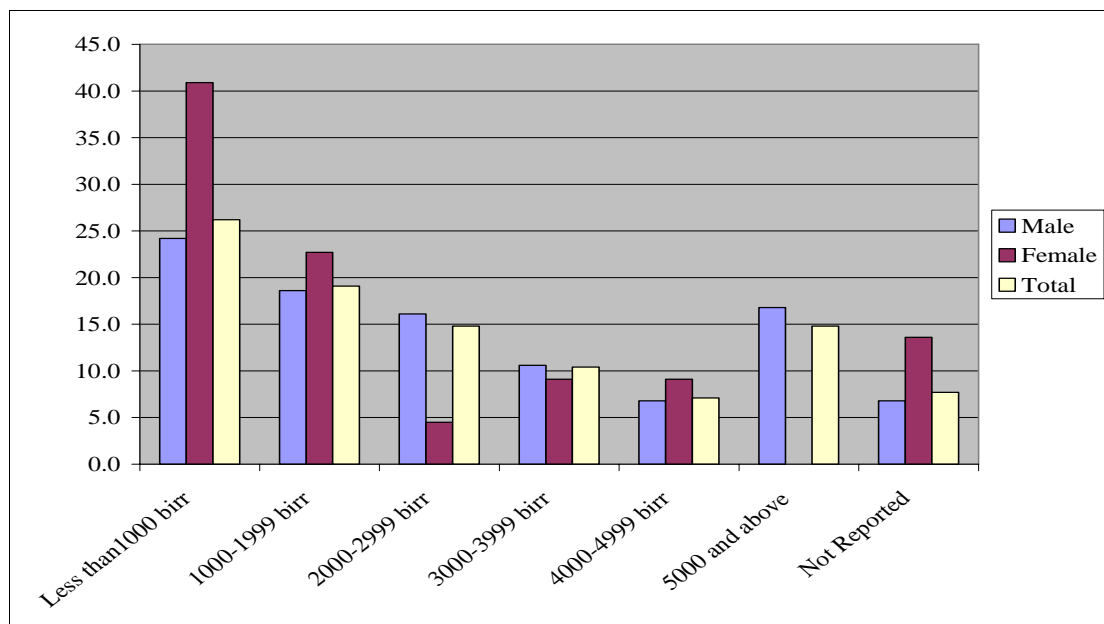
| <b>Sources of income</b>             | <b>2005</b> | <b>2008</b> | <b>%Change</b> |
|--------------------------------------|-------------|-------------|----------------|
| ▪ Coffee                             | 629.9       | 1629.5      | 159            |
| ▪ Large animals                      | 244.8       | 1808.2      | 639            |
| ▪ Casual labor and skill work        | 112.1       | 1212.2      | 981            |
| ▪ Cereals crops (upland)             | 89.0        | 1001.3      | 1,025          |
| ▪ Livestock products                 | 70.0        | 524.1       | 649            |
| ▪ Petty trade                        | 68.6        | 1111.1      | 1,520          |
| ▪ Local drinks                       | 64.4        | 501.5       | 679            |
| ▪ Small animals                      | 50.0        | 487.6       | 875            |
| ▪ Chat                               | 35.3        | 369.8       | 948            |
| ▪ Seedlings                          | -           | 270.7       |                |
| ▪ Remittance                         | 26.6        | 232.9       | 776            |
| ▪ Honey and beeswax                  | 13.1        | 254.0       | 1,839          |
| ▪ Vegetables (uplands)               | 12.0        | 210.7       | 1,656          |
| ▪ Hand craft products                | 9.9         | 374.3       | 3,681          |
| ▪ Fuel wood and charcoal             | 9.1         | 108.2       | 1089           |
| ▪ Renting of animals                 | 8.5         | 105.5       | 1141           |
| ▪ Root crops                         | 7.3         | 247.6       | 3,292          |
| ▪ Construction wood (plantation)     | 6.9         | 595.0       | 8,523          |
| ▪ Construction wood (natural forest) | -           | 823.3       |                |
| ▪ Cereals crops (wetlands)           | 7.3         | 218.5       | 2893           |
| ▪ Fruits                             | 3.4         | 206.1       | 5,962          |
| ▪ Vegetables (wetlands)              | 3.8         | 130.6       | 3337           |

The largest proportion of surveyed households (about 45.3 percent) earns an annual income less than two thousand birr (see table 12 and figure 3), which is nearly equivalent to those used to earn less than 1000 birr in 2005. There is a clear variation on the amount of annual income earned between male and female-headed households. Nearly 64 percent of female-headed households earn annual income of less than 2000 birr as compared to 42.8% for their male counterpart. None of the female-headed household earns annual income greater than 2500birr as compared to 16.8% for their male counterpart. There is no significant variation in terms of income distribution pattern when we compare the situation of year 2008 against 2005.

Table 12: Income level of the surveyed households

| Category            | Income |       |        |       |       |         |
|---------------------|--------|-------|--------|-------|-------|---------|
|                     | Male   | %     | Female | %     | Total | Percent |
| Less than 1000 birr | 39.0   | 24.2  | 9.0    | 40.9  | 48.0  | 26.2    |
| 1000-1999 birr      | 30.0   | 18.6  | 5.0    | 22.7  | 35.0  | 19.1    |
| 2000-2999 birr      | 26.0   | 16.1  | 1.0    | 4.5   | 27.0  | 14.8    |
| 3000-3999 birr      | 17.0   | 10.6  | 2.0    | 9.1   | 19.0  | 10.4    |
| 4000-4999 birr      | 11.0   | 6.8   | 2.0    | 9.1   | 13.0  | 7.1     |
| 5000 and above birr | 27.0   | 16.8  | 0.0    | 0.0   | 27.0  | 14.8    |
| Not Reported        | 11.0   | 6.8   | 3.0    | 13.6  | 14.0  | 7.7     |
| Total               | 161.0  | 100.0 | 22.0   | 100.0 | 183.0 | 100.0   |

Figure 3: Income level of the surveyed households



## Expenditure

Average annual expenditure of households in Wichi watershed is 3531.9 (ranging from 150 minimum to 23260 maximum (table 13). Finding of the baseline study show that, the largest proportion of household expenditure goes to food crops and clothing while in the year 2008 purchase of livestock and building materials took the largest share of expenditure which implies resources are channeling towards building family asset instead of consumable items.

Table 13: average annual expenditure of households in Wichi watershed with the major items

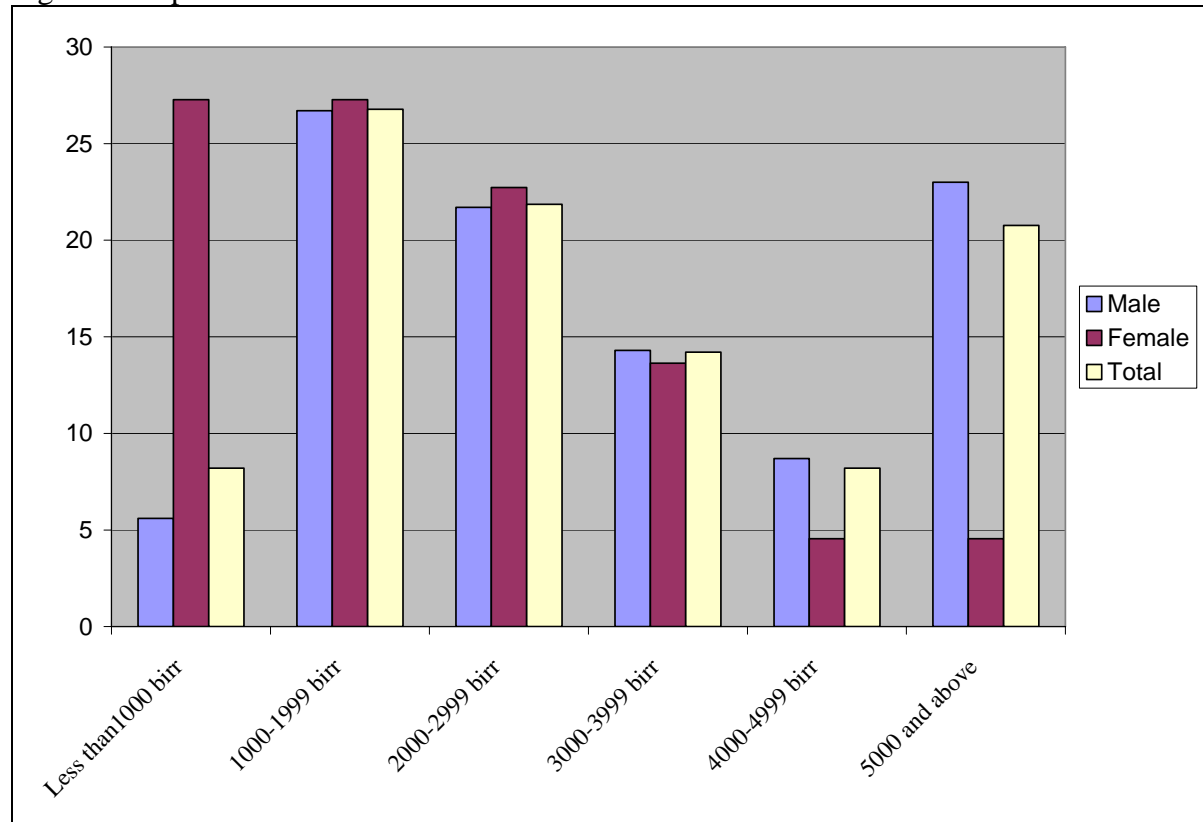
| Descriptive Statistics          | 2005    |       | 2008    |        |
|---------------------------------|---------|-------|---------|--------|
|                                 | Maximum | Mean  | Maximum | Mean   |
| ▪ Building materials            | 3800    | 194.2 | 10000   | 1313.3 |
| ▪ Livestock                     | -       | -     | 4400    | 1267.8 |
| ▪ Food crops                    | 2098    | 317.0 | 8400    | 959.0  |
| ▪ Cloths                        | 1500    | 326.5 | 3400    | 504.0  |
| ▪ Pay back debts                | 600     | 31.5  | 2214    | 503.0  |
| ▪ Milk and milk products        | 520     | 43.3  | 2000    | 307.2  |
| ▪ Other food items              | 220     | 4.0   | 840     | 275.8  |
| ▪ Agricultural inputs           | 518     | 16.9  | 1350    | 239.1  |
| ▪ Medical expense               | 980     | 128.3 | 1700    | 222.0  |
| ▪ Pepper and spices             | 400     | 66.1  | 1200    | 220.4  |
| ▪ Home utilities                | 400     | 41.6  | 2500    | 215.1  |
| ▪ Meat                          | 500     | 122.6 | 3000    | 201.1  |
| ▪ Edible oil                    | 362     | 76.5  | 1200    | 195.6  |
| ▪ Kerosene                      | 930     | 89.4  | 1200    | 192.6  |
| ▪ Coffee                        | 300     | 13.0  | 960     | 190.9  |
| ▪ Radio/tape recorder           | 600     | 22.6  | 500     | 184.2  |
| ▪ Educational expenses          | 2000    | 65.6  | 3000    | 167.2  |
| ▪ Transportation                | 700     | 30.3  | 1000    | 160.5  |
| ▪ Vegetables                    | 290     | 57.9  | 480     | 131.4  |
| ▪ Other non food items          | 1100    | 27.0  | 400     | 125.4  |
| ▪ Salt                          | 500     | 59.2  | 1500    | 124.1  |
| ▪ Sugar                         | 360     | 54.7  | 1000    | 108.0  |
| ▪ Fruit                         | 270     | 5.4   | 500     | 105.2  |
| ▪ Veterinary services           | 500     | 41.3  | 500     | 93.0   |
| ▪ Tax and other contributions   | 217     | 62.4  | 537     | 92.5   |
| ▪ Cultural and religious issues | 240     | 24.9  | 700     | 78.8   |
| ▪ Storage and packing materials | 100     | 9.1   | 900     | 58.1   |
| ▪ Farm tools                    | -       | -     | 310     | 54.4   |
| ▪ Social expenses               | 200     | 34.6  | 600     | 52.1   |
| ▪ Payment for hired laborers    | 580     | 5.4   | -       | -      |

Like income, expenditure of households in Wichi watershed varies by gender of heads households. About 54.6% of female-headed households annually spend less than 2000 birr as compared to 32.3% for their male counterparts while only 4.5% of the female-headed households annually spend above 5000 birr as compared to 23% for their male counterparts (table 14 and figure 4). Amount of annual household expenditure increased in the year 2008 as compared to the initial year of project intervention as a result of rising of income level.

Table 14: Expenditure level of households in Wichi watershed

| Category            | Expenditure |      |        |       |       |       |
|---------------------|-------------|------|--------|-------|-------|-------|
|                     | Male        | %    | Female | %     | Total | %     |
| Less than 1000 birr | 9           | 5.6  | 6      | 27.3  | 15    | 8.2   |
| 1000-1999 birr      | 43          | 26.7 | 6      | 27.3  | 49    | 26.8  |
| 2000-2999 birr      | 35          | 21.7 | 5      | 22.7  | 40    | 21.9  |
| 3000-3999 birr      | 23          | 14.3 | 3      | 13.6  | 26    | 14.2  |
| 4000-4999 birr      | 14          | 8.7  | 1      | 4.5   | 15    | 8.2   |
| 5000 and above      | 37          | 23   | 1      | 4.5   | 38    | 20.8  |
| Total               | 161         | 100  | 22     | 100.0 | 183   | 100.0 |

Figure 4: Expenditure level of households in Wichi watershed



Comparison of income with expenditure shows marked exaggeration of expenditure while income is under reported (figure 5). Furthermore, comparison of year 2008 against 2005 with respect to income and expenditure level show steady increases of both income and expenditure levels as witnessed from the finding of the study (table 15).

Figure 5: Comparison of annual income against expenditure of households for the year 2008

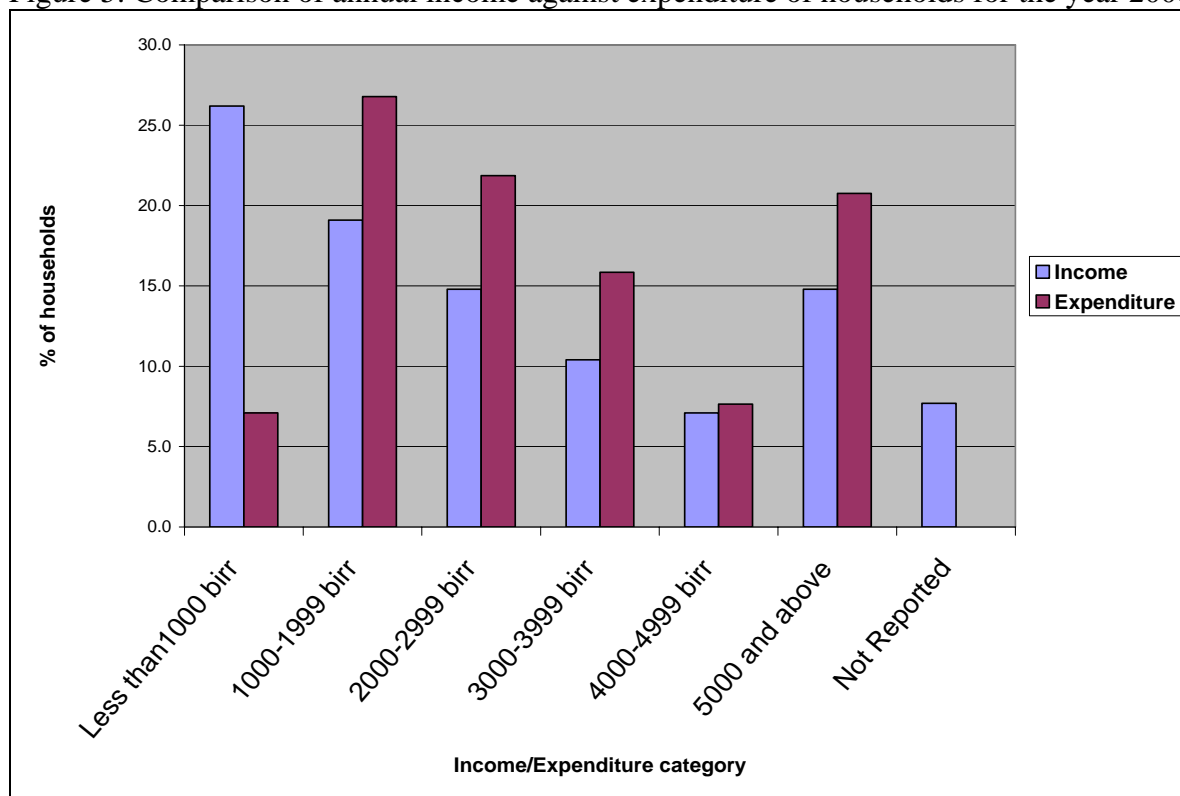


Table 15: Comparison of income and expenditure levels of the year 2005 and 2008

| Income              | Income |       | Expenditure |       |
|---------------------|--------|-------|-------------|-------|
|                     | 2005   | 2008  | 2005        | 2008  |
| Less than 500 birr  | 21.4   | 10.4  | 6.3         | 1.6   |
| 500- 999 birr       | 22.2   | 14.8  | 21.4        | 5.5   |
| 1000-1499 birr      | 15.9   | 12.6  | 20.6        | 13.7  |
| 1500-1999 birr      | 10.3   | 7.7   | 15.1        | 13.1  |
| 2000-2499 birr      | 15.1   | 10.9  | 9.5         | 13.7  |
| 2500 and above      | 11.9   | 36.1  | 23.0        | 52.5  |
| Missing/not respond | 3.2    | 7.7   | -           | -     |
| Total               | 100    | 100.0 | 100.0       | 100.0 |



#### **4.1.5. Natural Resource Management Practices**

Reducing soil erosion to avoid the subsequent land degradation and improving land productivity in the watershed through implementing biophysical soil and water conservation is one of the primary objectives of the project intervention. The project intervened in this regard through providing capacity building trainings, provision of materials required for conservation works (like digging hoe, spade hoe, and slasher) and provision of technical support in collaboration with Mettu Woreda Agriculture and Rural Development Office.

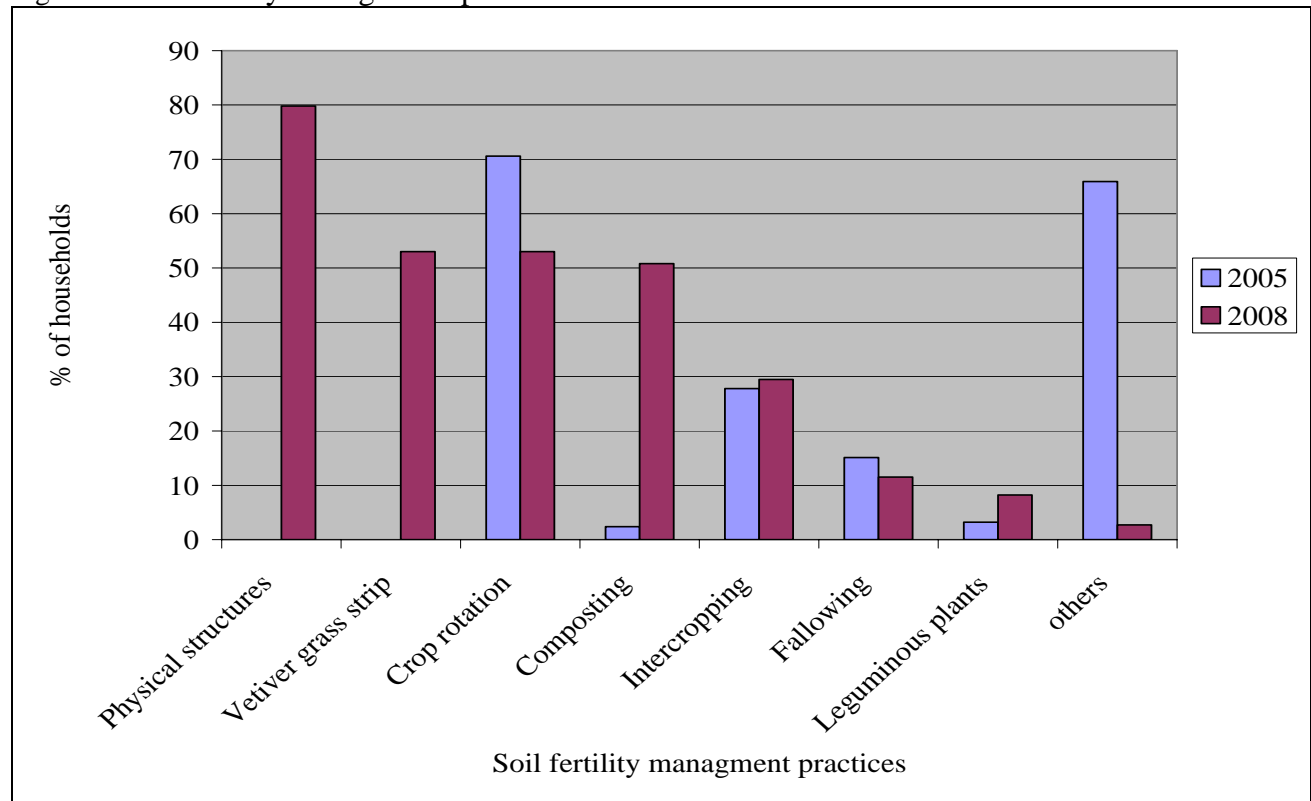
Remarkable positive impacts were recorded particularly on soil fertility management of the upslope agricultural lands. The project report shows the construction of about 946.36 km of different physical structures, planting of 200,000 bundles of Vetiver grass and more than 255000 tree seedling during the past four years of the project implementation. As a result, the adoption of biophysical soil and water conservation practices, which were almost nil at the initial year of the project intervention has been significantly increased in the year 2008.

Only 19.8% of households in the watershed were practicing physical soil and water conservations, 6.3% were practicing biological soil and water conservations and 2.4% were using compost. While, the largest proportion of farmers were used to use agronomic methods of soil fertility management practices such as crop rotation, manure, intercropping and fallowing. Significant changes have been recognized in 2008 with respect to biophysical soil and water conservations such as construction of physical structure, use of vertiver grass strip and composting (table 16 and figure 6). For instance, the percentage of farmers practicing physical soil and water conservations increased to 80.3% and those practicing biological soil and water conservations increased to 60.7% in 2008.

Table 16: Involvement in biophysical soil and water conservation practices

| Soil and water conservation practices | Response | 2005 |        |       |       | 2008 |        |       |       |
|---------------------------------------|----------|------|--------|-------|-------|------|--------|-------|-------|
|                                       |          | Male | Female | Total | %     | Male | Female | Total | %     |
| Physical                              | Yes      | 23   | 2      | 25    | 19.8  | 132  | 15     | 147   | 80.3  |
|                                       | No       | 81   | 15     | 96    | 76.2  | 24   | 5      | 29    | 15.8  |
|                                       | Missing  | 4    | 1      | 5     | 4.0   | 5    | 2      | 7     | 3.8   |
|                                       | Total    | 108  | 18     | 126   | 100.0 | 161  | 22     | 183   | 100.0 |
| Biological                            | Yes      | 8    | 0      | 8     | 6.3   | 101  | 10     | 111   | 60.7  |
|                                       | No       | 95   | 17     | 112   | 88.9  | 56   | 9      | 65    | 35.5  |
|                                       | Missing  | 5    | 1      | 6     | 4.8   | 4    | 3      | 7     | 3.8   |
|                                       | Total    | 108  | 18     | 126   | 100.0 | 161  | 22     | 183   | 100.0 |

Figure 6: Soil fertility management practices used in Wichi watershed



Note: others in 2005 including cow dung and other organic materials but not appropriately prepared compost

Increasing use of biophysical soil and water conservation practices has brought positive impact on reducing soil erosion from agricultural lands. For instance, the proportion of households facing soil erosion problems reduced from 89.7% in 2005 to 44.3 in 2008 (table).

Out of those currently facing soil erosion problems, only 8.6% reported that the extent of soil loss was high as compared to 37.3% in 2005. Furthermore, the largest percentage of households (76%) witnessed the improving trends of soil fertility on agricultural lands unlike the initial year of project intervention where about 87.3% of the households reported declining trends of soil fertility (table 17 and figure 7).

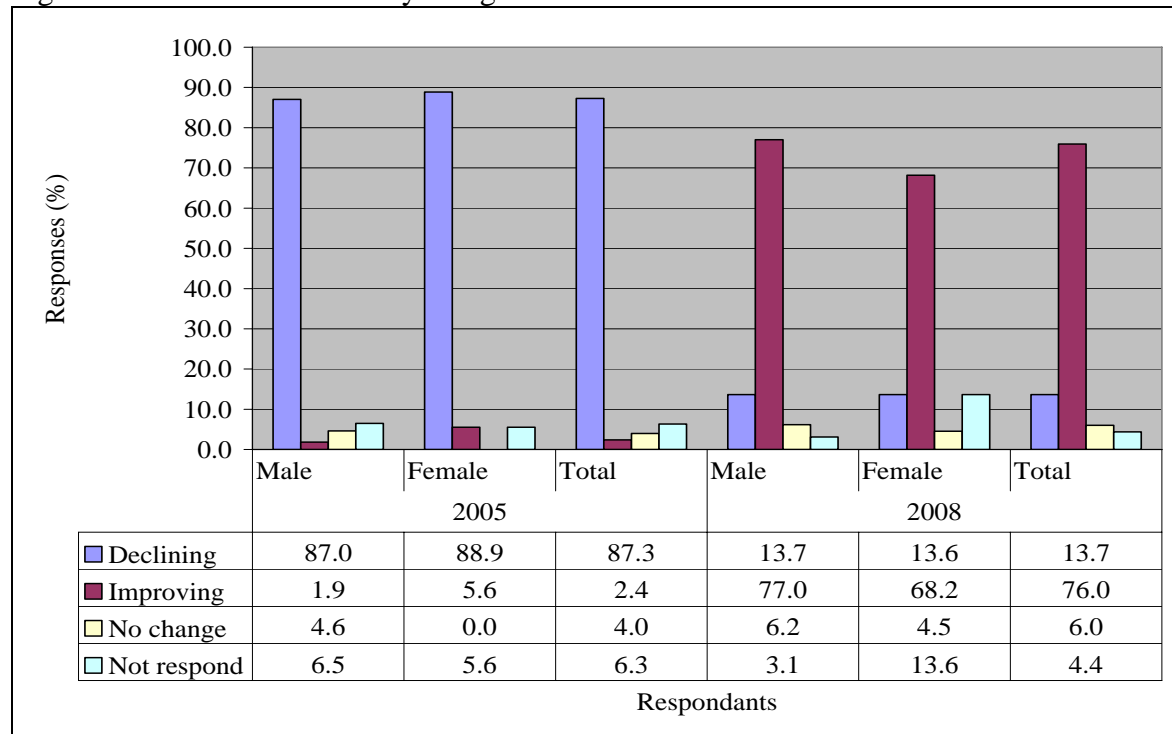
Table 17: Presence of soil erosion problem on their agricultural lands

| Responses   | % of households |        |
|---|-----------------|--------|
|   | 2005*           | 2008** |
| Have you faced soil erosion problem?              |                 |        |
| • Yes   | 89.7            | 44.3   |
| • No  | 6.3             | 51.4   |
| • Not reported                                    | 4.0             | 4.4    |
| • Total   | 100.0           | 100.0  |
| What is the trend of fertility on your farmlands? |                 |        |
| • Declining                                       | 87.3            | 13.7   |
| • Improving                                       | 2.4             | 76.0   |
| • No change                                       | 4               | 6.0    |
| • Not respond                                     | 6.3             | 4.4    |
| • Total   | 100             | 100.0  |

\* Before

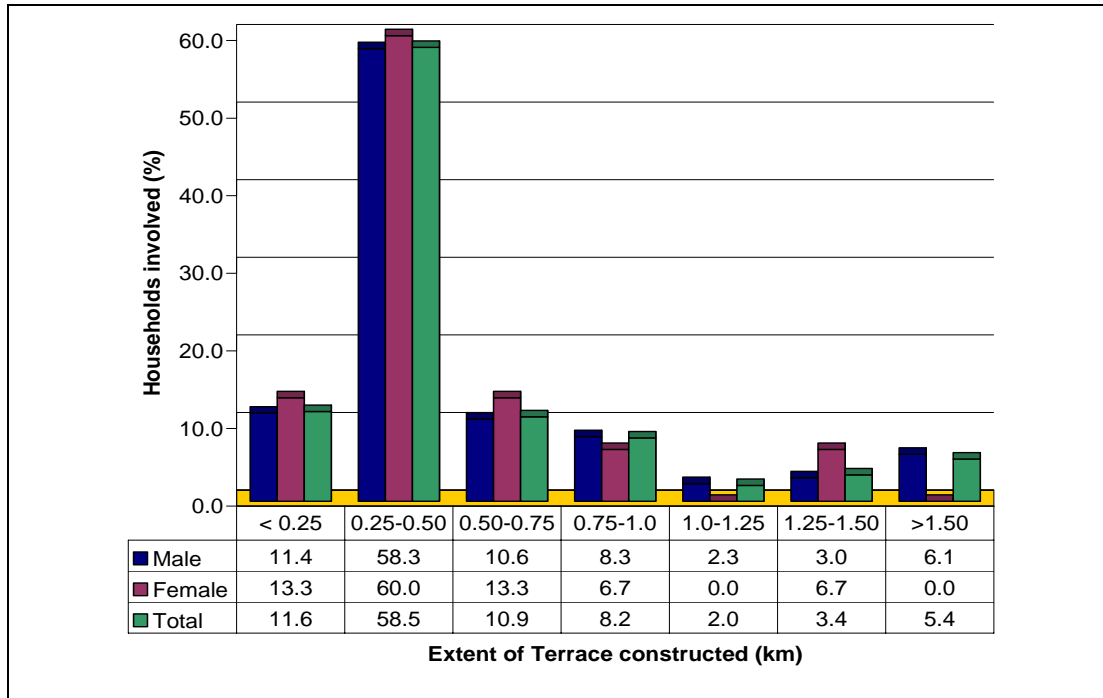
\*\* Between 2005 and 2008

Figure 7: Trends of soil fertility on agricultural lands



The extent of terraces constructed by those who practiced the physical soil and water conservation works during the four years of project intervention varies from the minimum 0.05km to the maximum 2.6km, which gives an average of 0.5452km per household.

Figure 8: Extent of terrace constructed in kilometer between 2005 and 2008.



Constructing physical structure is not an end by itself in soil and water conservation activities. Therefore, the constructed physical structure should be well stabilized and control soil erosion problems. Findings of the impact study indicated that the constructed physical structures were well stabilized and fairly functioning as witnessed from 64.6% of the households reported that the terraces they have constructed were fully stabilized and well controlling soil erosion problems while 0.7% reported that they have been damaged and no more functioning (table 18)

Table 18: Status of the terrace constructed for physical soil and water conservation

| Response                                    | Gender of head of household |        |       |       |
|---|-----------------------------|--------|-------|-------|
|   | Male                        | Female | Total | %     |
| Fully stabilized and well functioning       | 83                          | 12     | 95    | 64.6  |
| Partially stabilized and fairly functioning | 45                          | 3      | 48    | 32.7  |
| Damaged and no more functioning             | 1                           | 0      | 1     | 0.7   |
| Not reported                                | 3                           | 0      | 3     | 2.0   |
| Total                                       | 132                         | 15     | 147   | 100.0 |

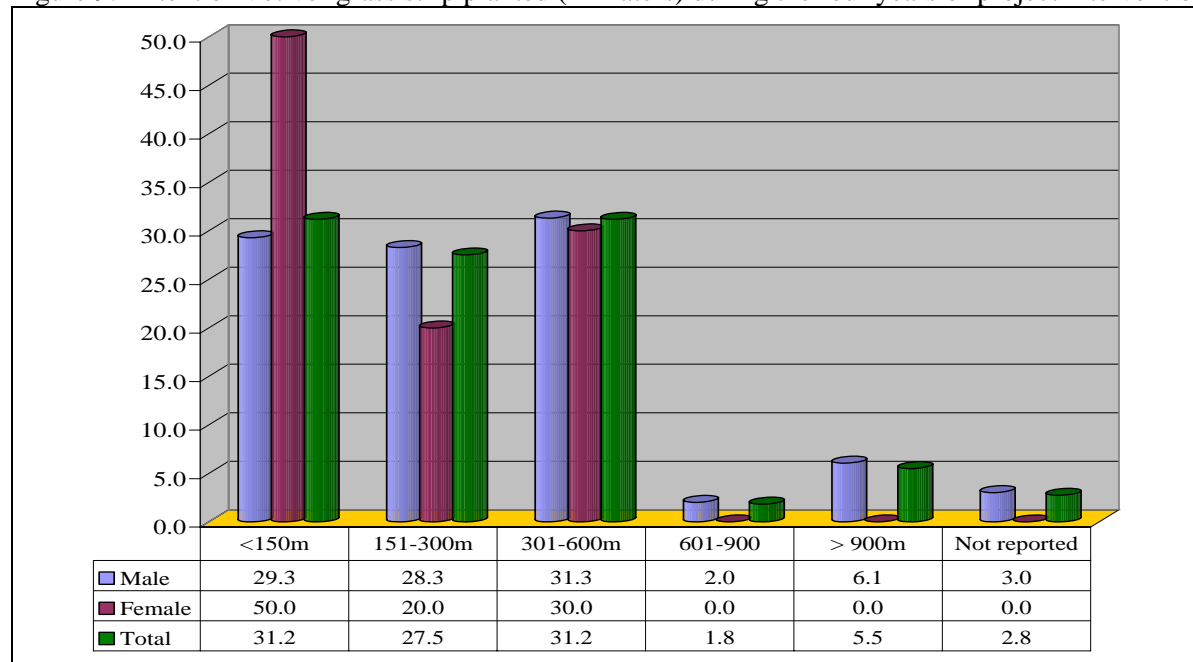
Combinations of biological soil and water conservation were practiced in Wichi watershed during the past four years among which Vetiver grass, fodder grass, fodder trees and leguminous trees are the ones widely practiced of which again planting Vetiver grass strip on physical structures is the most widely practiced (table 19)

Table 19: Types of biological soil and water conservation practices during the past 4 years

| Reponses  | Frequency | % Of total households surveyed |
|---|-----------|--------------------------------|
| Veriver grass only  | 109       | 59.6                           |
| Veriver grass +fodder grass                                     | 113       | 61.7                           |
| Veriver grass +Leguminous trees                                 | 113       | 61.7                           |
| Veriver grass + Fodder Trees                                    | 111       | 60.7                           |
| Veriver grass +fodder grass+ Fodder Trees                       | 112       | 61.2                           |
| Veriver grass + Fodder Trees +Leguminous trees                  | 111       | 60.7                           |
| Veriver grass +fodder grass+ Fodder Trees+ Leguminous trees     | 110       | 60.1                           |
| Any one of the biological soil and water conservation practices | 111       | 60.7                           |
| Not practiced   | 64        | 35.0                           |
| Missing System  | 8         | 4.4                            |
| Total   | 183       | 100.0                          |

The extent of Vetiver grass strip planted for biological soil and water conservation during the four years of project intervention varies from the minimum 20 meters to the maximum 1600meters with average of 327.4 meters per household (Figure 9).

Figure 9: Extent of Vetiver grass strip planted (in meters) during the four years of project intervention



About 70.6% of the households who have planted Vetiver grass reported that the planted grass is well stabilized and functioning, 22% reported partially stabilized and fairly functioning while 7.3% reported it has already damaged and no more functioning.

Another dimension of sustainable agricultural land husbandry is the adoption of organic farming practices. Using compost as organic fertilizer is economically viable, socially acceptable and environmentally friendly (sustainable) way of boosting agricultural productivity. However, experience of farmers in Wichi water with respect to preparing and using compost is very low prior to the project intervention. Finding of the baseline study indicated that only 2.4% of the households use compost. The project provided demonstrative trainings on the methods of compost preparation and use. About 233 innovative farmers nearly 8.6% of the total households in the watershed were attended training on compost making during the first two years of project life. The impacts of such training are measured by adoption of the practice among farming households in the watershed. Promising changes have been observed during the past four years with respect to preparation and use of compost. The percentage of households adopted the practice increased from 2.4% in 2005 to 35% in 2008 with marked difference between male and female-headed households (37.9% and 13.6% respectively). Although improvements have been observed, there is need to further promote the practice as the percentage of households adopted the technology is still low.

One way of addressing land degradation is planting trees on degraded lands and developing individual wood lot so as to reduce pressure on the remnant natural forest. The project implemented has intensive reforestation program through raising and distribution of forest tree seedlings for planting. More than 255000 seedlings were planted during the four years of project implementation in Wichi watershed. The baseline study attempted to assesses the tree planting experiences of local community. Accordingly only 38.9% of the households in Wichi watershed used to have experience of tree planting which increased to 53.6% after four years of the project implementation. Gravillia is becoming more popular in the area followed by eucalyptus (table 20) where about 60.1% of Gravillia and 65.2% of eucalyptus seedlings planted during the past four years reported to be survived

Table: 20 Tree species widely planted, purpose of tree planting and places where trees mostly planted

| <b>Description</b>   | <b>2005</b>  | <b>2008</b>  |
|--|--|--|
| Tree species widely planted (by order of importance)       | <ol style="list-style-type: none"> <li>1) Eucalyptus</li> <li>2) Cordia</li> <li>3) Sesbania</li> <li>4) Gravillia</li> <li>5) Others</li> </ol>   | <ol style="list-style-type: none"> <li>1) Gravillia</li> <li>2) Eucaluptus</li> <li>3) Cupresus spp</li> <li>4) Others</li> </ol>  |
| Purpose of tree planting (by order of importance)          | <ol style="list-style-type: none"> <li>1) Fuel and construction wood supply</li> <li>2) Shade including coffee</li> <li>3) Sale/income</li> <li>4) Soil and water conservation</li> <li>5) Livestock feed</li> </ol>                                     | <ol style="list-style-type: none"> <li>1) Sale/ income</li> <li>2) Fuel and construction wood supply</li> <li>3) Soil and water conservation</li> <li>4) Shade including coffee</li> <li>5) Livestock feed</li> </ol>                                    |
| Places where trees mostly planted (by order of importance) | <ol style="list-style-type: none"> <li>1) Coffee lands</li> <li>2) Along road side and gullies</li> <li>3) Garden plot and farm lands</li> <li>4) Individual grazing lands</li> <li>5) As Live fence</li> <li>6) Wetlands and wetland fringes</li> </ol> | <ol style="list-style-type: none"> <li>1) Coffee farm/lands</li> <li>2) Garden plot and farmlands</li> <li>3) Along roadside and gullies</li> <li>4) Live fence</li> <li>5) Wetlands and wetland fringes</li> <li>6) Individual grazing lands</li> </ol> |

#### **4.1.7. Wetland Use and Management**

Wetlands in Ilu Aba Bora in general and Wichi wetland in particular provide multiple benefits to the local communities such as cultivation for food crop production, livestock grazing, water supply, thatching grass, craft materials and medicinal plants supply and others.

One of the encouraging impacts of the project is the positive change observed on the use and management of Wichi wetland. Unlike the initial year of the project intervention where cultivation and grazing are the major uses of Wichi wetland, currently the wetland is used for harvesting of thatching grass and dry season grazing while drainage in cultivation significantly decreased. For instance, in the year 2005, about 71.4% surveyed households used to practice drainage and cultivation in Wichi wetland while currently the people involved in cultivation are nil. About 80.9% of the households are currently practice grazing in the wetlands of which about 93.2% are practicing only during dry season while 3.4% are practicing during wet season. Restricted dry season grazing has relatively minimum ecological impacts on wetland hence it allow regeneration during wet season.

At the initial year of the project intervention, 69% of the surveyed households reported that they have observed undesired changes on Wichi wetland such as decreasing of water level/drying of wetlands, shortage of *chafe* grass, decline in productivity of wetlands, unexpected flooding and siltation are the major ones. Similarly, 70% of the surveyed households recognized changes on Wichi wetlands during the past four years of which 85.4% reported that the changes recognized are positive (rehabilitation/improvement). In general, the study found that siltation is decreasing while water level and wild life resources are increasing in Wichi wetlands during the past four years (table 21) that could be directly or indirectly linked with the project intervention.

Table 21: Trends of changed in Wichi wetlands with respect to siltation, water level and wild life

| Indications | Trends of change during the past four years |            |           |
|-------------|---|------------|-----------|
|             | Increasing                                  | Decreasing | No change |
| Siltation   | 13.1  | 83.8       | 3.1       |
| Water level | 59.2  | 37.7       | 3.1       |
| Wildlife    | 64.6  | 12.3       | 23.1      |



#### 4.1.8. Capacity Building and Community Empowerment

Capacity building is an integral component of almost all project activities which aim to empower and capacitate the community that enable them sustain the project activities after phasing out of the project. The project final reports show that more than 800 people attended training on different topics (Table 22)

Table 22: People trained on various topics during the past four years of the project implementation

| <b>Training Topics</b>                          | <b>Number Trained</b> |
|---|-----------------------|
| ▪ Integrated wetlands-watershed management      | 173                   |
| ▪ Agroforestry,                                 | 60                    |
| ▪ Compost making                                | 233                   |
| ▪ Institutional management                      | 56                    |
| ▪ Apiculture                                    | 38                    |
| ▪ Fruit and vegetable production                | 28                    |
| ▪ Institutional and financial management        | 30                    |
| ▪ Environmental sanitation and personal hygiene | 60                    |
| ▪ Water scheme operation and management         | 63                    |
| ▪ Health care                                   | 60                    |

*Source: Final reports of the project*

The impact study also found that about 63.9% of the households (with almost balanced gender 64% for male and 63.6 for female) in the watershed attended training at least on one thematic area of the trainings provided by the project. The baseline study assessed limited aspects of existing capacity in the area of natural resource management and livelihood diversification theme for which making comparison is possible. Accordingly, the proportion of households who have at least certain skill and awareness in the area of wetland management, integrated watershed management, compost making and use, agroforestry practice and home garden vegetable production has significantly increased (table 23).

Table 23: Involvement in various capacity building and awareness raising training activities

| Theme of training   | 2005 |        |       |      | 2008 |        |       |      |
|---|------|--------|-------|------|------|--------|-------|------|
|   | Male | Female | Total | %    | Male | female | Total | %    |
| <b>Natural Resource management</b>                                |      |        |       |      |      |        |       |      |
| • Wetland management  | 4    | 0      | 4     | 3.2  | 46   | 5      | 51    | 27.9 |
| • Integrated watershed management and soil and water conservation | 4    | 0      | 4     | 3.2  | 54   | 7      | 61    | 33.3 |
| • Compost making & use  | 13   | 0      | 13    | 10.3 | 32   | 2      | 34    | 18.6 |
| • Nursery operation and management                                | -    | -      | -     |      | 18   | 2      | 20    | 10.9 |
| <b>Income improvement and livelihood diversification</b>          |      |        |       |      |      |        |       |      |
| • Agroforestry  | 3    | 0      | 3     | 2.4  | 25   | 2      | 27    | 14.8 |
| • Vegetable production  | 3    | 0      | 3     | 2.4  | 36   | 4      | 40    | 21.9 |
| • Apiculture  | -    | -      | -     |      | 19   | 2      | 21    | 11.5 |
| • Financial management  | -    | -      | -     |      | 11   | 1      | 12    | 6.6  |
| <b>Clean water supply, sanitation and health</b>                  |      |        |       |      |      |        |       |      |
| • Personal hygiene and Environmental sanitation                   |      |        |       |      | 69   | 10     | 79    | 43.2 |
| • Health  |      |        |       |      | 62   | 9      | 71    | 38.8 |
| • Water scheme operation and management                           |      |        |       |      | 11   | 5      | 16    | 8.7  |
| <b>Cross cutting</b>  |      |        |       |      |      |        |       |      |
| • Institutional management & community mobilization               | -    | -      | -     |      | 19   | 2      | 21    | 11.5 |

It is worthwhile to evaluate to what extent people trained apply knowledge and skill gained from the trainings provided. Excluding the clean water supply, sanitation and health theme, about 86.9% of those who attended one of the trainings (87.2 for male and 83.3 for female) reported that they have partially or fully applied knowledge and skill gained from the training while the rest 13.1 were not for various reasons. The limiting factors mentioned by those who fail to apply knowledge and skill obtained from the training is personal inconveniency, resource constraint such as land and labor and insufficiency of knowledge gained from the training.

#### 4.1.9. Food Security

The concept of food security is built on three pillars: availability (sufficient quantities of food available on a consistent basis), access (having sufficient resources to obtain appropriate foods for a nutritious diet) and use (appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation). Therefore, food security is defined as a situation that exists when all people at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.

Both the baseline and this impact study attempted to evaluate the availability dimension of food security. The findings show that 71.4% of the households in the Wichi watershed used to experience sever food shortage during the five years period prior to the project intervention in 2005 while the proportion of households facing sever food shortage afterwards reduced nearly by half and only 36.1% reported sever food shortage during the past four years (table 24). Furthermore, the percentage of households who able to satisfy their household food requirement with out depleting any of their family assets for more than half a year increased from 70.6 % in 2005 to 82.6% in 2008 (Figure10). Such evidence of food security gives sufficient premises to conclude that the project has contributed towards the achievement of ensuring food security and livelihood enhancement as one of its goal.

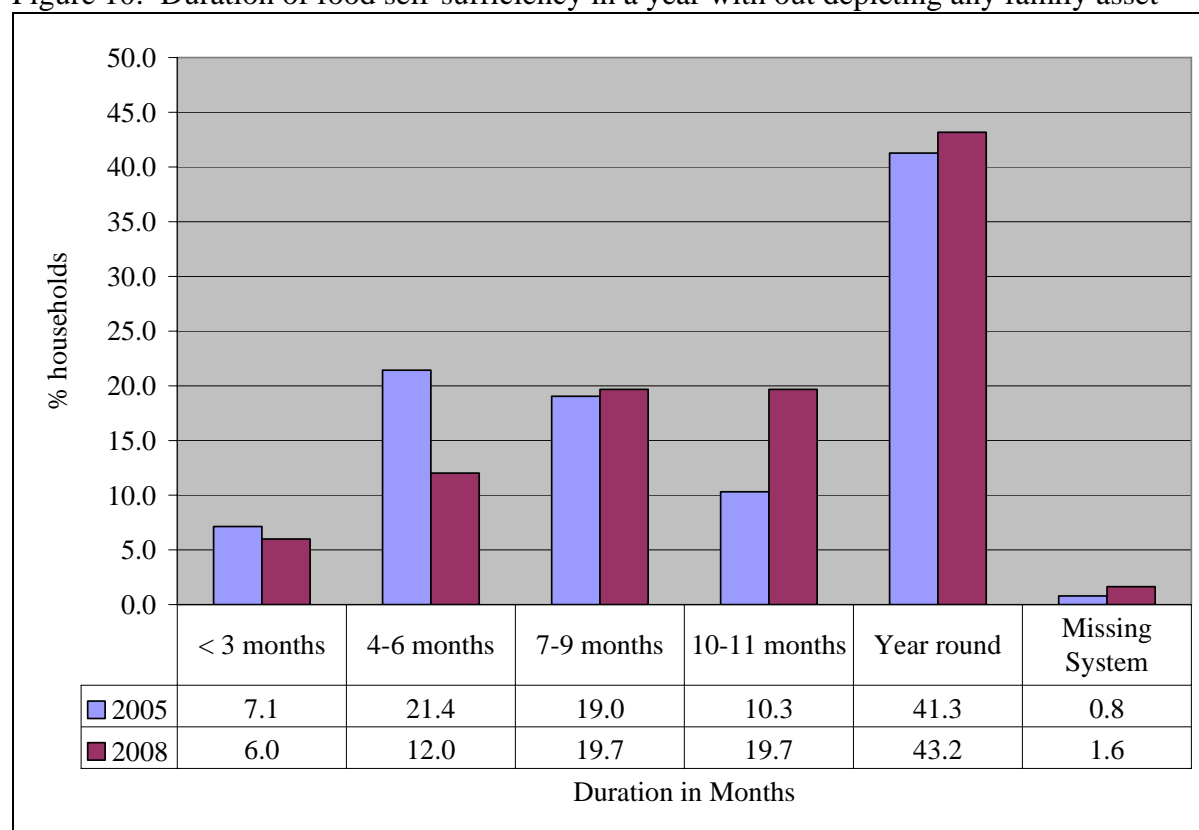
Table 24: Do the household faced sever food shortage?

| Response       | 2005* |        |       | 2008** |        |       |
|----------------|-------|--------|-------|--------|--------|-------|
|                | Male  | Female | Total | Male   | Female | Total |
| Yes            | 67.6  | 94.4   | 71.4  | 35.4   | 40.9   | 36.1  |
| No             | 30.6  | 5.6    | 27    | 63.4   | 54.5   | 62.3  |
| Missing System | 1.9   | 0      | 1.6   | 1.2    | 4.5    | 1.6   |
| Total          | 100   | 100    | 100   | 100.0  | 100.0  | 100.0 |

\* *Ever faced*

\*\* *during the past four years*

Figure 10: Duration of food self-sufficiency in a year with out depleting any family asset



However, there are still significant proportions of households who are vulnerable to sever food shortage because of various reasons (table 25). It is interesting to note that productivity loss due to soil erosion is the third major cause for food insecurity in the year 2005 which take the sixth place in 2008. Lack of farm oxen, shortage of farmland is still the leading course of food insecurity.

Table 26: Causes of household food insecurity in the Wichi watershed by order of importance

| S.N | 2005                                     | 2008                                     |
|-----|--|--|
| 1   | Lack of farm oxen                        | Lack of farm oxen                        |
| 2   | Shortage of farm lands                   | Shortage of farmlands                    |
| 3   | Productivity decline due to soil erosion | Low use of modern inputs                 |
| 4   | Productivity decline due to wild pests   | Unsuitable whether condition             |
| 5   | Crop damage by natural disasters         | Unsuitable farmland (steep slope)        |
| 6   | Unsuitable weather condition             | Productivity decline due to soil erosion |
| 7   | Shortage of productive labor             | Poor farmland management                 |
| 8   | Poor farm management                     | Shortage of productive labor             |
| 9   | Low use of modern inputs                 | Crop loss/damage due to pest             |
| 10  | Unstable farmland (steep slope)          | Time constraints                         |
| 11  | Time constraints                         | Crop damage due to natural disasters     |
| 12  | Other agricultural related problems      | Other agriculture related problems       |

#### **4.1.10. Clean water supply and Sanitation**

Access to safe drinking water and adequate sanitation are the fundamental requirement for human wellbeing. Provisioning of clean water supply and sanitation directly helps to achieve at least two of the health related United Nations Millennium Development Goals (goal 4 reducing child mortality and goal 6 combat HIV/AIDS, malaria and other diseases). However, ensuring access to clean water and sanitation services is one of the critical global challenges threatening life of many people. Millions of people particularly in developing countries including Ethiopia lack access to clean drinking water and adequate sanitation facilities, which is responsible for high prevalence of morbidity and mortality. Global estimate shows that about 1.1 billion people lack access to safe drinking water; 2.6 billion people lack adequate sanitation, death of 1.8 million people (90 % of children under 5) per year attributed to unsafe water, poor sanitation, and lack of hygiene.

Ethiopia is among the top ten countries having the lowest clean water supply and sanitation coverage. The situation in Wichi watershed is not different, even worst than the national scenario. Prior to the project intervention, there were only two hand pumps and two developed springs in the watershed providing clean water supply. As a result the largest proportion of the population depends on unsafe water sources for domestic consumptions.

Lack of clean water supply at reasonable distance has both health and socio economic implications. Use of unsafe water for domestic consumption expose people to different water born diseases such as diarrhea and intestinal practices which are the leading among the ten top ten diseases recorded in the local health institutions. Furthermore, lack of clean water facilities at reasonable expose women and girls to various physical and psychological sufferings.

Clean water supply is one of the most critical felt needs of the communities in the watershed given the top priority. The clean water supply and sanitation component of the project is the lately come intervention based on the frequent request of the communities. Prior to the project intervention on clean water supply and sanitation services, there were only four clean water supply schemes in Wichi watershed (two hand pumps and two developed springs).

During the past four years a total of twenty hand pumps were installed and two springs were developed in the watershed of which twelve of the hand pumps were installed with financial support obtained from Japan embassy. This has brought significant improvement in clean water supply coverage. In the year 2005, only 11.1% of households in the watershed have access to clean water while currently 56.3% of the households reported that their sources of water for domestic consumption are from protected hand pumps and developed springs (table 27) of which 54.1% reported that they got access to clean water supply during the past four years. The time taken to fetch water (round trip) before the installation of the water scheme, which was 17.2 minutes currently, reduced to 11.9 minutes after wards (table 28).

Table 27: Source of water currently used for various purposes

| Sources                   | Domestic uses |       | Sanitary purposes |       | Livestock |      |
|---------------------------|---------------|-------|-------------------|-------|-----------|------|
|                           | No.           | %     | No.               | %     | No.       | %    |
| Open river/stream         | 16            | 8.7   | 118               | 64.5  | 150       | 82.0 |
| Stagnant water            | 2             | 1.1   | 5                 | 2.7   | 8         | 4.4  |
| Unprotected spring        | 42            | 23.0  | 34                | 18.6  | 20        | 10.9 |
| Unprotected hand dug well | 20            | 10.9  | 6                 | 3.3   |           |      |
| Protected hand pump       | 84            | 45.9  | 16                | 8.7   |           |      |
| Protected springs         | 19            | 10.4  | 4                 | 2.2   | 2         | 1.1  |
| Missing System            |               |       |                   |       | 3         | 1.6  |
| Total                     | 183           | 100.0 | 183               | 100.0 | 180       | 98.4 |

The provision of clean water supply at closet distance reduce job burden on women and enable them take part in other productive activities like gardening and enable girls performing well in education. Therefore, although all members of houseless in the watershed benefited from the water supply schemes, women and girls are the most beneficiaries. About 90% of the surveyed households reported that women are the most beneficiaries.

Table 28: Time taken to fetch water before and after installation of water supply scheme

| Time taken in minuets | Before    |         | After     |         |
|-----------------------|-----------|---------|-----------|---------|
|                       | Frequency | Percent | Frequency | Percent |
| <10 minuets           | 38        | 20.8    | 64        | 35.0    |
| 10 to 20 minuets      | 38        | 20.8    | 28        | 15.3    |
| 20 to 30 minuets      | 18        | 9.8     | 5         | 2.7     |
| 30 to 40 minuets      | 1         | .5      | 1         | 0.5     |
| > 40 minuets          | 4         | 2.2     | 1         | 0.5     |
| Total                 | 99        | 54.1    | 99        | 54.1    |
| Missing System        | 84        | 45.9    | 84        | 45.9    |
| Total                 | 183       | 100.0   | 183       | 100.0   |

The major benefits obtained from the installation of the water supply schemes according to order of importance are improvement of human health, followed by reduce job burden on women and girls and saving of time spent for water fetching.

About 75% of those households got access to clean water reported that the installed schemes are well functioning while 25.3% reported the existing of some problems on the water supply schemes. The major problems reported according to order of importance are: shortage of skill personnel for operation and maintenance, misuse/mismanagement of the water schemes, sanitation surrounding the schemes, malfunctioning of the schemes, water quality problems particularly warms conflicts over water use, shortage of water and improper location of the schemes

The clean water supply and sanitation component of the project compose community training on varies water scheme operation and management, sanitation, hygiene and health. The project report shows the establishment of nine water and sanitation committee and training of 63 water and sanitation committee members on water scheme operation and management, 60 people on environmental sanitation and personal hygiene and 60 people on health. The impact survey also found that about 43.2%, of the respondents reported that at least one member of their household attended training on sanitation and hygiene, 38.8% on health and 8.7% on water scheme operation and management (table 29).

Table 29: Involvement on trainings accompanied the clean water supply activities of the project

| Topics of training                            | Households trained |        |       |      |
|---|--------------------|--------|-------|------|
|   | Male               | Female | Total | %    |
| Environmental sanitation and personal hygiene | 69                 | 10     | 79    | 43.2 |
| Health  | 62                 | 9      | 71    | 38.8 |
| Water scheme operation and maintenance        | 11                 | 5      | 16    | 8.7  |

## 4.2. Findings of the PRA Study

One session PRA study was conducted at two sites in Tulube and Adele Bise Kebeles. A total of 18 informants (15 male and 3 female) attended a two hours discussion. The discussion was aimed to gather qualitative information with respect to impacts of the project. Three key issues explored include impacts of the project intervention on the natural environment (with separate treatment of uplands and wetland micro-environment), income and livelihood, and community awareness, capacity building and empowerment. Results of the PRA study are summarized as follows.

### 4.2.1. Impacts of the intervention on the natural environment

The informant witnessed that, in the past (before four years) soil erosion was sever and soil loss from agricultural land was high. However, during the past four years since soil and water conservation works started in the watershed, the land is becoming stable and the trend of soil erosion is significantly declining. Four years ago, crop yield per unit area was low even with application of fertilizer. But afterwards, with advice from agricultural staff and intensive soil and water conservations works, productivity of land improved. The outcomes of conservation works on productivity become clearly visible after two years of the project implementation

The adoption of soil and water conservation practices by the community members in the watershed is steadily increasing during the past four years of the project intervention. This is demonstrated by proportional pilling of people adopted biophysical conservation practice and proportion of land in the watershed covered by biophysical conservations as depicted in the photo below



Photo1: Participants of the PRA study Tulube Kebele



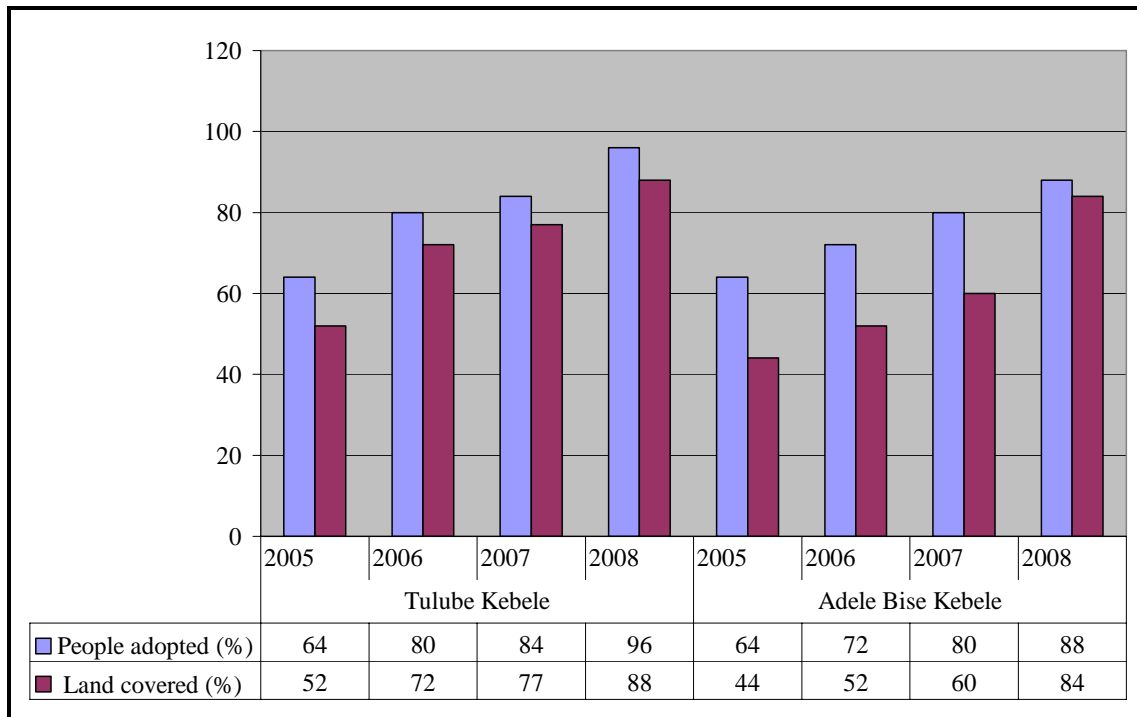
Photo2: Participants of the PRA study Adele Bise Kebele



A number of benefits obtained from soil and water conservation practices were listed as follows

- Soil erosion from agricultural lands decreased while land productivity improved. It has been pointed out that 3-4 quintals of yield use to be obtained from one-eighth of a hectare now increased to 6-8 quintals. Fertility indicators are appearing on agricultural lands like lands usually growing *kello* are now started growing *tuffo*.
- The Vetiver grass planted to reinforce physical conservation strictures is giving multiple socio economic benefits apart from soil conservation
- Wichi wetland rehabilitated, chafe grass and water became available through out the year
- Household income diversified and improved as a result of the introduction of home garden fruit and vegetable production.
- Farm tools provided supported framer to undertake conservation works and other agricultural activities
- The fodder trees and grasses introduced have improved livestock production and productivity.

Figure 10: Trends in the adoption of biophysical conservation and land conserved



Challenges faced on soil and water conservation activities were also identified and listed as follows

- Shortage of Vetiver grass supply to reinforce the physical conservation structures
- Frequent breaking down of physical structures, poor design of waterway and cut-off drain and the associated damages on land and crop.
- Failure of few individuals to involve in the soil and water conservation activities due to either negligence or shortage of labor force due to illness.
- Unfair distribution of Vetiver grass and fruit tree seedlings. It is not done according to the household size of each village. Those who are close to access roads and those who have sufficient family labor got more while others were not.
- Improper planting of the Vetiver grass supplied by few individuals

Changes observed on the wetlands during the past four years were separately treated to evaluate links of wetland rehabilitation with the integrated watershed management activities done on the uplands. Participants of the discussion reported that the water level of Wichi wetland is raising and becoming available all year round. The wetland even becomes impossible to cross in some places. Deep green *chaffe* grass, which was, disappeared in the past is reappearing as the wetland is rehabilitating. Different bird species, which disappeared, were reappearing and new ones were also observed. In the past, soil eroded from the surrounding upslope used to accumulate in Wichi wetland and often divert the waterway. After the soil loss in the upslope trapped by biophysical conservations, the problem is now minimized. As a result of these, water and grass become sufficiently available for livestock during dry season, wetland products such as *chaffe* grass used for roof thatching become available for every body at vicinity, various attractive bird species came back to the wetland which increased the natural attractiveness of the wetland and the fringing forests are also recovering from degradation.

Participants of the discussion further asked how the local community would like to use and manage Wichi wetland in the future. They replied that grazing and *chaffe* harvesting are the priority of the local community. Hence the wetland is a refuge site for livestock during dry season especially for milking cows. Therefore, local community wishes to partition the wetland for various uses and use it according to agreed land use plan and self initiated bylaw.

However, there are certain degree of pessimism about realization of desired used and management of the wetland because of the existing and potential challenges. There exist conflicts of interest over uses of the wetland among the local community members. There are some people who still want to use the wetland for cultivation. The ever-increasing population and land shortage will make expansion of agriculture into the wetlands inevitable. Unless the decision makers are convinced about the multiple benefits of wetlands, they may continue encouraging the conversion of the wetlands into agriculture with the pursuit of ensuring food security. Ensuring sustainable grazing is also another big challenge hence there are some people who disobey the prohibition of wet season grazing in the wetland

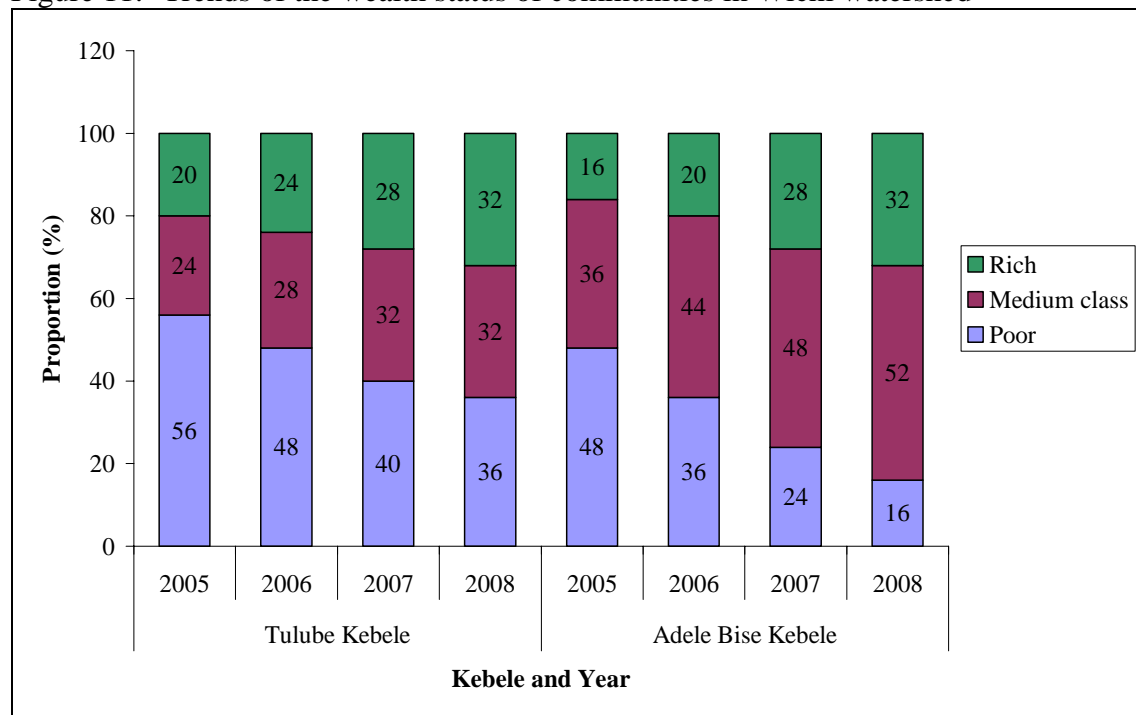
#### **4.2.2. Impacts of the project intervention on income and livelihood**

Participants confirmed the improvement of income and diversification of the livelihood basis of the local community during the past four years as witnessed from the qualitative trend analysis of wealth status of the community using wealth-ranking method.

Table 30:-Trends of the wealth status of communities in Wichi watershed

| Wealth class | Tulube Kebele          |      |      |      | Adele Bise Kebele      |      |      |      |
|--------------|------------------------|------|------|------|------------------------|------|------|------|
|              | % Of each wealth class |      |      |      | % Of each wealth class |      |      |      |
|              | 2005                   | 2006 | 2007 | 2008 | 2005                   | 2006 | 2007 | 2008 |
| Poor         | 56                     | 48   | 40   | 36   | 48                     | 36   | 24   | 16   |
| Medium class | 24                     | 28   | 32   | 32   | 36                     | 44   | 48   | 52   |
| Rich         | 20                     | 24   | 28   | 32   | 16                     | 20   | 28   | 32   |
| Total        | 100                    | 100  | 100  | 100  | 100                    | 100  | 100  | 100  |

Figure 11: -Trends of the wealth status of communities in Wichi watershed



Not only the wealth status of the community improved, the livelihood basis of the local community has been also diversified due to the adoption of home garden vegetable production, fruit production as agroforestry component, improvement of livestock production. Crop production has also been improved as a result of the improvement of agricultural land husbandry. Improvement of agricultural production ensured food security of households and reduced food expenditure. Vetiver grass planted as biological soil and water conservation helped as additional source of income and reduced money spent for purchase of roof thatching materials. The saving and credit services inculcated the saving culture and

attitude among community members in addition to enabling the beneficiaries build additional family assets. With respect to improving access to basic needs, it has been confirmed that overwhelming proportion of the community in the watershed got access to clean water supply. The clean water supply accompanied by awareness raising education on personal hygiene and environmental sanitation helped to reduce the prevalence of diseases associated with drinking unsafe water, poor personal hygiene and environmental sanitation that makes people healthy and productive. It also reduced medical expenditure that has been channeled to other uses. Participants of Adele Bise kebele further mentioned about the establishment of discussion forum every two weeks at kebele level on HIV/AIDS, which is a development challenge though it is not regular, and about 108 people tested their blood.

Equity and sustainability are among the key issues evaluated. The informants witnessed that gender balance is maintained in all components of the project interventions including conservation, income improvement and livelihood diversification and capacity building activities. Furthermore, the micro credit service is particularly focusing on women.

When asked about the sustainability of the project, an elder participant replied with a simple Oromo proverb '*Fardi hin geesa malee hin waraanu*' meaning a horse may take you to a battleground but not fight. Participants of the discussion explained that the project has shown the path and empowered the locals, the local community who tested the benefits has committed to take over and move forward the activities started even with out the presence of external support. Knowledge, skill and capacity have been built within the community that enable them move forward activities started. However, there are few people who haven't involved in the integrated watershed management for various reasons. This has been sought as a potential challenge requiring close follow up of external bodies

#### **4.2.3. Impacts on Awareness Creation, Capacity Building and Community Empowerment**

Participants witnessed that skill and capacity of the community members has been built on various issues packaged within the integrated watershed management of the project such as soil and water conservation, agroforestry practice, compost preparation and use, home garden vegetable production, improved beekeeping both through direct involvement in the trainings

and indirectly from fellow farmers participated in the training who are disseminating knowledge and skill acquired on community meetings such as *ider*. Participants have also been confirmed that the local community got awareness on personal hygiene and environmental sanitation as a result the majority accepted and practicing toilet construction, homestead sanitation management, sanitation management around water schemes, household utensils sanitation, and water management at home. Information has also been disseminated on HIV/AIDS control and prevention and family planning. Community leaders such as members of watershed committee, *ider* and kebele administration are doing fine on community mobilization after being attended leadership trainings.

## **5. DISCUSSION OF THE FINDINGS**

Although slight declined in family size observed between 2005 and 2008, that could not be attributable to the project intervention rather is a cumulative effect of various factors. Improvement of rural livelihood has a positive contribution towards school enrollment as witnessed from the slight increase in the number of literate person per household between 2005 and 2008. However, there is still gap in terms of literacy status between male and female-headed households. Therefore, further attention should be given with respect to economic empowerment to female-headed households.

The use of wetland grass (*Cyperus latifolius*) for roof thatching is significantly declining as more farmers are switching to corrugated iron sheets for two main reasons. The first reason, which was also disclosed during participatory study was declining availability of the grass prior to the rehabilitation of the Wichi wetland. Secondly, improvement of the livelihood of the community that enables them to afford for iron sheet, which is more comfortable and durable. However, the demand for wetland grass is still high hence local people are using the grass for thatching of granary, guarding post, cooking houses, livestock shelter, occasional gathering halls, beehive wrapping etc. Furthermore, the middle and poor classes of the community is still heavily rely on wetland grass for thatching of dwelling houses.

An increment observed on the proportion of households owning livestock is one of the indicators of livelihood improvement as livestock is critical productive and disposable assets in the rural setting of Ethiopia on which people tend to invest. With the growing shortage of grazing lands, there is a need to improve quality of livestock instead of increasing the size along with grazing management and integrating fodder development in the farming system. The decreasing trends of land holding size also urge intensification of the agriculture systems and improving land husbandry that enable to improve return per unit area as there are no more marginal lands for expansion of farmlands.

It seems that farmers have already realized the opportunities and challenges at hand as witnessed from high tendency of adopting biophysical soil and water conservations and use of compost as organic fertilizer to reverse the declining scenario of land productivity. However, there is still shortage in the distribution of *Vetiver* grass seedling as realized from the PRA study. Farmers participated in the discussion reported that the amount of *Vetiver* grass seedling distributed during the past four years is not sufficient to satisfy their increasing demands. Therefore, there is a need to establish follow-up mechanisms of raising and distributing *Vetiver* grass, which has wider acceptance among the local communities. Tree planting as individual woodlot also shows encouraging achievement. Exotic species like gravillia and eucalyptus are the widely planted species. There is need to promote planting of indigenous tree species hence tendency toward the fast growing exotic species is an indication to the dwindling of indigenous species.

The primary reason of the project intervention is degradation of wetlands, which resulted from limited livelihood opportunities, low upland productivity and food insecurity driving farmers toward over exploitation of wetlands and associated resources in the watershed. That is why one component of the project gear towards the improvement and diversification of livelihood alternatives and thereby strengthens the resilience of community to the external shocks. The project significantly contributed towards income improvement and livelihood diversification by promoting the existing and new alternatives. As there is still significant proportion of land less young farmers looking for new agricultural frontiers, expansion of agriculture into wetlands and forest fringe is inevitable unless there is continuous livelihood based interventions targeting this segment of the community are in place.

## 6. CONCLUSION AND RECOMMENDATIONS

The study attempted to compare situations pre and post project intervention. The findings indicated that the integrated intervention approach has brought promising changes on the natural environment, livelihood and capacity of the local communities. The proverb told on the participatory discussion “*Fardi ni geesa malee hin waraanu*” meaning horse may take you to the battleground but not fight for you is an indication of commitment on the side of the community to keep forward the positive achievements. Therefore, there is a need to scale up and replicate similar intervention to the neighboring communities where similar problems are prevailing. Secondly, population issues, an important dimension of the integration, which was not sufficiently incorporated in this project, should be given sufficient emphasis in the future interventions. Lastly, close follow-up and technical support should be continued until the communities develop full capacity in the sustainable management of their natural resource basis.



## 5. ANNEX

### Ethio Wetlands and Natural Resource Association Questionnaire to undertake impact assessment of Wichi Integrated Wetland and Watershed Management Project in Metu Wereda, Ilu Abba Bora Zone

#### Annex 1: Non Specific Questions

##### 1. Household profile

1. Name of the household \_\_\_\_\_  
Kebele \_\_\_\_\_
2. Sex of the head of the household:  
1. Male            2. Female
3. Total number of individuals in the household/family size of the household  
1. Male \_\_\_\_\_ 2. Female \_\_\_\_\_
4. Number of literate household members including husband and wife  
1. Male \_\_\_\_\_ 2. Female \_\_\_\_\_
5. Roofing material of the main dwelling house?
  1. Corrugated iron sheets
  2. Wetland Grass (chafe)
  3. Other type of grass

##### 2. Resource Ownership

6. Type and number of household items and farm tools owned

| Type of household items   | Quantity |
|---------------------------|----------|
| . Tape Recorder           |          |
| . Radio                   |          |
| . Wrist watch             |          |
| . Modern bed              |          |
| . Table                   |          |
| . Chair                   |          |
| . Mattress                |          |
| . Blanket                 |          |
| . Kerosene lump           |          |
| . Others (specify)        |          |
|                           |          |
| . Ploughshare             |          |
| . Shovel ( <i>Doma</i> )  |          |
| . Spade                   |          |
| . <i>Slasher (Gejera)</i> |          |
| . Sickle                  |          |
| . hoe                     |          |
| . Traditional bee hive    |          |
| . Modern bee hive         |          |
| . Others                  |          |

7. Indicate the number of each of the following livestock owned (if any)

| Type of livestock | Number owned |
|-------------------|--------------|
| . Cows            |              |
| . Oxen            |              |
| . Bulls           |              |
| . Heifers         |              |
| . Calves          |              |
| . Sheep           |              |
| . Goats           |              |
| . Mule            |              |
| . Horse           |              |
| . Donkey          |              |
| . chicken         |              |
| . others          |              |
|                   |              |
|                   |              |
|                   |              |

8. Indicate the size of your land holding in 2000/2001 E.C. cropping year

| Type of land holding               | Area owned (in hectares) |
|------------------------------------|--------------------------|
| . Cultivated land for annual crops |                          |
| . Grazing lands                    |                          |
| . Fallow Land                      |                          |
| . Coffee land                      |                          |
| . Wood Lot                         |                          |
| . Other perennial crops            |                          |
| . Other specify                    |                          |
|                                    |                          |
|                                    |                          |

### 3. Livelihood Sources

9. What are the main source of livelihood for the households (rank it from 1<sup>st</sup> to 3<sup>rd</sup>)

| Livelihood sources                 | Rank  |        |       |
|------------------------------------|-------|--------|-------|
|                                    | First | Second | Third |
| . Cereal Crop production- upslope  |       |        |       |
| . Cereal Crop production- wetlands |       |        |       |
| . Coffee production                |       |        |       |
| . Livestock production             |       |        |       |
| . Vegetable production- upslope    |       |        |       |
| . Vegetable production- wetlands   |       |        |       |
| . Fruit production                 |       |        |       |
| . Beekeeping                       |       |        |       |
| . Petty trade                      |       |        |       |
| . Other (specify)                  |       |        |       |
|                                    |       |        |       |
|                                    |       |        |       |

10. Estimated amount of the household expenditure on different expenditure items of 2000 E.C.

| <b>Items of Expenditure</b>       | <b>Amount of expenditure (in birr)</b> |
|-----------------------------------|--|
| <b>Food Items</b>                 |  |
| . Food crops                      |  |
| . Milk & milk Products            |  |
| . Meat                            |  |
| . Salt                            |  |
| . Sugar                           |  |
| . Edible oil                      |  |
| . Coffee                          |  |
| . Pepper and Spices               |  |
| . Fruit                           |  |
| . Vegetables                      |  |
| . Other food items                |  |
|                                   |  |
| <b>Non food items</b>             |  |
| . Clothes (including shoe)        |  |
| . Kitchen Utensils                |  |
| . Lamp oil                        |  |
| . Transportation                  |  |
| . Tax and other contributions     |  |
| . Pay back debits                 |  |
| . Buy Radio/tape recorder         |  |
| . Buy building materials          |  |
| . Agricultural inputs             |  |
| . Buy livestock                   |  |
| . For renting of farm tools       |  |
| . Storage and packing materials   |  |
| . Human Medication                |  |
| . Veterinary Service              |  |
| . Educational expenses            |  |
| . Ritual and ceremonial expenses  |  |
| . Contribution for social affairs |  |
| . Others Specify                  |  |
|                                   |  |
|                                   |  |

11. Estimated amount of cash income the households earned from different sources in 2000 E.C.

| Sources of cash income               | Amount earned in Birr |
|--------------------------------------|-----------------------|
| . Sale of large animals              |                       |
| . Small animals                      |                       |
| . Sale of Livestock products         |                       |
| . Coffee                             |                       |
| . Cereal from uplands                |                       |
| . Cereal from wetlands               |                       |
| . Vegetables from uplands            |                       |
| . Vegetables from wetland            |                       |
| . Fruits                             |                       |
| . Root crops                         |                       |
| . Chat                               |                       |
| . Honey and beeswax                  |                       |
| . Construction wood (planted)        |                       |
| . Construction wood (Natural forest) |                       |
| . Fuel wood and charcoal             |                       |
| . Sale of seedling                   |                       |
| . Hand craft                         |                       |
| . Local drinks and foods             |                       |
| . Petty trade                        |                       |
| . Payment for labor work             |                       |
| . Remittance from Relatives          |                       |
| . Renting of animals                 |                       |
| . Other (Specify                     |                       |
|                                      |                       |
|                                      |                       |
|                                      |                       |

#### 4. Natural Resources Management practices

12 Have you experienced soil erosion problems from your agricultural lands during the past four years?

1. Yes
2. No

13. If yes, what is the extent of soil loss from your farmlands during the past four years?

1. High
2. Medium
3. Low/ minimum

14. What is the trend of soil fertility change on your farmlands during the past four years?

1. Declining/deteriorating
2. Improving
3. No change

15. Which soil fertility management methods have you practiced during the past four yeas (**rank according to their order of importance**) [\_\_, \_\_, \_\_, \_\_, \_\_, \_\_, \_\_, \_\_]

1. Physical structures
2. Crop rotation
3. Intercropping
4. Compost/organic manuring
5. Fallowing
6. Vetiver grass planting
7. Leguminous tree planting
8. Other (specify) \_\_\_\_\_

16. Have you constructed any type of physical soil and water conservation structures on a farm plot you are cultivating during the past four years?

1. Yes
2. No

17. If yes, please indicate extent of the structures constructed during the past four years?

| S.N | Type of structure constructed | Unit | Extent | Area of land treated | Current status of the structure constructed (select code)<br>1. Fully stabilized and well functioning<br>2. Partially stabilized and fairly functioning<br>3. Totally damaged/destroyed and no more functioning |
|-----|-------------------------------|------|--------|----------------------|---|
| 1   | Terraces                      |      |        |                      |   |
| 2   | Water way                     |      |        |                      |   |
| 3   | Cutoff drain                  |      |        |                      |   |
| 4   | Other specify                 |      |        |                      |   |

18. Have you practiced any one of biological soil and water conservation measures during the past four years?

1. Yes
2. No

19. If yes, which one of the following measures have you practiced? (**Multiple answer possible**)

1. Vetiver grass strip
2. Fodder grass
3. fodder trees
4. leguminous tress
5. other (specify) \_\_\_\_\_

20. If yes, indicate the extent of biological conservations practiced during the past four years

| S.N | Type of biological conservations | Unit | Extent | Current status of the biological conservations measures (select code)<br>1. Fully stabilized and well functioning<br>2. Partially stabilized and fairly functioning<br>3. Totally damaged/destroyed and no more functioning |
|-----|----------------------------------|------|--------|---|
| 1   | Vetiver grass strip              |      |        |   |
| 2   | Fodder grass                     |      |        |   |
| 3   | fodder trees                     |      |        |   |
| 4   | leguminous tress                 |      |        |   |
|     | Other specify                    |      |        |   |
|     | Total                            |      |        |   |

21. Have you produced and used compost as organic fertilizer during the past four years?

1. Yes
2. No

22. If yes, indicate the volume of composed produced and used during the past cropping season  
\_\_\_\_\_m<sup>3</sup>

23. Have you practiced home garden vegetable production during the past four years?

1. Yes
2. No

24. If yes, please list the type of vegetables you produced/producing

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

25. Have you planted any fruit tree during the past four years?

1. Yes
2. No

26. If yes, please list type of fruit tree planted, number planted and number survived

| S.N | Type of fruit tree planed | Number planted | Number survived |
|-----|---------------------------|----------------|-----------------|
|     |                           |                |                 |
|     |                           |                |                 |
|     |                           |                |                 |
|     |                           |                |                 |

27. Have you planted tree other than fruit trees during the past four years?

1. Yes
2. No

28. If yes, please list species of tree planed, number planted and number survived

| S.N | Tree species planed | Number planted | Number survived until now |
|-----|---------------------|----------------|---------------------------|
|     |                     |                |                           |
|     |                     |                |                           |
|     |                     |                |                           |
|     |                     |                |                           |
|     |                     |                |                           |

29. If yes, for what purpose do you plant trees? (Rank) [\_, \_\_, \_\_, \_\_]

1. Fuel and construction wood supply
2. Sale
3. Soil and water conservation
4. Livestock feed
5. Shade (including coffee shade)
6. Other (Specify) \_\_\_\_\_

30. If yes, where have you planted the trees? (Multiple answer possible)

1. Coffee farm
2. Garden plot
3. along roadsides and gullies
4. as life fence
5. In wetlands and wetland fringes
6. in grazing fields
7. Other (Specify) \_\_\_\_\_

31. Do you and/or any member of the community practice livestock grazing in wetlands?

1. Yes
2. No

32. If yes, when does wetland grazing took place most often?

1. Dry season
2. Wet season
3. No seasonal differences

33. How long (in months) the wetlands in the watershed remain wet during the past four years?

1. Less than 3 months
  2. 3-6 months
  3. 7-11 months
  4. All year round
34. Have you recognized changes on wetlands found in the watershed during the past four years?
1. Yes
  2. No
  3. Not certain
35. If yes, what type of change have you recognized?
1. Rehabilitation
  2. Degradation
36. How is the trend of siltation in the wetland during the past four years?
1. Increased
  2. Decreased
  3. Not visible
37. How is the situation of water level in the wetland during the past four years?
1. Increased
  2. Decreased
  3. No change
38. How is the situation of water birds and other wildlife in/around wetlands during the past four years?
1. Increased
  2. Decreased
  3. No change
39. If increased, please list the water birds reappeared in/around the wetland over the last four years which have been extirpated before

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

40. Overall, what improvement have you observed during the past four years
- 1) \_\_\_\_\_
  - 2) \_\_\_\_\_
  - 3) \_\_\_\_\_
  - 4) \_\_\_\_\_

## 5. Capacity Building

41. Have any member of your household ever attended extended training on the following issues/topics?

| Topic of training   | Yes | No |
|---|-----|----|
| Wetland management  |     |    |
| Soil and water conservation/integrated watershed management |     |    |
| Agro forestry development                                   |     |    |
| Home garden vegetable production                            |     |    |
| Fruit production  |     |    |
| Compost preparation and use                                 |     |    |
| Beekeeping  |     |    |
| Seedling rising and nursery management                      |     |    |
| Institutional management/community mobilization             |     |    |
| Financial management  |     |    |

42. If any member of your household ever, attended any one of the above trainings, have you found that the training/s useful and practical?

1. Yes
2. No
3. Not certain

## 6. Food security

43. Have you faced chronic food shortage during the past four years?

1. Yes
2. No

44. If yes, what are the main causes for the food shortage? (Rank by order) [\_\_, \_\_, \_\_, \_\_, \_\_]

1. Decline in productivity of land due to soil erosion
2. Unsuitable farmland due to steepness of slope
3. Poor farm land management practice
4. Unsuitable whether condition
5. No use of modern agricultural inputs
6. Lack of farm oxen
7. Shortage of farmlands
8. Shortage of productive human labor
9. Shortage of time allocated for farming activities
10. Loss of yield due to damage by pests
11. Loss of yield due to natural disasters
12. Others specify \_\_\_\_\_

45. How long in a year your household was food self-sufficient during the past four years?

| Year | Duration in months |            |           |              |           |
|------|--------------------|------------|-----------|--------------|-----------|
|      | 1-3 months         | 4-6 months | 7-9 month | 10-11 months | 12 months |
| 2005 |                    |            |           |              |           |
| 2006 |                    |            |           |              |           |
| 2007 |                    |            |           |              |           |
| 2008 |                    |            |           |              |           |



## 7. Clean water supply and sanitation

46. Indicate source of water your household is currently using for various purposes

| Purposes                               | Sources           |                     |                    |                           |                     |                  |
|--|-------------------|---------------------|--------------------|---------------------------|---------------------|------------------|
|  | Open Stream/River | Open stagnant water | Unprotected spring | Unprotected hand dug well | Protected hand pump | Protected spring |
| Human consumption (drinking & cooking) |                   |                     |                    |                           |                     |                  |
| Washing and bathing                    |                   |                     |                    |                           |                     |                  |
| Livestock watering                     |                   |                     |                    |                           |                     |                  |
| Other purposes                         |                   |                     |                    |                           |                     |                  |

47. If your household is recently got access to clean water supply scheme, indicate comparative time taken to fetch water (round trip) in minutes

- 1) Past (before installation of water scheme) \_\_\_\_\_ minutes
- 2) Now (after installation of water scheme) \_\_\_\_\_ minutes

48. If your household is recently got access to clean water supply, who benefited most among the family members?

- 1) Husband
- 2) Children (boys)
- 3) Wife
- 4) Children girls

44. If your household is recently got access to clean water supply, what advantage have you got from being get access to clean water supply schemes (**rank by order**) [\_\_, \_\_, \_\_, \_\_]

- 1) Improvement of human health
- 2) Save time
- 3) Reduce job burden
- 4) Other (specify) \_\_\_\_\_

49. If your household is recently got access to clean water supply, is your water scheme properly working since installation?

- 1) Absolutely yes
- 2) Mildly yes
- 3) No

50. Have you recognized any problem with the water supply schemes?

- 1) Yes
- 2) No

51. If yes, what is/are the major problem/s (**rank according to order of importance**) [\_\_, \_\_, \_\_, \_\_]

- 1) Shortage of water
- 2) Misuse/mismanagement
- 3) Poor quality of water
- 4) Poor sanitation surrounding water schemes
- 5) Frequent malfunctioning/interruption
- 6) Improper location
- 7) Lack of skilled personnel for supervision and maintenance
- 8) Conflict over water use

52. Have any member of your household attended training/education on the following topics?

| Topics                                 | Yes | No |
|--|-----|----|
| Environmental sanitation               |     |    |
| Personal hygiene                       |     |    |
| Health education                       |     |    |
| Water scheme operation and maintenance |     |    |

53. As individual what do you feel about the installation of the water schemes?

- 1) Very happy
- 2) Unhappy
- 3) Nothing

## Annex 2: Specific Questions

### 1. Question addressing micro credit scheme

1. When did you involved in micro credit scheme? \_\_\_\_\_
2. How much money have you saved so far? \_\_\_\_\_
3. Have you requested for credit so far?
  - 1) Yes
  - 2) No
3. Have you secured/accessed the credit you requested?
  - 3) Yes
  - 4) No
4. If no, why your credit request refused? \_\_\_\_\_
5. If yes, how much money have you browed? \_\_\_\_\_
6. For what business have you browed the money? \_\_\_\_\_
7. Have you succeed in the business?
  - 1) Absolutely yes
  - 2) Mildly yes
  - 3) Not succeed
8. What substantial household asset have you built with the credit scheme?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
9. What challenges have you faced in connection to the micro credit scheme?
  - 5) \_\_\_\_\_
  - 6) \_\_\_\_\_
  - 7) \_\_\_\_\_
  - 8) \_\_\_\_\_
  - 9) \_\_\_\_\_
10. Please indicate the external solutions/supports you require to overcome the challenges
  - 1) \_\_\_\_\_
  - 2) \_\_\_\_\_
  - 3) \_\_\_\_\_
  - 4) \_\_\_\_\_
  - 5) \_\_\_\_\_

## 2. Question addressing modern apiculture

1. Indicate the number of bee hives currently you have

1. Modern \_\_\_\_\_
2. Transitional \_\_\_\_\_
3. Traditional \_\_\_\_\_

2. When did you started modern beekeeping \_\_\_\_\_

3. Indicate the number of modern bee hives you got during the past four years

1. Received on credit basis \_\_\_\_\_
2. Bought with full payment \_\_\_\_\_

4. How many of the modern bee hives you got during the past four yeas contains bee colony? \_\_\_\_

5. How many of your modern bee hives currently gives harvest? \_\_\_\_\_

6. If you have started harvesting, how much kilogram of honey did you harvest per hives? \_\_\_\_

7. Please indicate the volume of honey produced, sold and cash earned during the past four years

| Description  | Year |      |      |      |
|--|------|------|------|------|
|  | 2005 | 2006 | 2007 | 2008 |
| Volume of honey produced (kg)                        |      |      |      |      |
| Volume of honey soled (kg)                           |      |      |      |      |
| Cash income earned from sale of honey/bee wax (Birr) |      |      |      |      |

8. Have you received necessary skill trainings on apiculture?

- 1) Yes
- 2) No

9. Do you receive regular follow up and supervision of technical personnel?

- 1) Yes
- 2) No

10. What challenges have you faced in connection to beekeeping activities?

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_
- 5) \_\_\_\_\_

11. Please indicate the external solutions/supports you require to overcome the challenges

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_
- 4) \_\_\_\_\_

## **Annex. 3 Checklist of the PRA study**

### **1. Impacts of the project intervention on the natural environment:**

#### **1.1. Uplands**

- Trends of soil erosion in Wichi watershed
- Trends of land productivity in Wichi watershed
- Adoption of soil and water conservation practices
- Benefits obtained from soil and water conservation practices
- Major challenges faced

#### **1.2. Wetlands**

- Changes observed on the wetlands during the past four years on:
- Benefits obtained from the changes
- How the community would like to see the wetland in the future?
- Challenges faced

### **2. Impacts of the project intervention on:**

- Income improvement
- Livelihood diversification
- Equity and sustainability issues of the project

### **3. Impacts of the project on:**

- Community awareness,
- Capacity building
- Community empowerment

Annex 4: List of sampled households for the non-specific questionnaires

| ተ.ቁ | የሰየመው ስም  | ቀበሌ    |
|-----|-----------|--------|
| 1   | አበራ ታደሰ   | አሴ ቡራሳ |
| 2   | ሰማ ጆቲ     | አሴ ቡራሳ |
| 3   | ፍቃድ በርባ   | አሴ ቡራሳ |
| 4   | ጌቤ ስርጌሳ   | አሴ ቡራሳ |
| 5   | ዲንቁቱ ቀናሳ  | አሴ ቡራሳ |
| 6   | ደደታ መርጋ   | አሴ ቡራሳ |
| 7   | ታደሰ ወጋ    | አሴ ቡራሳ |
| 8   | ነጻይ ብረሀኑ  | አሴ ቡራሳ |
| 9   | ሀይሴ ቀኖ    | አሴ ቡራሳ |
| 10  | ሙሉጌታ አይመ  | አሴ ቡራሳ |
| 11  | ዲባባ አንበሴ  | አሴ ቡራሳ |
| 12  | አዳደ ወዳጅ   | አሴ ቡራሳ |
| 13  | ታሪኩ ደደታ   | አሴ ቡራሳ |
| 14  | ገንጫ ወጋ    | አሴ ቡራሳ |
| 15  | በቀሰች ዲባባ  | አሴ ቡራሳ |
| 16  | ክበይ አብዲሳ  | አሴ ቡራሳ |
| 17  | ብረሀኑ አብዲሳ | አሴ ቡራሳ |
| 18  | ጌቤ ወዳጅ    | አሴ ቡራሳ |
| 19  | ረጋሳ ተባ    | አሴ ቡራሳ |
| 20  | አሸቱ አበሙ   | አሴ ቡራሳ |
| 21  | አንዳል ፈሪሳ  | አሴ ቡራሳ |
| 22  | ወርቁ ራዶ    | አሴ ቡራሳ |
| 23  | ደረጃ ኪቱ    | አሴ ቡራሳ |
| 24  | ተስፋይ ዋሳ   | አሴ ቡራሳ |
| 25  | አብዲሳ ገምታ  | አሴ ቡራሳ |
| 26  | ወርጃ ቀኖ    | አሴ ቡራሳ |
| 27  | ሀብታሙ ጉታ   | አሴ ቡራሳ |
| 28  | ዳወድ ቢሳቡ   | አሴ ቡራሳ |
| 28  | መኩራ ደገዙ   | አሴ ቡራሳ |
| 30  | ፋሪስ አበበ   | አሴ ቡራሳ |
| 31  | ሙሀመድ አሚን  | አሴ ቡራሳ |
| 23  | አበበ ጆቲ    | አሴ ቡራሳ |
| 33  | አዲሱ አንበሳ  | አሴ ቡራሳ |
| 34  | ትርፌ ክምሳ   | አሴ ቡራሳ |
| 35  | ሰማ መርዳሳ   | አሴ ቡራሳ |
| 35  | ታይ ሰንበቸ   | ቦቸ     |
| 37  | ግዛዜ ሹራሙ   | ቦቸ     |
| 38  | ገሹ ዳጉማ    | ቦቸ     |
| 39  | ተሰማ ገሹ    | ቦቸ     |
| 40  | ተሚማ ወርቁ   | ቦቸ     |
| 41  | ደሴን መርጋ   | ቦቸ     |
| 42  | ተሰማ ጋራማ   | ቦቸ     |
| 43  | ሀብታሙ ጂማ   | ቦቸ     |
| 44  | ዲንቃ ወጋ    | ቦቸ     |
| 45  | ታምራ ዲንቃ   | ቦቸ     |
| 46  | ደገዙ ባልቻ   | ቦቸ     |
| 47  | ጌታሁን መኮንን | አሴ ቡያ  |
| 48  | አሰገደች ቤኛ  | አሴ ቡያ  |
| 49  | ብረሀኑ መርኛ  | አሴ ቡያ  |
| 50  | አደኛ ጉደታ   | አሴ ቡያ  |
| 51  | መሰሰች ታክስ  | አሴ ቡያ  |
| 52  | ደገፋ ኢብሳ   | አሴ ቡያ  |
| 53  | ጫሲ ገሳ     | አሴ ቡያ  |
| 54  | በሳይንስ መርጋ | አሴ ቡያ  |
| 55  | ጌታቸው አብዲሳ | አሴ ቡያ  |
| 56  | ታሪኩ ደበሳ   | አሴ ቡያ  |
| 57  | ትርፌ ንጋቱ   | አሴ ቡያ  |
| 58  | ጌታቸው በሺር  | አሴ ቡያ  |
| 59  | ጆርገሳ ፈይሳ  | አሴ ቡያ  |
| 60  | ተስፋይ መንገሻ | አሴ ቡያ  |
| 61  | ተካ ሚጃ     | አሴ ቡያ  |
| 62  | ሀዋ ሸንጋ    | አሴ ቡያ  |
| 63  | ጆማል ሁመር   | አሴ ቡያ  |
| 64  | ዘሪሁን ቦጋስ  | አሴ ቡያ  |
| 65  | ታምራ ሰይፍ   | አሴ ቡያ  |
| 66  | ሀብታሙ ደደሳ  | አሴ ቡያ  |
| 67  | ዲባባ ወጋ    | አሴ ቡያ  |
| 68  | አድጉ ገምታ   | አሴ ቡያ  |
| 69  | ግርማ ማሞ    | አሴ ቡያ  |
| 70  | አድማሱ ቤኛ   | አሴ ቡያ  |
| 71  | አበበች ኑራ   | አሴ ቡያ  |
| 72  | አዲሱ አብዲሳ  | አሴ ቡያ  |
| 73  | ዳስሙ ደደታ   | አሴ ቡያ  |
| 74  | ገሪመወ ጶልጂራ | አሴ ቡያ  |
| 75  | ቡሳ ሞሲሳ    | አሴ ቡያ  |
| 76  | አደኛ ሰርዳ   | አሴ ቡያ  |

|     |               |        |
|-----|---------------|--------|
| 77  | ገመቹ ሸፈራዜ      | አሴ ቡያ  |
| 78  | ትፈራ ተጂ        | አሴ ቡያ  |
| 79  | አሴደስ ሁሴን      | አሴ ቡያ  |
| 80  | ብረሃኑ ወልደ      | አሴ ቡያ  |
| 81  | በድቱ ገበታ       | አሴ ቡያ  |
| 82  | መብራቱ ቦጋስ      | አሴ ቡያ  |
| 83  | ዳስማይሁ ገዛኝኝ    | አሴ ቡያ  |
| 84  | ሲሳይ ተመስገን     | አሴ ቡያ  |
| 85  | ጂፕሮስ ሚልኪያስ    | አሴ ቡያ  |
| 86  | ደደታ በቀስ       | አሴ ቡያ  |
| 87  | ደጉ ገምታ        | አሴ ቡያ  |
| 88  | ዳስማይሁ ክምሳ     | አሴ ቡያ  |
| 89  | ሸጉጥ ስራጋ       | አሴ ቡያ  |
| 90  | ሰገሳ ቡታ        | አሴ ቡያ  |
| 91  | ሸፈራዜ አደኛ      | አሴ ቡያ  |
| 92  | ተካ ሀረራ        | አሴ ቡያ  |
| 93  | ረታ ተሾሞ        | አሴ ቡያ  |
| 94  | ታደሰ ዲኮ        | አሴ ቡያ  |
| 95  | መብራቱ ታምራ      | አሴ ቡያ  |
| 96  | በፍቃድ ገበኛ ቦረ   | አዲሴ ቢሴ |
| 97  | አደኛ ባርጋ       | አዲሴ ቢሴ |
| 98  | ገዛኝኝ ፈሪሳ      | አዲሴ ቢሴ |
| 99  | አምቢሳ ሳምቢ      | አዲሴ ቢሴ |
| 100 | አዲሱ ታደሰ       | አዲሴ ቢሴ |
| 101 | ግታቸው ፈጠን ሶኒሳ  | አዲሴ ቢሴ |
| 102 | ገዜ አካሳ        | አዲሴ ቢሴ |
| 103 | ይመር አራርሳ      | አዲሴ ቢሴ |
| 104 | አሰፋ መልደይ      | አዲሴ ቢሴ |
| 105 | ኢርገ መንግስቱ     | አዲሴ ቢሴ |
| 106 | መንገስ ታክስ      | አዲሴ ቢሴ |
| 107 | ክስይመን ሳይሁብረሀን | አዲሴ ቢሴ |
| 108 | ሰማዜ ሰገሰ       | አዲሴ ቢሴ |
| 109 | ደረሰ በሳይ       | አዲሴ ቢሴ |
| 110 | ታደሰ በርሄ       | አዲሴ ቢሴ |
| 111 | አርጌ አሴ        | አዲሴ ቢሴ |
| 112 | ተካ ዲባባ        | አዲሴ ቢሴ |
| 113 | ነጻይን አዲኛ      | አዲሴ ቢሴ |
| 114 | ወንድሙ ቱቸ       | አዲሴ ቢሴ |
| 115 | ኑራ ቸሰሳ        | አዲሴ ቢሴ |
| 116 | ሙሉጌታ ገብራ      | አዲሴ ቢሴ |
| 117 | አብራ አሰፋ       | አዲሴ ቢሴ |
| 118 | ተማሙ ኢሳ        | አዲሴ ቢሴ |
| 119 | ታደሰ መኩራያ      | አዲሴ ቢሴ |
| 120 | ታደሰ ገብራ       | አዲሴ ቢሴ |
| 121 | ሀብታሙ ታሪኩ      | አዲሴ ቢሴ |
| 122 | ተጃቱ ዳሳ        | አዲሴ ቢሴ |
| 123 | ፌዳሳ ቸሳ        | አዲሴ ቢሴ |
| 124 | ጌታቸው በሳይ      | አዲሴ ቢሴ |
| 125 | አበበ ግዛዜ       | አዲሴ ቢሴ |
| 126 | አብዲሳ ሆራ       | አዲሴ ቢሴ |
| 127 | ወጋ ሹራሙ        | አዲሴ ቢሴ |
| 128 | ታክስ ግዛዜ       | አዲሴ ቢሴ |
| 129 | ሸታይ በቀስ       | አዲሴ ቢሴ |
| 130 | ተሙኝ ተፈራ       | አዲሴ ቢሴ |
| 131 | ኪቱ ሰማ         | አዲሴ ቢሴ |
| 132 | አበበ ግዛዜ ገብራ   | አዲሴ ቢሴ |
| 133 | አብዲሳ ሹራሙ      | አዲሴ ቢሴ |
| 134 | ብረሀኑ ዲባባ      | አዲሴ ቢሴ |
| 135 | ኑራዲን ዳወድ      | አዲሴ ቢሴ |
| 136 | ተርፋ ሁንዲ       | አዲሴ ቢሴ |
| 137 | አደም ሙሀመድ      | አዲሴ ቢሴ |
| 138 | ሺ/አብራሃም ቡሹራ   | አዲሴ ቢሴ |
| 139 | አምሰዲን ሙሀመድ    | አዲሴ ቢሴ |
| 140 | ሲራጅ ሙሀመድ      | አዲሴ ቢሴ |
| 141 | ብራት ሰማ        | አዲሴ ቢሴ |
| 142 | ማሙድ አጋ        | አዲሴ ቢሴ |
| 143 | አብዳ ክዲር       | አዲሴ ቢሴ |
| 144 | ናበር ሙደስር      | አዲሴ ቢሴ |
| 145 | አሸቱ ፍቃድ       | አዲሴ ቢሴ |
| 146 | ሰሰሞን አደኛ      | አዲሴ ቢሴ |
| 147 | ታምራ ደጉ        | ቱሱቤ    |
| 148 | ታደሰ ደጋጋ       | ቱሱቤ    |

|     |            |     |
|-----|------------|-----|
| 149 | ታደሰ ዲሳሳ    | ቱሱቤ |
| 150 | አሸቱ ቡራይ    | ቱሱቤ |
| 151 | ጆማል ገምታ    | ቱሱቤ |
| 152 | ገርሙ ጆቲ     | ቱሱቤ |
| 153 | መኮንን ገምታ   | ቱሱቤ |
| 154 | ተካልኝ ገምታሳ  | ቱሱቤ |
| 155 | አሸቱ ቦጋስ    | ቱሱቤ |
| 156 | ሚርክና በዳሳ   | ቱሱቤ |
| 157 | አማኑአል ተፈራ  | ቱሱቤ |
| 158 | ግዛቸው ሰገሰ   | ቱሱቤ |
| 159 | ናበር ቀኖ     | ቱሱቤ |
| 160 | ጉተማ ተፈራ ዳሳ | ቱሱቤ |
| 161 | ወንድሙ ፕረንህ  | ቱሱቤ |
| 162 | ሀይሴ ዶባ በዲ  | ቱሱቤ |
| 163 | አሰምነስ መኩራያ | ቱሱቤ |
| 164 | ተፈራ ዳባ     | ቱሱቤ |
| 165 | አዲሱ ማሞ ወርጃ | ቱሱቤ |
| 166 | ኩሳኒ ኢርኪሳ   | ቱሱቤ |
| 167 | ሀብታሙ ታደሰ   | ቱሱቤ |
| 168 | ወብሸት ማሞ    | ቱሱቤ |
| 169 | ታምራ ገምታ    | ቱሱቤ |
| 170 | ራማቲ ዲልቦ    | ቱሱቤ |
| 171 | ብረሀኑ ቀምቡ   | ቱሱቤ |
| 172 | አማኑአል ማሞ   | ቱሱቤ |
| 173 | ትርፌ ገዛኝኝ   | ቱሱቤ |
| 174 | አብቸ ጌታቸው   | ቱሱቤ |
| 175 | ጌታቸው ስራጋ   | ቱሱቤ |
| 176 | ኢብሳ ገዛኝኝ   | ቱሱቤ |
| 177 | ታሪኩ ጃሰታ    | ቱሱቤ |
| 178 | መኮንን ገምታ   | ቱሱቤ |
| 179 | ፀሀዩ ግዲይ    | ቱሱቤ |
| 180 | አዲሙ ገሳዜ    | ቱሱቤ |
| 181 | ሀብታሙ ረጋሳ   | ቱሱቤ |
| 182 | አሳኝ ገበታ    | ቱሱቤ |
| 183 | ተገኝ ጥጋቡ    | ቱሱቤ |

Annex 5: List of sampled households from micro credit group and those involved in beekeeping

| S.N  | Name               | Kebele     |
|--|--------------------|------------|
| <b>Women involved in Micro credit services</b> |                    |            |
| 1  | Zemzem Dawud       | Boto       |
| 2  | Chaltu Gemta       | Boto       |
| 3  | Betre Husen        | Boto       |
| 4  | Mariam Yimer       | Boto       |
| 5  | Birke Bula         | Boto       |
| 6  | Desta Arega        | Boto       |
| 7  | Sinke Bikila       | Boto       |
| 8  | Tsehayinesh Kasaye | Tulube     |
| 9  | Regatu Kumsa       | Tulube     |
| 10   | Jemanesh Gameda    | Tulube     |
| 11   | Rehima Yasin       | Tulube     |
| 12   | Shewanesh Matebe   | Adele Bise |
| 13   | Feyise Bekele      | Adele Bise |
| 14   | Amsalu Debisa      | Adele Bise |
| 15   | Tsige Eshetu       | Adele Bise |
| 16   | Workinesh Niguse   | Adele Bise |
| 17   | Almaz Kasahun      | Adele Bise |
| 18   | Etenesh Eshetu     | Adele Bise |
| 19   | Zubeda Mammo       |            |
| 20   | Asegedech Wakjira  | Adele Bise |
| <b>Farmers involved in improved beekeeping</b> |                    |            |
| 1  | Tilahun W/Yohannis | Burusa     |
| 2  | Dereje Tadesse     | Burusa     |
| 3  | Dereje Ettana      | Burusa     |
| 4  | Mulugeta abdussa   | Burusa     |
| 5  | Solomomn wakjira   | Burusa     |
| 6  | Kemal Eshetu       | Adele Bise |
| 7  | Muhamed Dawud      | Adele Bise |
| 8  | Tibebu Reggasa     | Tulube     |
| 9  | Endale Belete      | Tulube     |
| 10   | Mebreku Taddese    | Tulube     |
| 11   | Alemayehu Yigezu   | Tulube     |
| 12   | Olana Wedajo       | Ale Buya   |
| 13   | Nasir Husen        | Ale Buya   |
| 14   | Muluneh Lemma      | Ale Buya   |
| 15   | Girma Tesfaye      | Ale Buya   |
| 16   | Terefe Tolasa      | Ale Buya   |
| 17   | Befikadu Gudeta    | Ale Buya   |
| 18   | Mitiku Wegga       | Ale Buya   |