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BARC SSIP

EXECUTIVE SUMMARY OF SOCIO-
ECONOMIC, FINANCIAL
ANALYSIS AND ORGANIZATION
AND MANAGEMENT REPORT



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OROMIA IRRIGATION DEVELOPMENT AUTHORITY - FINFINNE

Table of Contents

1. EXECUTIVE SUMMARY	ii
1.1. Introduction to the Study	ii
1.2. Purpose and Outline of the Feasibility Report	ii
1.3. Methods Used in the Study	iii
2. MAIN FINDINGS OF THE STUDY	iii
2.1. Key Findings of Socioeconomic Survey and O & M Study	iii
2.2. Key Findings of Financial Analysis	iv
3. CONCLUSION	iv
4. RECOMMENDATIONS	v

SECTION 1: SOCIO-ECONOMIC STUDY REPORT

SECTION 2: ORGANIZATION AND MANAGEMENT STUDY REPORT

SECTION 3: FINANCIAL ANALYSIS REPORT

1. EXECUTIVE SUMMARY

1.1. Introduction to the Study

The sustainable development approach suggests that natural resources have to be utilized in a manner that considers the future generation. However, most development projects affect the environment, resources, raw materials, and the people, undermining the ability of future generations to cope with their own needs and aspirations. Therefore, an instrument has been designed to safeguard the environment and avoid the likely negative socio economic and environmental impacts of development projects. Any effects which results from the implementation of a proposed project needs to be identified and evaluated in advance. Thus the socioeconomic aspects of the project and its surrounding, its organization and management scenarios, and financial viability have to be investigated.

In this regard, the Bako Agricultural Research Center (BARC) has planned to develop small scale irrigation projects. BARC Scheme is one of the proposed schemes for irrigation development. The OIDA has proposed feasibility study and detail design preparation to be conducted for the scheme, so as to conduct the feasibility study and detail design preparation of the proposed irrigation development. Thus, the Socioeconomic Survey, Organization and Management Study, and Financial Analysis have been conducted at feasibility level to the BARC SSI Project.

The BARC SSI Project is located within Gobu Seyo District Kejo Kebele of the East Wollega Zone of the Oromia Regional State. It is located 8 km away toward Nekemte road from Bako town, at about 258 km from Addis Ababa.

1.2. Purpose and Outline of the Feasibility Report

This report is the sixth volume of the feasibility and detail design study of the project, which is part and continuation of the other reports. It should be, hence, read in conjunction with the other reports.

The main purpose of this report is to provide the major findings of the socio-economic survey, organizational management of the project, and financial analysis of the intended small scale irrigation project. The overall prevailing conditions that are related to social, financial, and economic conditions have been investigated and evaluated from the point of view of suitability, adequacy, efficiency, sustainability, and soundness for irrigation development.

Generally, this report has three sections, which are shown further in the following table.

Nº	Section	Sector Name
1	Section 1	Socioeconomic Survey Report
2	Section 2	Community Organization and Management Study Report
3	Section 3	Financial and Economic Analysis Report

1.3. Methods Used in the Study

Both primary and secondary data gathered from relevant key informants, research center, and sectorial office. Moreover, woreda government offices, key informants, and other responsible partners at woreda office level contacted and discussed on the project under study. Relevant data and information required for the study was identified prior to field work and pre-prepared information checklist that used in gathering information and baseline data with respect to socioeconomic situation of the area and checked consistency of the data thorough discussion with research center.

Generally, the consultant has used standard approaches and methods of small scale irrigation preparations, including those set by OIDA and AGP. In analyzing the financial viability of the project, standard technical methods have been carried out based on the socioeconomic setting of the project area.

2. MAIN FINDINGS OF THE STUDY

2.1. Key Findings of Socioeconomic Survey and O & M Study

The area of BARC Small Scale Irrigation Project is intended to produce 150 ha under irrigation. Due to the project is going to be implemented at the source of Gibe River; there should be a shortage of water mostly for downstream irrigation water users that faces after the implementation of this project.

The beneficiaries of this project will be the rural population of the Bako Research Center focused zones as well as the country as a whole. In these zones more than 85 % of the population lives in rural and their main source of income come from agriculture.

Agriculture is the main economic base and it is the major means of livelihood for the farmers around the project area as well as Bako Agricultural Research Center focused zones. The types of agricultural economic activities of the project area include: crop production/farming, livestock production. Few households are engaged in secondary activities of apiculture, Cattle Fattening, Masonry, and Daily Laborer. Crop production is practiced under rain fed and traditional as well as modern irrigation methods. The community of the area practice agriculture since a long period of time using rain fed and traditional irrigation.

There is no existing water management related organization in the center. The implementation of the project has got acceptance and support by the staff members and the institution. They all are ready to support the project in various ways.

2.2. Key Findings of Financial Analysis

The land development plan indicates that 100% would be irrigated during the first year, and thus, the entire area of land would be developed beginning from year 2 onwards. Year 1 would be used for the construction of the project. The yield build up plan shows that, because of professionals working in the center optimum level of production would begin from year 1 onwards.

With regard to the source of finance, the entire project cost required for the entire analysis period is assumed to be covered by government. The government would cover the investment cost associated with the construction of the projected represented by the Bill of Quantities, repair and maintenance cost, and every cost associated to this project.

The financial analysis indicates that the IRR is 77% against the discount rate of 10.23% whereas the NPV and B/C Ratio amount to Birr 221,352.25 and 6.85 respectively. The sensitivity analysis is conducted at 10% reduction in yield and price levels, 10% cost increment. In all the tests, the project is financially profitable.

3. CONCLUSION

There are no significant socio economic negative impacts that could happen due to the project implementation. On the other hand, the project would have positive impacts and received full support from stakeholders. The surrounding community, the Kebele and two Wereda (Bako-Tibe and Gobu Seyo) officials have positive attitude towards the implementation of the project. Therefore, the implementation of the project is recommended in view of its socio economy findings.

Likewise, from financial point of view, it can be concluded that BARC small scale irrigation project is viable in consideration of both the entire project as well as the farmers' aspects. The project, if implemented, will have significant contributions to the socio-economic conditions of people in the project area, BARC focused zones and of the region in particular, and the country and national economy, in general. The income of people due to the output of this research center will increase to the level that they can be able to pay for their needs and the social services. The increase in agricultural production and employment opportunity will make further contributions to the local and national economy. In view of the above findings, the project deserves priority and it is recommended that the project be implemented as early as possible.

In general, the project is socially plausible and acceptable. It is confirmed that the project is financially sound and viable. Besides, it is economically reasonable and profitable.

4. RECOMMENDATIONS

1. In order to address the larger community and change the livelihood of rural farmer's special attention should be given from the government to hasten the speed of the center to pierce its goal on timely bases.
2. The research center should have to clearly apply water saving technologies which will have a positive impact on the downstream irrigation water users and it ensures the sustainability of the project;
3. Irrigation water management process should be created in the office; this process manage every issues related with irrigation water and give support for core process of the research center;
4. In view of financial analysis, the project deserves priority and it is recommended that the project be implemented as early as possible.



4/3/2018

BARC SSIP

Socio-Economic Profile



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OROMIA IRRIGATION DEVELOPMENT AUTHORITY, FINFINE

TABLE OF CONTENTS

LIST OF TABLES..... 3

LIST OF FIGURES 4

ACRONYMS 5

EXECUTIVE SUMMARY 6

1. INTRODUCTION AND BACKGROUND 8

1.1. Introduction.....8

1.2. Rationale of the project.....9

1.3. Review of policies and strategies.....10

1.4. Objectives.....12

1.5. Scope of the Study.....12

2. METHODOLOGY.....13

2.1.1. Review of Reports and Secondary Data Source 13

2.1.2. Key Informants and Discussion With Stakeholder institutions..... 13

2.1.3. Key informants Interview and Discussion With BARC 14

2.1.4. Household Survey.....15

2.1.5. Data analysis.....15

2.1.6. Procedures and Process flow 15

3. SOCIO ECONOMIC FEATURES.....15

3.1. Socio-Economic Profile of BARC..... 16

3.1.1. *Proposed Project Command area and Beneficiaries..... 16*

3.1.2. *Climate and topography..... 17*

3.1.3. *Water source..... 17*

3.1.4. *Population and Demographic..... 18*

3.1.5. *BARC Stakeholders..... 19*

3.1.6. *Agriculture..... 19*

3.1.7. *Livestock..... 22*

3.1.8. *Major Challenges of the Center..... 23*

3.2. Socio-economic profile of BARC neighbor woreda’s (Bako-Tibe Woreda and Gobu Seyo Woreda)
24

3.2.1. *Introduction..... 24*

3.2.2. *Physical Settings..... 25*

3.2.3. *Socio-Economic Conditions..... 28*

3.3. Socio-economic profile of BARC focused zones (East Wollega, H.G.Wollega and West Shewa)
50

3.3.1. *General Profile of BARC Focused Zones..... 50*

3.3.2. *Population and Demographic Characteristics..... 57*

3.3.3. *Access to Social Services..... 59*

3.3.4. *Economic Base of BARC Focused Zones..... 64*

3.3.5. *Agricultural Sector..... 64*

3.3.6. *Major Constraints of Agriculture and Livestock Production 67*

3.3.7. *Mining and Industry..... 68*

3.3.8. *Transport, Trade, Tourism and Sport*..... 69

3.4. Food Aid and Prevalence of Drought in BARC Focused Zones71

SUMMARY AND CONCLUSION73

LIST OF TABLES

Table 3.1-1 BARC Employees based on Different Categories..... 18

Table 3.1-2 BARC Stakeholders..... 19

Table 3.1-3 Types of Crops Produced in BARC (Meher Season) 20

Table 3.1-4 Types of Crops Produced in BARC (Using Irrigation)..... 21

Table 3.1-5 Type of Improved seed applied 22

Table 3.1-6 Livestock Population of BARC in 2010..... 22

Table 3.2-1 Total Population Based on 2007 G.C population and Housing census for the year 2005 E.C and 2007 E.C for Gobu Sayo and Bako Tibe Respectively..... 28

Table 3.2-2 School Age of Gobu Sayo District’s Population by Age Group 28

Table 3.2-3 School Age of Gobu Sayo District’s Population by Age Group 29

Table 3.2-4 Farmer Associations and Member of Farmers Association of Gobu Sayo District 30

Table 3.2-5 Peasant Association and Service Cooperative of Bako Tibe District..... 30

Table 3.2-6 Land resource and utilization of Bako Tibe District..... 32

Table 3.2-7 Crop Production..... 32

Table 3.2-8 Agricultural calendar and agricultural activities..... 33

Table 3.2-9 Average number of farm plots per household..... 34

Table 3.2-10 Average number of farm oxen per household..... 34

Table 3.2-11 Number of farmers engaged in the irrigation, area irrigated and amount of crops produced in the district..... 35

Table 3.2-12 Livestock population of Gobu Sayo and Bako Tibe Woreda..... 36

Table 3.2-13 Number of schools and classrooms under government holding by the year 2004 E.C and 2005 E.C..... 39

Table 3.2-14 Number of student enrolled, dropped out and detained by level of school in the year 2004 E.C and 2005 E.C. 40

Table 3.2-15 Number of students sat for grade 10 national exams (EGSCE), passed and failed and those sat for university entrance, promoted for degrees and failed by sex and year..... 40

Table 3.2-16 Number of teachers by level of schools (1-4), (5-8) and (9-10), vocational, Preparatory, sex, level of education and ownership..... 40

Table 3.2-17 Number of health technicians in the district under government, private and nongovernmental organizations ownership by the year 2004 and 2005 E.C 41

Table 3.2-18 Health coverage of the district 42

Table 3.2-19 Child health index, maternal health index, Disease index..... 42

Table 3.2-20 Maternal mortality ratio 44

Table 3.2-21 Number woman who have been tested to HIV/AIDS and percentage of maternal mortality attributable to AIDS..... 44

Table 3.2-22 Number of women used family planning service (contraceptive prevalence)..... 45

Table 3.2-23 Number and percentage of women who gave birth before age 18..... 45

Table 3.2-24 Number of women access to save delivery (mid wife) for non- complicated delivery..... 45

Table 3.2-25 Total Expenditure or budget (capital and recurrent) of the district.....	47
Table 3.2-26 Number of operational private investment projects by types of sector including their total employees and capital.....	48
Table 3.3-1 Distance of BARC Focused Zones.....	50
Table 3.3-2 Climatic Condition of BARC Focused Zones	51
Table 3.3-3 Temperature and Rainfall.....	51
Table 3.3-4 Major Basins.....	52
Table 3.3-5 Man-made Lakes.....	52
Table 3.3-6 Types of Soil.....	52
Table 3.3-7 Natural Resources.....	54
Table 3.3-8 Land Use Pattern.....	55
Table 3.3-9 Wild Life	56
Table 3.3-10 Population Size.....	57
Table 3.3-11 East Wollega Zone Students Gross Enrollment	60
Table 3.3-12 H.G.Wollega Zone Students Gross Enrollment	61
Table 3.3-13 West Shewa Zone Students Gross Enrollment.....	61
Table 3.3-14 Health.....	62
Table 3.3-15 Health Technicians	62
Table 3.3-16 Potable water Supplied for Rural BARC Focused Population	63
Table 3.3-17 Agricultural Extension of BARC Focused Zone in Different Years	64
Table 3.3-18 Major Crop Types Produce in BARC Focused Zones.....	65
Table 3.3-19 Livestock and Poultry Production in thousands.....	67
Table 3.4-1 Showing the number of affected people by hail storm and cold air from 4 districts of West Shewa Zone.....	71
Table 3.4-2 Relief Aids Allocation and distribution and Number of beneficiaries in year 2007 and 2008 E.C respectively.....	72

LIST OF FIGURES

Figure 3-1: Location Map of BARC and Sub-Station.....	16
Figure 3-2 Crop Production in BARC	21
Figure 3-3 Livestock Population of BARC.....	23
Figure 3-4 BARC Neighboring Woreda's.....	24
Figure 3-5 BARC Focused Zones	50
Figure 3-6 Climatic Condition of BARC Focused Zones	51

ACRONYMS

AGP	Agricultural Growth Program
ARI	Acute Respiratory Infection
AIDS	Acquired Immune Deficiency Syndrome
BARC	Bako Agricultural Research Center
CSA	Central Statistical Authority
FUO	Fever of Unknown Origin
GTP	Growth and Transformation Plan
Ha	Hectare
HIV	Human Immunodeficiency Virus
Masl	Meter above Sea Level
MDGs	Millennium Development Goal
OARI	Oromia Agricultural Research Institute
OCSSCO	Oromia Credit and Saving Share Company
ONRS	Oromia National Regional State
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
URTI	Upper Respiratory-Track Infection

EXECUTIVE SUMMARY

BARC small scale irrigation feasibility study was one of the projects of Agriculture Growth program (AGP) undertaken and this report deals with the socio economic analysis of the project. The report used descriptive and quantitative analysis approach and tried to give general overview of the BARC focused zones and research center specific features.

Location: The proposed irrigation project is located in Oromia National Region State, East Wollega zone, Gobu Sayo woreda, Kejo kebele. The project area is in approximate distance of about 18 km from woredas town Ano and 8 km away from Bako town, 109 km from zone town East Wollega and 258 km from Finfinne.

Agro ecology and climate indicates that Gobu Sayo woreda has altitude range from 1500 - 1960 above Sea Level. The average rainfall 770 - 1,657 mm and temperature ranges between 13 c⁰ and 27⁰C. Majority, 80 % of the woreda is characterized as mid land and 20 % low land. With this agro-climatic situation the research center growing more than 30 (thirty) types of agricultural products. Production greatly rainfall dependent and few traditional irrigation crop productions practice.

Population: the center focus on the population of three zone namely East Wollega, H.G.Wollega and West Shewa. The number of total rural population expected to get BARC service are independently discussed in the document. The total current permanent BARC's employee are 241 of which 215 are males and 26 are females.

The proposed project command area considered one side of the Gibe River, and net irrigable area of about 150 ha and expected beneficiaries of farmers of the country in general people three zone in specific.

As the project implementation is in the compound of the research center all the headwork, the canals, the pump house, the night storage, the command area and other irrigation infrastructures are exercised and installed in the center there is no any displacement and social issues. As observed and issues raised on the discussion the major impact is that the impact on downstream irrigation water users caused by the shortage of water.

In my view, upper and downstream impact assessed and there is no significant adverse social impact and socially the project is feasible for implementation. However, clearly applying water saving technologies will have a positive impact on the downstream irrigation water users and it ensures the sustainability of the project.

1. INTRODUCTION AND BACKGROUND

1.1. INTRODUCTION

In line with government development strategic direction and policy focus for agriculture, Bako Agricultural Research Center irrigation project was identified for feasibility and design study.

According to BARC establishment history, Bako Agricultural Research Center (BARC), the then Ethio-German experimental station, was established in 1964 by an agreement signed between the Federal Republic of West Germany and Ethiopian government (Emperor H/Silase I). At the infant stage (1964 - 1977) it was called Ethio-German experimental station. Latter on (1977-2002) the center was transferred to Ethiopian government and managed under Ethiopian Agricultural Research Institute. Then after the regional government agricultural research institute establishment (2002 to date) BARC has been managed by Oromia National Regional State (Oromia Agricultural Research Institute, OARI)

The center is located at 258 km west of the capital, Addis Ababa, 8 km away from the nearest town, Bako and 4 km from highway road to Nekemte town, western Ethiopia. BARC lies between 9°6'N latitude and 37°9'E longitude at an altitude of 1650 masl. Agro-ecology is mid-altitude with high ran fall of 1238 mm year and hot humid weather 13.3 °C minimum and 28 °C Maximum annum.

BARC covers an area of 1440 hectares. Majority of the land area (66.5%) was allocated for natural and artificial forest and grazing land, 22.5% is allotted for experimental and seed multiplication, the rest 10% is for residential, research block and management office, laboratory, library and recreation centers.

Feasibility study of the project included most of stockholders sectorial studies and this socio-economic study conducted as one components of the feasibility study with aims to identify basic socio-economic features of the project area. The report considered the requirements of the Terms of reference and prepared based on field assessment, data

collected at project center and different stakeholder consultations to depict general socio-economic overview of the project area.

1.2. RATIONALE OF THE PROJECT

Agriculture is the dominant sector of the Ethiopian economy that contributes over 41.6% of GDP, 90% of export earnings and 85% of employment as of “GTP” document. However, the sector characterized largely rain fed dependent that cause severe damage in agriculture due to shortage of rainfall and others.

To overcome the effects of climate change and rainfall shortage, water centered development in agriculture is given prime importance more than ever in current agricultural development program with aims to improve the problem with food deficits in the country. Therefore, there is growing interest of government and other stakeholders towards promotion of water centered agricultural development.

The government policy support both private investment as well as small holders farm in agriculture development and small scale irrigation is believed to relief small holders rainfall dependence to increase agricultural production and one among the interventions options and one of the pillars in agriculture growth program (AGP). In addition to this government strongly working on the agricultural research centers to undertake different research activities under three sub components of research component of AGP II project. The centers are established to contribute to the increase of agricultural production and productivity, alleviation of poverty and improvement of the overall living standard of the farming community of Oromia on sustainable bases while restoring and maintaining the natural resource base of the region by adapting, generating, multiplying, and disseminating appropriate technologies.

To do so, irrigation is a must to address those issues by doing research two to three wise a year rather than waiting for rain which increase the gestation period plants which in turn take more than five years to address new technologies to users. The development of this project is also have a significant impact in the following issues:

- Shorten the experimental duration as the research may be done during the main cropping and off season
- Solve the scarcity of improved seeds
- Reduce the climate change impact through the practice of green agriculture
- Creating job opportunity for youth
- Maintaining food security
- Practicing of intensive agriculture on small area of land

Thus, technical support for development of the available water resources and irrigation is inevitable and necessary to bring sustainable food production and agricultural development.

1.3. REVIEW OF POLICIES AND STRATEGIES

The government of Ethiopia adopts development policies and strategies every five years. The Plan for Accelerated and Sustained Development to End Poverty (PASDEP) adopted for the period 2005/6-2009/10 has given prime importance for rural and agriculture development with aims for accelerated, sustained, and people-centered economic development to achieve the MDGs by 2015.

Following the PASDEP, Growth and Transformation Plan (GTP) adopted for the period (2009/10-2014/15) and is directed to achieve an economy which has a modern and productive agricultural sector with enhanced technology and an industrial sector that plays a leading role in the economy; to sustain economic development and secure social justice; and, increase per capita income of citizens so that it reaches at the level of those in middle-income countries.”

In policy direction of GTP, smallholder farming will continue to be the major source of agricultural growth with shift into commercialization. To complement this development objective, concerted policy support for private investment in large commercial farms. Fundamentals of the strategy include the shift to produce high value crops, a special focus on high-potential areas, facilitating the commercialization of agriculture, supporting the development of small and large-scale commercial agriculture where it is feasible. In

general, agricultural will direct on placing major effort to support the intensification of marketable farm products by small and large farmers for domestic and export market.

During the GTP period, it is planned to transform agriculture sector to high growth path in order to ensure the food security challenge of the country and to curb inflationary pressure as well as broadening the export base of the country. The sector also serves as a spring board to bring about structural transformation in the long run through contribution to industrial growth. To promote multiple cropping and better cope with climate variability and insure food security, the Growth and Transformation Plan (GTP) has adopted agricultural development and focus strategies include;

- ▶ Scaling up production and productivity of land, labor and available natural resource use based on agro ecological suitability.
- ▶ Specialization, diversification and strengthening agricultural production and marketing system.
- ▶ Strengthen extension service for majorities of smallholders
- ▶ Provide support for the private large scale commercial farms.
- ▶ Promotes appropriate use of rain water and other water source,
- ▶ Improve water use efficiency through expanding of irrigation schemes with special attention to small scale irrigation schemes development.
- ▶ Strengthen public participation in the planning and implementation and take affirmative actions to enhance women participation at woreda and kebele level; engaging and mobilizing the public in the construction of local infrastructure development activities (road, schools, health stations, irrigation and others).

In general, the agricultural Transformation Plan has adopted range of interventions and public investments directed to basic infrastructure development mainly road, market infrastructures and others to support and scale-up of the success in economic growth of the country.

In line with the general development policy and strategic framework, several attempts underway in study and design of small scale irrigation project initiated by respective

regions with vision towards water centered irrigated agriculture development for small holder benefit through efficient utilization of the existing water resource.

1.4. OBJECTIVES

The main objectives of the socio economic study is to collect, process, analyze and depict baseline socio economic and demographic situation of the project area. The study is to reveals socio economic situation of existing conditions, economic activities, income and livelihood source, and food security situations, population and demographic features, production and marketing of agricultural products and inputs, identify socio economic constraints and priority problems and asses expected positive and adverse impacts as well as community attitude and social feasibility of the project.

1.5. SCOPE OF THE STUDY

The socio economic study deals all about socio economic and demographic features of the project area (BARC), neighboring woredas (Gobu Sayo and Bako) and the research center focused zones (East Wollega, H.G.Wollega and West Shewa). These includes assessment of existing economic activities, economic and livelihood basis, existing basic social infrastructure and social services, and identifying major economic and social problems.

2. METHODOLOGY

Both primary and secondary data gathered from relevant key informants, research center, and sectorial office. Moreover, woreda government offices, key informants, and other responsible partners at woreda office level contacted and discussed on the project under study. Relevant data and information required for the study was identified prior to field work and pre-prepared information checklist that used in gathering information and baseline data with respect to socioeconomic situation of the area and checked consistency of the data thorough discussion with research center. The general methodology approach used in data collection and descriptive analysis includes;

2.1.1. REVIEW OF REPORTS AND SECONDARY DATA SOURCE

Available secondary data and socio economic information were gathered at regional, zonal, woreda and kebele level that expected to serve as input for the study. Pertinent documents on policy issues mainly land policy of the region and other national and regional development strategic policy direction accessible were also gathered and reviewed within the framework of the project objective.

2.1.2. KEY INFORMANTS AND DISCUSSION WITH STAKEHOLDER INSTITUTIONS

Primary data required for this study were generated through developed questioner from research center and sectorial offices. Discussions were held with different focal group discussion including interview with individual researchers. Representatives of sectoral office and other stakeholders and experts of these institutions have been contacted from which the following are the major ones;

- Woreda water resource development office
- Woreda agriculture and rural development office ,
- Kebele office, Development agents and neighboring community representatives, and

- Health, education and Other sector offices in the project areas
- Woreda Women, children and youths' Affairs' Office
- Discussion and consultation meeting was held with center manager and department heads of research center.

The main issue discussed with research center informants, DA's, nearest community was regarding the impact of the project mainly the downstream part. From the discussion there is one water user association known as Gambela Tare IWUA containing 40 members were established in 1983 E.C. The whole management systems were controlled by committee selected from farmers. Their responsibility were maintenance, controlling water distribution systems from source to command area. This committee controlled the water through setting local bylaw and regulations. The water reached the command area by turn (i.e., they close the one side of the canal by shutter while they open the other side).

The water they are currently applying for irrigation is upper Gibe River which have a minimum flow sometimes affected by the shortage of water that the crop demanding. Especially the downstream water users may affected at the time of water scarcity (December - March). Because, the water become small and not enough to meet the demand of the farming community at downstream. Because of the shortage of water for the downstream users proper water balance have to be made and the center should have to apply different water effective and efficient technologies.

2.1.3. KEY INFORMANTS INTERVIEW AND DISCUSSION WITH BARC

Key informants interview was made with key responsible individuals in agricultural research center. Discussion was held to provide information on specific and selected issues related to irrigation development and other relevant socio-economic issues. From this discussion they raised the benefit of this project and how it fasten the research activities undertaken by the center to address the rural community. They also react on how the project is helpful in reducing the year required for breeding program by half, practice of double cropping system, reducing the dependency on rainfall, improving the livelihood of the farmers through providing improved seed multiplied by irrigation, solving of the

scarcity of the improved seeds as the seed produced using only rainfall is not enough, practicing of climate smart agriculture.

2.1.4. HOUSEHOLD SURVEY

Due to the type of the project household survey was not undertaken, rather primary /questioner/ data distributed to different department and secondary data were used from the research center.

2.1.5. DATA ANALYSIS

The socio economic report used descriptive and quantitative analysis approach. The report focuses on project area specific socio economic features, and also provides highlight on general overview of the region, zone (specific to project focus) and project woreda as required.

2.1.6. PROCEDURES AND PROCESS FLOW

The socio economic study followed steps and procedure required in data collection and analysis. At the first glance to field work contact was made with Bako Agricultural Research Center and mapped project specific location, accessibility condition...etc. After preliminary discussion with Center Manager Ato Getachew, and Socio-economist Ato Kifle, the research center assigned one researcher, Ato Kifle, to guide the socio-economist to project area and different woreda level offices and to undertake different tasks related to secondary data fulfillment.

3. SOCIO ECONOMIC FEATURES

Depending on the mission and responsibilities given to this specific research center; the center mainly focuses on three western zones (West Shewa, East Wollega and Horo Guduru Wollega) of the region. Due to this the socio-economic study highlights these three regions socio-economic profile and socio-economic profile of woredas adjacent to the center /project site/ in addition to the project sites or the research center.

3.1. SOCIO-ECONOMIC PROFILE OF BARC

The center is located at 258 km west of the capital, Addis Ababa, 8 km away from the nearest town, Bako and 4 km from highway road to Nekemte town, western Ethiopia.

BARC covers an area of 1440 hectares. Majority of the land area (66.5%) was allocated for natural and artificial forest and grazing land, 22.5% is allotted for experimental and seed multiplication, the rest 10% is for residential, research block and management office, laboratory, library and recreation centers.

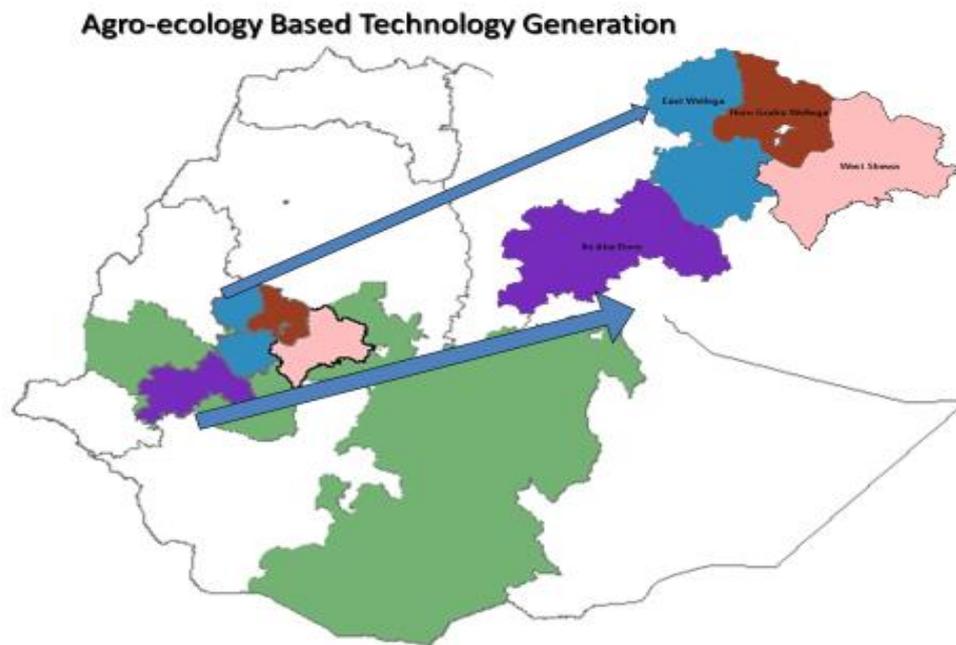


Figure 3-1: Location Map of BARC and Sub-Station

3.1.1. PROPOSED PROJECT COMMAND AREA AND BENEFICIARIES

It has been physically observed that the command area falls in right hand side of the river Gibe which have suitable land topography and the proposed command area considered right side of the river.

The proposed irrigation technology system use pump from Gibe River and expected to develop irrigable land area of 150 hectare. As far as the ownership of the command area belongs to the research center all proposed plot of land going to be used for irrigation. The

beneficiaries of the proposed project are indirectly population of the country but directly focusing on the population of three zones (East Wollega, H.G.Wollega and West Shewa) those BARC assigned to undertake research.

3.1.2. CLIMATE AND TOPOGRAPHY

According to available data source from BARC, the research center lies between 9°6'N latitude and 37°9'E longitude at an altitude of 1650 masl and the Agro-ecology is mid-altitude with high rain fall of 1,238 mm year and hot humid weather 13.3 °C minimum and 28 °C Maximum annum.

The proposed project is characterized as medium where temperature, sunshine, winds, etc., is very moderate thus resulting in medium climate, which is suitable for crop production particularly for seasonal crops like cereals and pulses and oil crops.

3.1.3. WATER SOURCE

The water source for crop production at the project area depends on seasonal rain fall and in researchers view the rainfall pattern is not adequate to undertake agricultural research by only at one time by rain fall. Although the rain fall pattern is enough for crop production at rainy season the community demands for water to produce more. Although, there exist potential rivers like Gibe which is not yet exploited neither for modern nor for traditional irrigation schemes for the center. The proposed BARC irrigation project is potential water source in free flow to Gibe River in the compound. As it was observed during the field assessment and secondary data collected from the relevant sources, Gibe River is Perennial which is not yet much exploited for irrigation or other use and opportunities for efficient utilization of land and water resource of the area.

3.1.4. POPULATION AND DEMOGRAPHIC

Population Size /Number of BARC Employees

Table 3.1-1 BARC Employees based on Different Categories

No.	Categories	Reference	Number of Permanent Employees		
			Male	Female	Total
1	Age	Below 18	0	0	0
		18-25	11	0	11
		26-35	102	13	115
		35-64	102	13	115
		Above 64	0	0	0
		Total	215	26	241
2	Education	Grade 8 & Below	73	9	82
		Grade 9 Complete	6	1	7
		Grade 10 Complete	32	6	38
		Grade 12 Complete	15	4	19
		Lev-II	1	0	1
		Lev-III	7	0	7
		Lev-IV	10	3	13
		Diploma	6	1	7
		BA/	8	1	9
		BSC	17	1	18
		DvM	1	0	1
		MA	0	0	0
		MSC	37	0	37
		PhD	2	0	2
		Total	215	26	241
3	Experience	Below 2 year	25	6	31
		2 up to 5	36	3	39
		5 up to 10	58	0	58
		Above 10 year	96	17	113
		Total	215	26	241
4	Average Monthly Income	< = 1,000	6	5	11
		1,000 - 2,500	119	13	132
		2,500 - 5,000	31	6	37
		5,000 - 10,000	58	2	60
		> 10,000	1	0	1
		Total	215	26	241

3.1.5. BARC STACKEHLERS

Table 3.1-2 BARC Stakeholders

No.	Existing stakeholders	Roles and Responsibilities	Their Interests	Potential Conflict	Strength
1	Woreda Administration	Managing of the whole systems of irrigation	resolving when the conflict raised among users	absence of equity, equality and fairness among users	taking measure correction, maintaining of equality, fairness and equity
2	Irrigation Development authority	give technical support and training for the farmers	creating sustainable and productive irrigation system	absence of equity, equality and fairness among users	taking measure correction, maintaining of equality, fairness and equity
3	Farmers user association	maintenance, setting norms, rules and regulations	sharing irrigation water equally and producing boost production,	absence of equity, equality and fairness among users	setting local bylaw for water sharing by turn and managing water source
4	Oromia Agricultural Research Institute	Funding for maintenance	Technology generation		
5	Bako Agricultural Research Center	Managing the activities & project	Technology improvement and managing the project		
6	Technology Research Teams	Managing the activities performed with the project	Technology improvement		
7	Chemical Companies	Provision of pesticides	To verify chemicals		
8	National Research Institutions	Technology provision	Technology improvement		
9	Universities	Technology provision	Technology improvement		

3.1.6. AGRICULTURE

3.1.6.1. CROPS

There are different variety of agricultural products are under the research. Bako agricultural research center has planned to undertake different research activities under three sub components of research component of AGP II project. There are about 17, 14 and 18 activities planned for this budget year (2010 E.C) under sub components one, two and three respectively. From the following table the plantation of maize cover most of the land which is about 80 hectare. There is also a federal research center in the same place having the same mission with BARC. The federal one only focus on the breeding of the variety of maize. The following table shows some of the varieties of crops the BARC is undertaking

research in 2010. Regarding the agricultural products because of unavailability of full data as demanded to clearly pinpoint the issues this document tries to give some highlights on what's found from BARC.

Table 3.1-3 Types of Crops Produced in BARC (Meher Season)

Nº	Crop Type	Area in ha	Production in Qun/ha	Main Production Bitt/Qun
1	Maize	80	14	500
2	Soybean	4	52	1,100
3	Sesame	0	6	2500-3000
4	Teff	0	12	1500-2000
5	Sorghum	3	43	1,100
6	Finger millet	4	32	1,100
7	Rhodes Grass	3	3	45,000
8	Doluchos Lablab	1	2	10,000
9	Elephant Grass	2	> 4 mil cuttings	400,000
10	Pegion pea	0	1	2,500
11	Lucenea	1	4	20,000
12	Dasho grass	0	about 1 mil root splits	100,000
13	Bracharia Spps	1	1	75,000
14	Dismodium	0	1	1,250
15	Punicum	1	1	5,000
16	Stylo Santhes	0	0	750
17	Oat	1	100	1,000
18	Cowpea	1	0	625
19	Grevillea robusta	2 ha		
20	Cordia africana	0.25 ha		
21	Eucalyptus camadulensis	1 ha		
22	Potato	0.5	85	
23	Hot pepper	1	25 kg (ssed)	
24	Yam	0.2	35	
25	Sweet potato	0.2	10,000 cutting	
26	Anchote	0.15	1kg seed	
27	Banana	0.25	3500 sucker	
28	Mango	0.3	10 Qt	
29	Avocado	0.3	12 Qt	



Figure 3-2 Crop Production in BARC

The following table shows the types crops produced under irrigation.

Table 3.1-4 Types of Crops Produced in BARC (Using Irrigation)

Nº	Crop Types	Area in ha	Production in qt
1	Moringa oleifera	NA	4,500
2	Moringa Stenopetal	NA	3,000
3	Leucaena pallida	NA	4,200
4	Grevillea robusta	NA	6,000
5	Cordia Africana	NA	1,500
6	Delonix regia	NA	1,000
7	Sesbania sesban	NA	1,000
8	Eucalyptus camadulensis	NA	3,000
9	Bottle Brush (Callistemon calatrusis)	NA	600
10	Cajanus cajan	NA	1,000
11	Tephrosia candida	NA	1,000
12	Melia azandirach	NA	500
13	Phonex reclinata	NA	50
14	Calliandra calothyrsus	NA	2,200
15	Hot pepper	0.1	50,000 seedling
16	Sweet potato	0.1	12,000 cutting
17	Tomato	0.15	5kg seed
18	Banana	0.25	3500 sucker
19	Mango	0.3	10 Qt
20	Avocado	0.3	12 Qt

3.1.6.1. TYPES OF SEEDS USED

Table 3.1-5 Type of Improved seed applied

	Crop Types	Variety		Rate Utilization		Yield	
		Improved Variety (√)	Non-Improved Variety (√)	improved Varity (kg/ha)	Non-improved variety (kg/ha)	improved Varity (qt/ha)	Non-improved variety (qt/ha)
1	Maize	√		25		50-60	
2	Soybean	√		100		20-30	
3	Field pea	√		100-150		14	
4	Fababean	√		200		20-22	
5	Rhodes Grass	√					
6	Doluchos Lablab	√					
7	Elephant Grass	√					
8	Pegion pea	√					
9	Lucenea	√					
10	Dasho grass		√				
11	Bracharia Spps		√				
12	Dismodium		√				
13	Punicum		√				
14	Stylo Santhes		√				
15	Oat	√					
16	Cowpea	√					
17	Potato	√		12-22 qt/ha		270-400	
18	Hot pepper	√		0.5 kg/ha		7.5-30	
19	Tomato	√		0.25 kg/ha		240-295	
20	Yam	√		50,000 cutting		227-460	
21	Sweet potato	√		33,333 Cutting		128-322	
22	Anchote	√		-			
23	Banana	√		1,600 suckers		370-550	
24	Mango	√		204 seedling		Up-150	
25	Avocado	√		205 seedling		100-146	

3.1.7. LIVESTOCK

Bako Agricultural Research Center also undertaking researches on different kinds of livestock species such as cattle, equines, goat and sheep, apiculture and poultry.

Table 3.1-6 Livestock Population of BARC in 2010

Cattle	Equines	Goat and Sheep	Apiculture	Poultry
183	1	133	42 hives	500



Figure 3-3 Livestock Population of BARC

3.1.8. MAJOR CHALLENGES OF THE CENTER

The major challenges that the research center currently facing are shortage of field Vehicles (which is that BARC only owns 4 vehicles to undertake all its operations), Tractors and farm machineries (The tractor the research center own is far below the recommended amount of the ratio of tractor to land size), Salary and promotion for supportive staffs, technical assistant and researchers (human resource is the main engine part to undertake any activities), Requirements of technicians (Technical Assistances), Shortage and late release of budget, and Shortage of office are the major challenging issues.

3.2. SOCIO-ECONOMIC PROFILE OF BARC NEIGHBOR WOREDA'S (BAKO-TIBE WOREDA AND GOBU SEYO WOREDA)

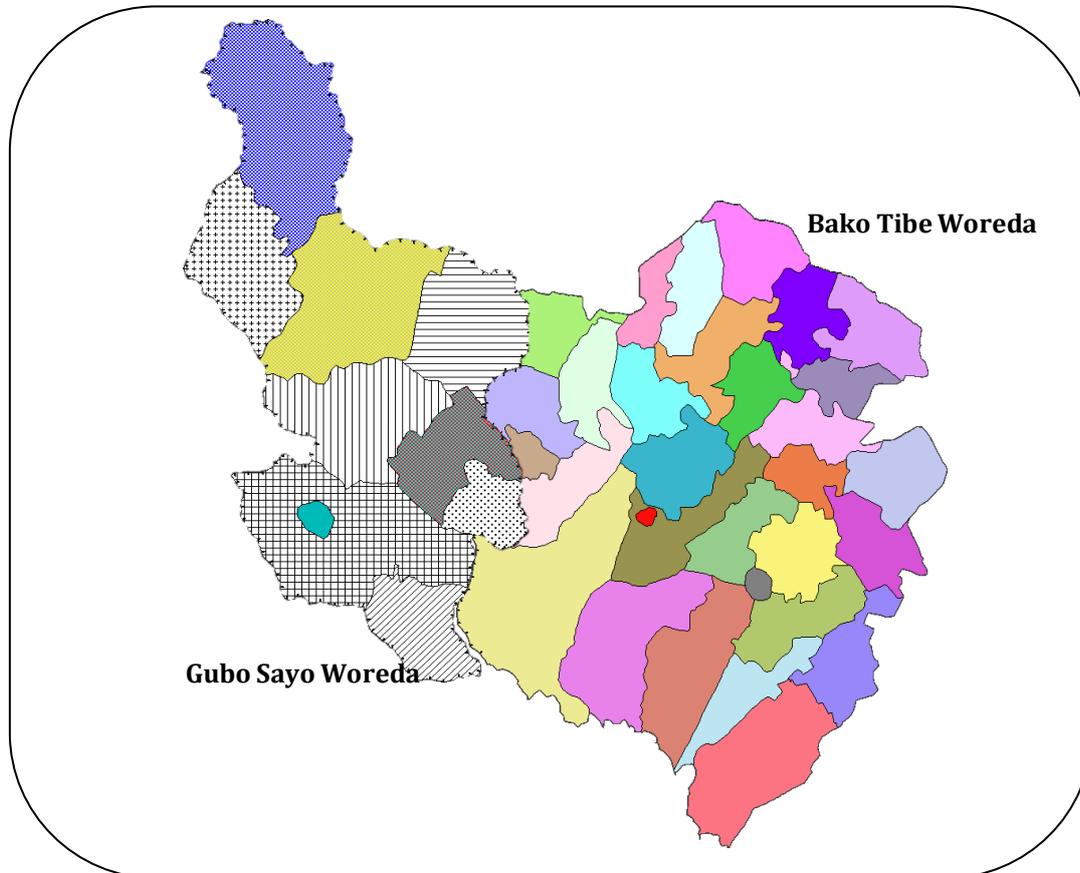


Figure 3-4 BARC Neighboring Woreda's

Source: own mapping from global mapper v.18

3.2.1. Introduction

Gobbu Sayyo is one of the districts in east Wollega Zone, which is located in the eastern part of the zone. Today this district is sub divided in to 8 farmers associations and one urban center for all its administrative purposes.

Gobbu Sayyo was administratively with the district Gudeyya Bila possessing common governmental offices at the town Anno until 1995. To enhance service delivery and for close supervision of development activities, a separate administrative power was set for Gobbu Sayyo departed from the previous district name Bila Sayyo and today Gobbu Sayyo has its own separate administrative power. Anno is the capital town of the district located

on the way along to Addis Ababa at the distance of 265 km and far 65 km from the zonal capital of Nekemte.

Whereas, Bako Tibe wereda is one of the twenty two (22) woredas found in west shewa Zone of Oromiya national regional state. Historically, the name of the Wereda is derived from the area called “Baka” which is presently found in Dambi Dima farmers association. Administratively Bako Tibe woreda is divided in to twenty eight (28) peasant associations and four (4) urban kebeles, namely Bako 01, Bako 02, Shoboka and Tibe. Bako and Sheboka are the only towns with municipality in the district.

This compiled profile is so expected to provide information about the district’s physical setting and its socio-economic conditions that help the research center to undertake or consider the neighboring woreda’s in his developmental activities.

3.2.2. Physical Settings

3.2.2.1. AREA AND LOCATION

Gobbu Sayyo is the district found in East Wollega zone. It is located at about 65 kilometers to the east of zonal town Nekemte, possessing a total area of 383.80 km². This district is contiguous with Bakko Tibe district of West Shewa Zone in the east, Gudeyya Bila district in the north, Boneyya Boshe district in the south and Sirbu Sire district in the west. It is divided in to 8 farmers associations and one urban center having the capital town named Anno.

Distance of the district capital /Bako/ from zonal capital /Ambo/ is 125kms while distance of the district capital from regional capital (Finfinnee) is 214 kms. The district is bounded by Chalia woreda and Ilugelan woreda of west shewa zone in the East and, Gobu sayo woreda and Gudeya Bila woreda of East Wellega zone in the west, Jima Rare woreda and Jima Geneti woreda of H.G.Wollega zone in the north and by Wama Boneya woreda in the south. Astronomically the wereda is located between 85.6 °N and 91.4 ½’ N E and 37%’ E. Its total area covers 656.5 km²

3.2.2.2. AGRO-ECOLOGY OF THE WOREDAS

Gobu Sayo is divided into two distinct geographical areas with different proportion; namely, the midland 79.99 percent having six (6) rural peasant associations and the low land 20.01 percent holding 2 rural peasant associations. The general altitude range of the district is 1,500 m to 1,960 m above sea level. But for Bako Tibe Woreda the data was not available. The minimum and maximum altitude of Bako Tibe Woreda lays between 150 m and 2,872 m above sea level.

3.2.2.3. RELIEF, DRAINAGE AND CLIMATE

RELIEF

Regarding the relief of the Gobu Sayo district Egu, Tulu Gelma, Aggo and Tulu Gushi are some of the mountains with low land plain areas especially to the east of Sayyo. In Bako Tibe case there are many plateaus, hills, valleys and plains but there are also mountains where some of data is not available due to scarcity of historical records. The known mountain is mount Adulan 2,872 masl.

DRAINAGE

Rivers and streams are also found in this district. Some of the rivers found in Gobu Sayo district are Gibe River, Meki and Dokonu and in Bako Tibe district are Gibe, Kala, Jima /Robi, Abuko, Mara and others. These revers are mostly used for irrigation purposes.

CLIMATE

Climate, the long-term effect of the sun's radiation on the rotating earth's varied surface and atmosphere. It can be understood most easily in terms of annual or seasonal averages of temperature and precipitation. Most part of Gobu Sayo woreda land has an elevation above 1,500 meters and characterized by sub-tropical climatic condition with a mean annual temperature between 13⁰c and 27⁰c and mean annual rainfall of 770 mm to 1,657 mm. According to Bako Tibe Woreda the annual rain fall is estimated to be 1,462 mm. The maximum and minimum monthly temperature of the this woreda is 23 °C to 30 °C for maximum temperatures and 8 °C to 13 °C for minimum temperatures.

3.2.2.4. SOILS

Gobu Sayo Woreda: Clay loam and loam soil is exceedingly dominating the district, which has a good quality of agricultural potentialities. The coverage of Clay loam soil in hectares is 27,002 and of this hectare 14,889.4 hectares is suitability for agriculture. Loam soil also covers 6,750.6 hectares and it is totally suitable for agriculture.

Bako Tibe Woreda: Out of the total area of the Wereda 400 Km² (60%) is Covered by Eutric nit soil or Red soil, 98 KM² (15%) is Luvu soils or black soil and the remaining 164 Km² (25%) is clay soil, sandy soil and Loam soil. Nit soil or reddish brown soil, which is good for agriculture is dominant indicating that as there is better agricultural development potentials.

3.2.2.5. VEGETATION AND WILDLIFE

VEGETATION

Gobbu Sayyo district has a better vegetation cover than the other neighboring districts. There are different patches of forests along the riverside. There was a forest area assumed to be under forest on some areas having a total area of about 1,381 hectares, but not demarcated as assumed. However, there is a very serious deforestation especially along the river and its surrounding where there had been a jungle forest before a decade.

In the past Bako Tibe district had dense forest and vegetation but nowadays it is decreased due to population factors such as situations where community members lack understanding of the relationship between forest and weather and distract the forest for the purpose of farm land, building their shelter, uses the forest as a source of energy like fire wood, charcoal and the like. Because of the above mentioned factors nowadays there is no dense forest (natural and man-made forest) protected by government, community and Non-governmental organizations in the district. At present major types of natural vegetation found in the district are reverie, shrub and bush and others.

WILDLIFE

Different wildlife those had been surviving in the district for a long period of time has migrated to different neighboring areas; such wildlife was Lion, tiger, Buffalo, and other different wild animals.

3.2.3. Socio-Economic Conditions

3.2.3.1. POPULATION

Population size, compositions, its spatial distribution and some other demographic and socio-economic data are very important for planning, monitoring and evaluation of various development programs. As shown in table below the counted population of Gobu Sayo district based on population and housing census conducted in 2007 G.C is 99,234 in 2005 E.C and 206,868 in 2007 for Bako Tibe. From the following table given different year data the percentage of population living in rural area is 43 % and 82 % for Gobu Sayo and Bako Tibe respectively. Here the data of Gobu Sayo not seems real. From total population female comprises about 51 % and 50 % of the pupolation in Gobu Sayo and Bako Tibe respectively.

Table 3.2-1 Total Population Based on 2007 G.C population and Housing census for the year 2005 E.C and 2007 E.C for Gobu Sayo and Bako Tibe Respectively.

Year (E.C)	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Gobu Sayo									
2005 E.C	21,118	21,717	42,835	27,505	28,894	56,399	48,623	50,611	99,234
Bako Tibe									
2007 E.C	83,737	86,569	170,306	18,818	17,744	36,562	102,555	104,313	206,868

Source: Each woredas Planning Office

The majority of the population of the Gobu Sayo district were included in the age group 15-64 and family size of the district were 7 for rural and 5 for urban. Based on the population density there is dispersed rural settlement pattern in each peasant association.

Table 3.2-2 School Age of Gobu Sayo District’s Population by Age Group

Age group	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-14	9,603	9,419	19,022	1,034	1,069	1,103	1,0637	10,488	21,125
15-64	10,365	11,240	21,605	1584	1670	3,254	11,949	12,910	24,859

Age group	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
65 & Above	553	446	999	55	69	124	608	515	1123
Total	20,521	21,105	41,626	2,673	2,808	4,481	23,194	23,913	47,107

Source: population and housing census conducted in 2007 G.C

According to the data obtained from the Gobu Sayo district education office, there were about 6,873 populations between the age 7-14 years, school age populations, of who 3,456 were males and 3,417 were females. Out of the total 3,204 were urban population with school age and 24,285 were rural population with school age.

Table 3.2-3 School Age of Gobu Sayo District's Population by Age Group

Age group	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<7 (kindergarten)	6,492	6,379	12871	690	694	1384	7182	7073	14255
7-14 (primary school age)	3,112	3,041	6153	344	376	720	3456	3417	6873
15-18 (secondary school age)	2,550	2,711	5261	548	552	1100	3098	3263	6361
Total	12,154	12,131	24285	1582	1622	3204	13736	13753	27489

Source: Gobbu Sayyo District Education Office

3.2.3.2. AGRICULTURE

FARMERS ASSOCIATIONS AND AGRICULTURE SERVICE

According to the data obtained from Gobu Sayo district agricultural and rural development office peasant association with larger families is T/Hara, total of 8,221 of whom 5,042 were females and peasant association with smaller family is Gembela Tere, total of 2,553 of whom 1,519 were females. For Bako Tibe there are about 18 peasant association having 16,800 members in the year 2007 E.C; and also there are agricultural service cooperative having 12119 members in 2008 E.C. Service cooperatives provide services such as supply of fertilizers, improved seeds and pesticides used to increase agricultural production and productivity, saving and credit service, supply of shopping goods, purchase of crops, distribution of dividend and so on.

Table 3.2-4 Farmer Associations and Member of Farmers Association of Gobu Sayo District

No.	Name of farmers association	Members			Families		
		Male	Female	Total	Male	Female	Total
1	Ongobo Bekenisa	887	119	1006	2778	4154	6882
2	Gembela Tere	410	45	455	1034	1519	2553
3	Sonbo Kejo	748	179	427	2147	2804	4951
4	Ulumayi Chala	82	95	937	1945	3285	5230
5	Tibe Hara	844	129	973	2241	3295	5536
6	A/Laften	1537	131	1668	3179	5042	8221
7	Alemi Seyo	865	122	987	2637	4435	7075
8	Adere Tiksa	487	61	548	1316	1778	3094
	TOTAL	6620	881	7501	17230	26312	43542

Source: Gobu Sayo District Agriculture and Rural Development Office

Table 3.2-5 Peasant Association and Service Cooperative of Bako Tibe District

No	Description	Years	
		2007	2008
A	Peasants' association		
1	Number of peasants association	28	28
2	Member of peasants association		
	Male	15,110	15,263
	Female	4,090	4,115
B	Service Cooperatives		
1	Number of service cooperatives	28	28
2	Member of service cooperatives		
	Male	10,350	11,308
	Female	1517	1,759
C	Capital of service cooperatives, br.	10,401,742	20,457,680
1	Fixed br.	8,328,971	8,328,971
2	Mobile br./ Moveable asset/	10,401,742	20,457,680

In Gobu Sayo district there are farmer service cooperatives with a member of 5,367 male and 535 female on delivering service as agricultural input supplies and credit giving services during last two years. These cooperatives have capital accumulated 6,348,999.30 birr in 2005 E.C. Concerning the settlers there is no any settlers settled in the district

during last two years. There is no occurrence of drought that affect households and children during the years 2004 and 2005 E.C.

LAND RESOURCES AND ITS UTILIZATION

The term land use refers to the ways that people use land and the natural resources it provides. It is the best allocation of land for its best alternative uses. Land use potential is necessary to select the land characteristics needed for any production. Some of the major factors that determine the potentiality of the land are temperature, length of growing period, moisture availability, flood hazard, degradation hazard, toxicity, rooting condition and workability.

Out of the total land of Gobu Sayo district the proximate areal coverage of land used for crop cultivation is 21,640 hectares of which 21,096 hectares of land is used for annual crop cultivation *and* 544 hectares of land is used for perennial crop production.

Arable land is a land that is ideal and economical for the cultivation of crops. Arable land is an area with more than 90 days of dependable growing period, soil depth of more than 25cm and surface stoniness of less than 50 to 90 %. Arable is pertaining to tillable land that is suitable for tillage and crop production. The area of arable land used in the district is unknown because of lack of data in the district. Out of the total land of the district an area of land 6,907 hectare is pasture or grazing land and 1,444 hectare is degraded or barren land.

The Natural forest of the district covers the total area of 1,381 hectares of land. Manmade type of forest is planted to solve the problem of environmental problem such as soil erosion, desertification, deforestation, and etc. With the aim of satisfying one of the millennium development goals of United Nations the inhabitants of the district were participated on the planting and protecting the trees. Out of the total land of the district about 366 hectare is covered with natural forest.

The land resource and its utilization of Bako Tibe district is depicted in the following table.

Table 3.2-6 Land resource and utilization of Bako Tibe District.

No	Description	2007		2008	
		Area (Ha)	%	Area(ha)	%
1	Land Under crops	28,138	100	28,138	100
	Land under annual crops	28,138	"	28,138	"
	Land Under perennial crops	0	"	0	"
2	Grassing Land	4,919	"	4,919	"
3	Land covered by Vegetation	3,358	"	3,358	"
4	Swampy and marsh land	11,000	"	11,000	"
5	Degraded Land	0	"	0	"
6	Land used for other purposes	4,000	"	4,000	"
	Total area of the district	64,469	"	64,469	"

CROP PRODUCTION

The crop cultivation activity was conducted during Meher season only. The production and area cultivated during last two years under private peasant holding is described on the following table.

Table 3.2-7 Crop Production

Crop under production	Gobu Sayo 2004 E.C		Bako Tibe 2007 E.C	
	Area (hectare.)	Production (quintals.)	Area (hectare.)	Production (quintals.)
Maize	5,934	59,219	11,200	78,100
sorghum	975	21,975	2,430	75,050
Teff	3,338	59,219	7,700	136,930
wheat	14	291	1,800	65,850
Barley	7	133	665	12,390
fegar millet	1,216	18,797		
Faba bean	47	889		
haricot bean	51	961		
field bean	4	51	430	37,012
nug	1,187	8,605	1,670	12,040
Rape seed			160	2,920
Total	12,773	170,140	25,895	417,372

Source: Gobbu Sayo District Agriculture and Rural Development Office

In these districts, there is no state farm and large scale private farms. Agricultural inputs are believed to be the most important factor to attain food self-sufficiency. Without chemical fertilizer, high yield is not expected & feeding a family of large size would be

impossible. During last two years the farmers used fertilizers as Urea, blended (NPS) and minimum the amount of DAP, improved seeds of maize and wheat and others distributed for them in order to improve productivity.

Farmers of the district used the two methods of soil fertility. Traditional methods of maintaining soil fertility used are organic and green manure and mulching whereas modern methods of maintaining soil fertility in the district are using adding chemical fertilizers, use compost and crop rotation. Shifting cultivation, intercropping and counter ploughing are among traditional methods of soil conservation and soil band, cut off drain, grass sting and water way are modern methods of soil conservation exist in the district.

Agricultural calendar of the district differ according to the weather condition of the area in the zone. The climatic conditions of the Gobbu Sayyo district experience only one agricultural season. Land preparation, planting (sowing), weeding and harvesting can be performed in meher season.

Table 3.2-8 Agricultural calendar and agricultural activities

<i>Major activities</i>	Seasons	
	Meher	Belg
<i>Land preparation</i>	March, April, May	
<i>Sowing</i>	April, May, June	
<i>Planting</i>	May, June, July	
<i>Weeding</i>	June, July, August, September	
<i>Harvesting</i>	November, December, January	

Source: Gobbu Sayyo District Agriculture and Rural Development Office

Oxen are the main source of power for peasant farming & farmer with no farm oxen is considered as poor. A farmer having a pair of ox can feed himself & his family if he/she possesses enough farmland. Saving capacity depends on what they produce & amount they obtain. To produce large amount of crop, farmers should possess fertile land, farm oxen, improved seed, fertilizer, credit facility & know how or technical service regarding recent agricultural technologies. Besides; the farm oxen needs medical care & uninterrupted follow up not to be attacked by a serious animal diseases.

As explained on table below average number of farm plots per household is decreased to 2.75 from 2.84 because total number of household in the district is increased in 2005 E.C.

Table 3.2-9 Average number of farm plots per household

<i>Item</i>	<i>Review period</i>	
	2004 E.C	2005 E.C
Total Farm plot in hectare(A)	20375	41383
Total number of household(B)	7154	15635
<i>Average =A/B (Average number of farm plots per household)</i>		
Percentage of farmers with	1 hectare	5121
	2 hectare	985
	3 hectare	200

Source: Gobbu Sayyo District Agriculture and Rural Development Office

Out of the total farmers of the district 69% and 2.7% were one hectare and three hectare holders respectively in the year 2005 E.C As explained on table below average number of farm oxen per household is increased to 1.63 from 1.14, because total number of farm oxen in the district is increased largely in 2005 E.C than households' increment.

Table 3.2-10 Average number of farm oxen per household

<i>Item</i>	<i>Review period</i>	
	2004 E.C	2005 E.C
Total number of farm oxen (A)		
Total number of household (B)		
<i>Average =A/B</i>		
Total number of farmers with	0 (No Ox)	1991
	½ Ox (single ox)	1371
	1 Ox (one pair oxen)	2162
	2 Oxen(two pair oxen)	838
	3 Oxen (three pair oxen)	253

Source: Gobbu Sayyo District Agriculture and Rural Development Office

The major diseases found and affect crops in the district are gray leaf sport, tuvcicum leaf blight, common test, diplodia ear rot and maize streak virus.

Irrigation is practiced in Gobbu Sayyo district on some irrigable land owned by few farmers. The presence of all season drain rivers in the district seems that it would have make possible the use of irrigation; but there were few farmers around these rivers those did practice the use of such activities.

Table 3.2-11 Number of farmers engaged in the irrigation, area irrigated and amount of crops produced in the district

<i>Economic Activities</i>		2004 E.C			200 5E.C		
		No. of farmers	Area irrigated (Ha)	Crop produced	No. of farmers	Area irrigated (Ha)	Crop produced
<i>Irrigation</i>	Traditional	663	182	17290	2014	376	36206
	Modern	410	202	19190	1061	205	22939

Source: Gobbu Sayyo District Agriculture and Rural Development Office

Non-Governmental Organization is an independent, voluntary, non-profit making, non-self-serving, value-based society, association, and foundation, charitable trust working for a betterment of a target society and which is not regarded under particular legal system as part of the government sector.

There are 45 development agents performing their rural development activities with farmers in all peasant association in the district by the year 2005 E.C, which is greater than the number of development agents in 2004 E.C. The crop produced in the district is sufficient to feed the total population of the district. But agricultural productivity in this district is with some obstacles as shortage of cultivates land and lack of new technology.

LIVESTOCK, POULTRY AND BEEKEEPING

LIVESTOCK

Livestock play a key role in day-to-day life of the society, especially in the peasant sector. They provide meat & milk, transport, manure, skin & hide & furnish regular & easily realizable cash income. But in contrast to the size of the livestock population, physical & value productivity are low. The following table indicates the size of livestock in the district.

Table 3.2-12 Livestock population of Gobu Sayo and Bako Tibe Woreda

<i>Year</i>	Cattle	Sheep	Goats	Mules	Horses	Asses
<i>Gobu Sayo 2005 E.C</i>	51,091	7,701	8,902	1,339	62	4,326
<i>Bako Tibe 2008 E.C</i>	162,587	14,957	17,003	1,212	4,365	10,066

Source: District Livestock Development, Health and Marketing Office.

The production of Cattle is affected by Internal parasite trypanosomiasis, external parasite, bounce pasterellosis, blackleg, and anthrax mastitis, whereas production of Sheep and Goats is affected by Internal parasite, external parasite, coccidiosis, and pneumonia and Mules is by Internal parasite, eternal parasite, trypanosomiasis and AHS lymphangitis .

Diseases as Internal parasite, external parasite, try paronomasias, African horses sickness, and lymphangitis affect the production of Horses and production of Asses is affected by diseases like Internal parasite, external parasite, trypanosomiasis and pneumonia in the district.

POULTRY

Poultry farming is commercial rising of chickens for their meat and eggs. Concerning production of poultry farming because of lack of management and disease there is no privately owned, state owned and cooperatively owned poultry farming in the gobu sayo district. In Bako Tibe district there are more than 117,984 number of poultries.

BEEKEEPING

Traditionally, farmers perform honey production not as a major duty but in their spare time. Registered data from Gobu Sayo district Livestock Development, Health and Marketing Office indicate that 80,585 kg honey was produced traditionally and 589 kg was produced by modern method of production under private holding in 2005 E.C and sold to 1,20,8775 birr (traditionally) and 14,725 birr (under modern method). According to Bako Tibe district there are about 1,305 kg in traditional and 530 kg in modern yield per kilogram was collected in 2008 E.C.

3.2.3.3. MINING AND INDUSTRY

MINING

Mining is the process of extracting useful minerals from the surface of the Earth, including the seas. One of the economic activities with the great role in economic development of a nation is mining. As data obtained from Gobu Sayo Water, Mineral and Energy Office there are construction minerals with known reserve as stone exist in 4 kebeles.

INDUSTRY

Industry is a group of productive enterprises or organizations that produce or supply goods, services, or sources of income. There is no registered small scale industry in gobu sayo district by the year 2005. In Bako Tibe there are 3 registered industries namely, wood and metal working, oil and mill industries.

3.2.3.4. INFRASTRUCTURE AND SOCIAL FACILITIES

TRANSPORT AND COMMUNICATION

The length of rural road in this district by 2004 E.C is about 279 km and decreased 236 km by 2005 E.C and the length of Asphalt by the year 2005 is 12 km which connects this district with other districts and zonal town. There was a telephone service in this district and postal service at agent level. Whereas in Bako Tibe district; there are 150 kms of all-weather roads of which 31 km's is asphalt , 43 kms are rural gravel and 76 kms are dry weather roads.

3.2.3.5. WATER AND ENERGY SUPPLY

WATER SUPPLY

Water is an indispensable resource for the survival of life on earth. Every movement of living things, either from one place to another or growth in a specific area is attached to the availability of water. The value (price) given for water is not according to its usefulness for its presence everywhere & full year flow. The available underground water is the great future potential of development. Though there is hardly available studied data in hand at moment, there could be a great potential of underground water in the district.

The available under ground water is the great future potential in water resource of the Gibe river. This river is expected to provide the irrigation scheme development at large. There are also other rivers that drain the whole year with none modern scale irrigation practice. The source of water for home utilization is mainly from spring for rural & urban dwellers. Both spring & well are the source of drinking & other purposeful source for rural community.

The sources of drinking water according to their importance in the district for urban areas are tap water, spring, river, well, and pond, whereas the rank according to the importance of sources of drinking water for rural areas in the district are spring, river, well, tap water and pond.

ENERGY SUPPLY

The sources of domestic energy supply according to their importance in the district for urban areas are firewood, charcoal, crop residue, electricity, kerosene and dung, whereas the rank according to the importance of sources of domestic energy supply for rural areas in the district are firewood, dung, crop residue, kerosene and charcoal. About four town of Gobu Sayo districts (Anno, Kejo, Alemi Sayo and Ago Laften) and three town of Bako Tibe (Bako, Tibe and Sheboka) have an access to a twenty four hour electric power as data of 2005 and 2008 respectively for both districts.

3.2.3.6. EDUCATION

Education is a base for the development of human society. It provides strength & resilience to people to respond to changing situations & enables them to cause & contribute to societal development through development of their attitudes, values, capabilities, both of knowledge & skills. A healthy & educated population is crucial for economic & social advancement. Education is, therefore an essential investment in people & as such a pre-requisite for equitable & sustainable development.

It is obvious that literate people are more productive than illiterate ones. An educated family has access to a broad range of opportunities, educated farmers are more receptive to new ideas & technology, and educated children & they are also open to the general

trends in education. Therefore, there is no doubt that the socio-economy of the society would be more meaningful if everybody gets access to primary education.

Kindergarten programs emphasize creative play, social interaction, and natural expression. They also teach social skills and provide children with an academic foundation for first grade. Kindergarten students are typically four or five years of age. In class, they are introduced to the alphabet, numbers, and colors; they study their bodies, their families, and their communities; they listen to stories read aloud; they make art projects; they participate in skits and dramatic productions; and they learn about holidays, plants, animals, and other topics in science and social studies. Some kindergartens also teach introductory reading and mathematical skills. Kindergartens strive to offer children a foundation for the development of social skills, self-confidence, motivation, and cognition (the process of knowing). One Kindergarten under private ownership provides service in Anno town by the year 2004 and 2005 E.C. The number of government primary school by the year 2004 E.C is 21 of which 11 were first cycle and 10 were second cycle. By the year 2005 E.C there is 1 senior secondary school and 1 preparatory.

Table 3.2-13 Number of schools and classrooms under government holding by the year 2004 E.C and 2005 E.C

No	Type of schools	Number of schools and classrooms under government holding			
		2004 E.C		2005 E.C	
		School	Room	School	Room
1	Primary 1 st cycle	11	109	11	123
2	Primary 2 nd cycle	10	77	10	68
3	Senior secondary (9-10)	1	16	1	15
4	Technical/vocational				
5	Preparatory(11-12)	1	6	1	6
	TOTAL	23	208	23	212

Source: Gobbu Sayyo Education Office

Table 3.2-14 Number of student enrolled, dropped out and detained by level of school in the year 2004 E.C and 2005 E.C.

Student enrolled, dropped out and detained by level of school

Year	Sex	Student enrolled, dropped out and detained by level of school																		
		Primary school									Senior secondary (9-10)			Technical (vocational)			Preparatory (11-12)			
		First cycle			Second cycle															
	Total	Enrolled	Dropped out	detained	Total	Enrolled	Dropped out	detained	Total	Enrolled	Dropped	detained	Total	Enrolled	Dropped	detained	Total	Enrolled	Dropped	detained
2004 E.C	M	3401	119	3282	1878	136	1742	520					200							
	F	3386	145	3241	1974	127	1847	452					179							
	T	6787	264	6523	3852	263	3589	972					379							
2005 E.C	M	3615			1772			410					152							
	F	3618			1668			352					108							
	T	7233			3440			762					260							

Source: Gobbu Sayyo Education Office

Table 3.2-15 Number of students sat for grade 10 national exams (EGSCE), passed and failed and those sat for university entrance, promoted for degrees and failed by sex and year.

Year	Number of students sat for grade 10 national exam (EGSCE), passed and failed									Number of students sat for university entrance, promoted for degrees and failed								
	Candidate			Passed			Failed			Passed			Candidate			Passed		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
2004 E.C	192	128	320	42	50	92	150	78	228	102	94	196	66	32	98	36	62	98
2005 E.C	153	154	307	35	62	97	118	2	210	54	47	101	66	32	98	36	62	98

Source: Gobbu Sayyo Education Office

Table 3.2-16 Number of teachers by level of schools (1-4), (5-8) and (9-10), vocational, Preparatory, sex, level of education and ownership.

No	Level of school	Level of education	Number of teachers under government ownership					
			2004 E.C			2005 E.C		
			M	F	T	M	F	T
1	Primary 1 st cycle(1-4)	TTI	20	11	31	15	7	22
		Diploma	11	12	23	27	17	44
2	Primary 2 nd cycle (5-8)	TTI	27	22	49	19	13	32
		Diploma	88	46	133	85	53	138

No	Level of school	Level of education	Number of teachers under government ownership					
			2004 E.C			2005 E.C		
			M	F	T	M	F	T
	“ “ “ (5-8)	BA	12	3	15			
3	Senior secondary school (9-10)	MA/MSC						
		BA/BSC	25	3	28	25	3	28
		Diploma	4	1	5	1		1
		TTI						
4	Preparatory	MA/MSc	2	-	2	1		1
		BA	11	2	13	14	1	15
		Diploma				1		1
		TTI						

Source: Gobbu Sayyo Education Office

3.2.3.7. HEALTH INSTITUTIONS

Among all needs to be available a healthy society, being well and free from any illness, is of great important for development. All activities whether economic or social, depend on the physical condition (mental, behavioral, internal body, external body) of human being. Farmers perform farming activity if they have good health in farming season, trade, teaching, learning, & all other similar activities can be under taken if health care is properly kept.

A health facility in the district indicates that there are two health center and 8 health posts under government ownership providing health services for the community in 2005E.C. There are also one rural drug venders and ten clinics under private holding by the year 2005 E.C. Health professionals exist in Gobbu Sayyo district by 2005 E.C were 18 government nurses, five health officers, three lab technicians, 1 health assistant, two sanitarians, 21 community health agents operating in health institutions by the year 2005 E.C.

Table 3.2-17 Number of health technicians in the district under government, private and nongovernmental organizations ownership by the year 2004 and 2005 E.C

No	Health technicians	Number of health technicians by the year 2004 and 2005 E.C					
		Government		Private		Non-Government	
		2004 E.C	2005 E.C	2004 E.C	2005E.C	2004E.C	2005 E.C
1	Doctors				18		
2	Nurses	18	20				
3	Health assistants						

No	Health technicians	Number of health technicians by the year 2004 and 2005 E.C					
		Government		Private		Non-Government	
		2004 E.C	2005 E.C	2004 E.C	2005E.C	2004E.C	2005 E.C
4	Health officers	5	5				
5	Laboratory technicians	3	4				
6	X-ray technicians						
7	Sanitarians	2	2				
8	Community health agents	16	21				
9	Pharmacists	2	3				

Source: Gobbu Sayyo Health Office

Human Disease is any harmful change that interferes with the normal appearance, structure, or function of the body or any of its parts. The most challenging diseases (the ten top diseases) in the district are as malaria, intestinal parasite, rheumatism, gastritis, respiratory tract infections, Skin disease and diarrheal diseases, fighting cases, acute febrile diseases other than malaria, eye & ear infections and sexual transmitted infections.

In the other case it is possible to understand from the following table that the health coverage in the district was found on a good position in the year under investigation. In general this trend shows a better health attention in the district was exists.

Table 3.2-18 Health coverage of the district

Name of the district	Districts health coverage (%)	
	2004 E.C	2005 E.C
Gobu Seyo	100	100

Source: Gobbu Sayyo Health Office

The major health problems of the district are high communicable diseases and lack of transportation at district health office.

Table 3.2-19 Child health index, maternal health index, Disease index

No.	Child health index	Reviewed period	
		2004E.C	2005E.C
1	Child health index		
1.1	Infant mortality ratio		
1.2	Child mortality ratio	0.1	
1.3	Coverage EPI under 5	80%	98%

No.	Child health index	Reviewed period	
		2004E.C	2005E.C
1.4	Proportion of children vaccinated for measles from 9 months to 12 months	73%	72%
1.5	Proportion of malnourished children 6 -59 months	0.35	0.3
2	Maternal health index		
2.1	Maternal mortality ratio	0.18	
2.2	Access to reproductive health service	0.7	10
2.3	Access to natal care	74%	100
3	Disease index		
3.1	Malaria	5270	
	➤ Prevalence	5270	7.5
	➤ Mortality		
	➤ Morbidity	5270	
3.2	HIV/AIDS		
	➤ Prevalence	2.4	0.9
	➤ Mortality	1	0.8
	➤ Morbidity	12	0.9

Source: Gobbu Sayyo Health Office

According to the data obtained from Gobbu Sayyo Health Office the number of children vaccinated during the year 2005 E.C were 98%. In this district the major child health related problems in the district were most of malaria, pneumonia, and diarrheal diseases.

3.2.3.8. WOMEN AND CHILDREN SOCIO-ECONOMIC INDICATOR

WOMEN ISSUE INDICATORS

Reducing maternal, infant and child morbidity and mortality rates as well as promoting the level of general welfare of the population is one of the national population policy goals and targets. Healthy mothers are likely to look after the health of infants and a child, thus promoting the health of mothers is imperative to promoting child-care and reducing child mortality. Reducing maternal mortality ratio by two-thirds, between 1990 and 2015, is proposed in the MDGs.

Table 3.2-20 Maternal mortality ratio

<i>Year</i>	Nºof mothers died (A)	Total Nº of mothers (B)	(A/B/*1,000)
<i>2004 E.C</i>	0	324	0
<i>2005E.C</i>	0	428	0

Source: Gobu Sayo District Health Office

Number of mothers died during 2004 EC was 13 and this was increased to 19 in the year 2005 E.C in Gobu Sayo district. The top causes of maternal death are hemorrhages, obstructed labor, and unsafe abortion. During last two years certain strategies have been undertaken in prevention of mother to child transmission of HIV/AIDS. PMTCT prophylaxis service delivery, counseling of mothers, awareness creation on prevention of mother to child transmission and condom promotion were among the measures taken.

Table 3.2-21 Number woman who have been tested to HIV/AIDS and percentage of maternal mortality attributable to AIDS

<i>Year</i>	Number woman who have been tested to HIV/AIDS	The percentage of maternal mortality attributable to AIDS	The percentage of under-five mortality attributed to AIDS
<i>2004E.C</i>	4,800		
<i>2005 E.C</i>	5,700		

Source: Gobu Sayo District Health Office

In Gobu Sayo district the number of women who have been tested for HIV/AIDS was increased from 2818 in 2004E.C to 4116 in 2005 E.C. this shows that awareness creation on HIV has been done.

Family planning is choosing the number of children in a family and the length of time between their births. This can be done through different methods. Birth control or contraception is deliberate prevention of pregnancy using any of several methods. Birth control prevents a female sex cell (egg) from being fertilized by a male sex cell (sperm) and implanting in the uterus. In this district the numbers of women who have taken family planning services have been increased during last two years.

Table 3.2-22 Number of women used family planning service (contraceptive prevalence)

Year	Number of women used family planning service				
	Traditional method	Modern method			
		Pills	Norplant	IUCD	Injectable
2004 E.C	0	817	1014	115	1,401
2005 E.C	0	709	160	63	1,010

Source: Gobu Sayo District Health Office

From the total of women in the district the number of women who gave birth before 18 years of age was increased from 2 in 2004 E.C to 4 in 2005 E.C.

Table 3.2-23 Number and percentage of women who gave birth before age 18

year	Total number of women in the district	number of women who gave birth before age 18	percentage of women who gave birth before age 18
2004 E.C	10,134	4	0.03
2005 E.C	25,225		

Source: Gobu Sayo District Health Office

The number of women used ANC (Antenatal Care) service was decreased during last two years while the number of women used PNC (Postnatal Care) was increased from 511 in 2005 E.C to 574 2006 E.C.

Table 3.2-24 Number of women access to save delivery (mid wife) for non- complicated delivery

Year	Number of women's used ANC (antenatal care) services	Number of women's used PNC (postnatal care) services
2004 E.C	1000	574
2005 E.C	1544	694

Source: Gobu Sayo District Health Office

Water is necessary for every activity of the society. The goal of health care facilities cannot be fulfilled without pure water supply. There were two health centers with improved water supply in Gobu Sayo district by 2005 E.C. But two health centers and eight clinics were also supplied with improved sanitation facilities.

Women empowerment is one of the current issues of the government of Ethiopia. In order to fulfill the government plan in empowering women in the socio economic life of the society a rewarding activity was done during last two years. There were 8 women who were a member of woreda cabinet during last two years.

Women are empowered at different levels in order to make them obtain basic needs and opportunities. Enhancing women competitiveness economically, affording educational opportunities for them and encouraging women in political participation were among activities implemented during last two years.

CHILDREN ISSUE INDICATORS

According to the following table neonatal mortality rate increased during last two years. Death of children under 5 years old was 4 in 2004 E.C. The coverage of EPI less than 5 years of age was increased to 1,000 in 2005 E.C from 1,544 in 2005 E.C.

In Gobu Sayo district infant mortality rate was increased due to asphyxia because of immediate neonatal care, pneumonia, diarrhea, malnutrition and neonatal sepsis.

There were 1 kindergarten, 9 primary schools and one secondary school which were supplied with improved water by the year 2005 E.C. There were 1 kindergarten, 13 primary schools, one preparatory school and three secondary schools which were supplied with improved sanitation by the year 2005 E.C.

3.2.3.9. SOCIAL SECURITY

Social Security is public programs designed to provide income and services to individuals in the event of retirement, sickness, disability, death, or unemployment. The number of vocational and technical persons in the district registered unemployed persons in the year 2005 E.C was about 62 females and 200 males. There were 6 males and 2 females registered employed persons on permanent basis under nongovernmental organization by the year 2005 E.C

Crime is commission of an act or act of omission that violates the law and is punishable by the state. The number of cases lodged during 2005 E.C is about 1756 of which 1584 were decided and 172 were pended.

3.2.3.10. FINANCE

According to the data obtained from district in land Revenue Office the larger share of revenue was from direct tax revenue and non-tax revenue and the total revenue of the district is increased to 3,736,876.73 birr in the year 2005 E.C from 3,653,757 birr in 2004

E.C. There is one saving and credit association under government ownership. Total expenditures of the district were increased to 23,283,808.01 birr in the year 2005 E.C from 83,119.73birr in the year 2004 E.C.

Table 3.2-25 Total Expenditure or budget (capital and recurrent) of the district

Year	Types of expenditure	Expenditures for General services	Expenditures for Economic services	Expenditures for Social services	Various expenditures	Total Expenditures
2004 E.C	Salary	4,628,878.20	3,297,027.40	8,706,364.85		16,632,270.45
	Operating Expense	826,410.33	20,753.15	509,180.20		1,356,343.68
	Capital	-	864,147.45	465,523.03		1,329,670.48
	Total	5,455,288.53	4,181,928	9,681,068.08		19,318,284.61
2005 E.C	Salary	4820825.11	4008166.14	10067479.63		18896470.88
	Operating Expense	1459114.18	1268324.19	889079.59		3616517.96
	Capital	-	662,884.4	107,934.47		770,819.7
	Total	6279939.29	5939374.73	11064493.69		23283808.54

Source: *Gobbu Sayyo Finance and Economic Development Office*

3.2.3.11. TRADE, TOURISM AND SPORT

TRADE

This district produces all cereal crops, Pulses, oil seeds, vegetables, root crops, spices and others. Farmers produce their crops for home consumption and for sale in order to cover their expenses such as fertilizer cost, cloths purchase, school fees and learning materials for their children, land use fee, and others. For all these expenses, farmers obtain money from the sale of crops produced and livestock's rearing.

Mostly the local cash crop that farmers produce is Niger seed, Linseed and rapeseed. This oil seeds are supplied to the central market and to the local oil producing mills. Large amount of hides & skins also supplied to the central market. This district also supply relatively large amount of food crops to the neighboring districts.

TOURISM

Tourism is an industry that brings about both direct and indirect economic and social benefits, and consequently supports other economic sectors. There were three cultural and historical tourist attraction sites that are well known religiously in the district.

SPORT

Types of sport activities practiced in the district were table tennis, football, volleyball and badminton and facilities satisfied for these activities are sport uniform, ball, shoes, pomp, net, tennis, field, and training hall.

3.2.3.12. DEVELOPMENT ACTIVITIES

In order to improve the social and economic wellbeing of the district the existence of development activities were very important. Project is task or planned program of work that requires a large amount of time, effort, and planning to complete. The major ongoing government project exist in the district were rural road, spring development, expansion of primary school and construction of youth recreational center.

Table 3.2-26 Number of operational private investment projects by types of sector including their total employees and capital

No	Name of operational private investment projects	Number of operational private investment projects	Type of sector	Total number of employees	Total capital (Br)
1	Ano Agro Industry	1	Agriculture	718	11,501,293.99
2	Dr. Geletu Bijjiga	1	"	40	647,463
3	Daraje Regasa	1	"	1	101,635
4	Enchalo Befikadu	1	"	3	827,400
5	Taye Dugasa	1	"	44	1,979,643
<i>TOTAL</i>		5		806	11,536,855.40

Source: *Gobbu Sayyo Investment Office*

The major problems of ongoing governmental projects and programs are lack of skilled man power to complete the project according to the schedule, lack of sufficient money, the increment of material cost and lack of budget to complete the project, and lack quality of the project under construction. There is also problem with NGO's projects. Among these problems lack of regular monitoring and evaluation by project owners can be mentioned.

3.2.3.13. PROBLEM AND POTENTIALITIES

PROBLEMS

The district has problems in the side of economic, social and environmental conditions that affect people. Shortage of farm land, lack of health institutions, lack of banks and credit and

saving, lack of transportation and communications, lack of Electric power and there is unknown problem and insufficient supply of agricultural inputs are among the problems in the district. Deforestation, malaria, farm land degradation, serious pest problem, lack of health institutions & professionals, insufficient veterinary services, lack of educational facilities, and Logistical service among the problems with the district. But the severity of these problems is not recorded as the experts of the district forwarded for us.

POTENTIALITIES

Regarding the potentiality of the district, there are big promising rivers like Gibe and others flowing all the year without any hindrance and plain land that can be used for large-scale farming are available. Habri mineral water, book cave, Arsa Abba Tune and Laga Ongobo waterfalls were among the natural tourist attraction sites. Gimbi Rabbi is among the cultural and historical tourist attraction sites exist in the district.

3.3. SOCIO-ECONOMIC PROFILE OF BARC FOCUSED ZONES (EAST WOLLEGA, H.G.WOLLEGA AND WEST SHEWA)

3.3.1. GENERAL PROFILE OF BARC FOCUSED ZONES

East Wollega, Horro Guduru Wollega and West Shewa zones are major target zones that BARC focused on.

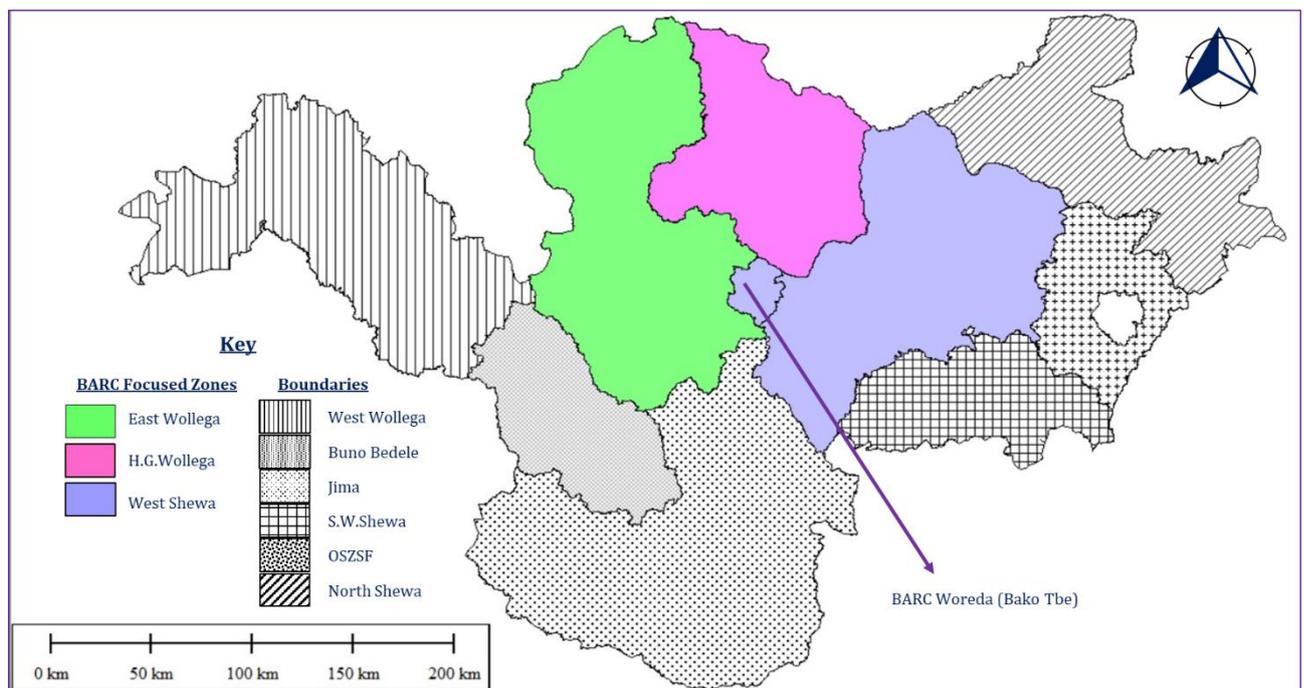


Figure 3-5 BARC Focused Zones

Source: Computed from Global Mapper V.18

3.3.1.1. DISTANCE OF BARC FOCUSED ZONES FROM ADDIS ABABA AND BARC IN KM

Table 3.3-1 Distance of BARC Focused Zones

N ^o	Name of Zone	Name of Town	From Finfinne	From BARC
1	East Wollega	Nekemte	331	109
2	H.G.Wollega	Shanbu	315	68
3	West Shewa	Ambo	114	133

From the BARC focused zones Shanbu town is the nearest town as compared to the others whereas, Ambo is 133 km far away from the research center.

3.3.1.2. CLIMATIC CONDITION OF BARC FOCUSED ZONES

Table 3.3-2 Climatic Condition of BARC Focused Zones

Nº	Name of Zone	Highland	Midland	Lowland
1	East Wollega	20.50%	50.90%	28.60%
2	H.G.Wollega	7.75%	54.75%	37.50%
3	West Shewa	27%	56%	17%

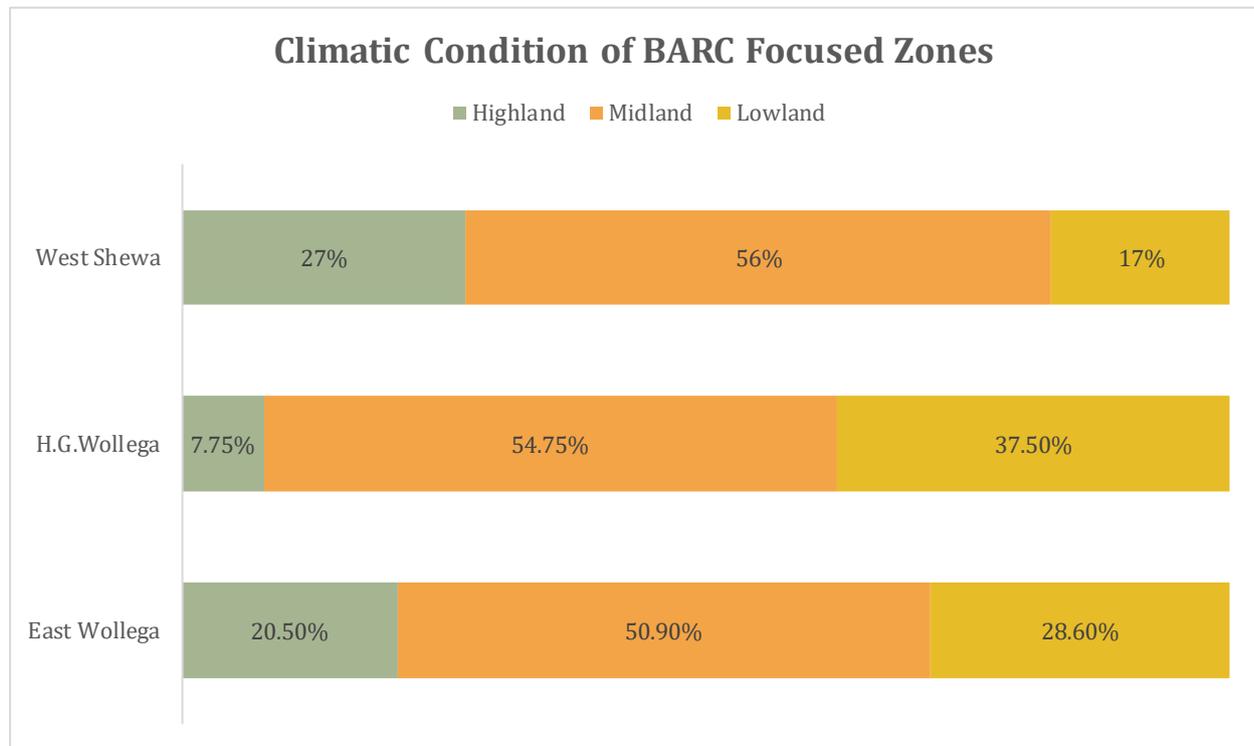


Figure 3-6 Climatic Condition of BARC Focused Zones

The average highland, midland and lowland of three zones comprises about 18.4%, 53.8% and 27.7% respectively. This shows that most of the climatic condition existing in these zones is much favorable to exercise agricultural activities.

3.3.1.3. ANNUAL TEMPERATURE AND ANNUAL RAINFALL RANGES OF BARC FOCUSED ZONES

Table 3.3-3 Temperature and Rainfall

Nº	Name of Zone	Low Temperature	High Temperature	Low Rainfall	High Rainfall
1	East Wollega	14°C	25°C	1000	2400
2	H.G.Wollega	12°C	32°C	1200	2700
3	West Shewa	10°C	25°C	812	1699

Based on the above table west Shewa zone have low average annual temperature and get low average annual rainfall range than East Wollega and H.G.Wollega.

3.3.1.4. MAJOR RIVER-BASIN/DRAINAGE OF BARC FOCUSED ZONES

Table 3.3-4 Major Basins

Nº	Name of Zone	Name of Major Basins		
1	East Wollega	Abay	Didesa	
2	H.G.Wollega	Abay	Didesa	
3	West Shewa	Abay	Awash	Gibe

Abay river basin located in all three BARC focused zones; Didesa river basin located in East Wollega and H.G.Wollega. West Shewa zone have Awash and Gibe river basin. Other than these major river basins there are more than 21 rivers in H.G.Wollega, more than 6 rivers in East Wollega and so many rivers in West Shewa zones.

3.3.1.5. MAN-MADE LAKE FOUND IN BARC FOCUSED ZONES

Table 3.3-5 Man-made Lakes

Nº	East Wollega	H.G.Wollega	West Shewa
1	Sorga	Finca'a Amarte	Dendi
2	Uke	Nashe	Obora
3			Birate

West Shewa zone have three man-made lakes Dendi, Obora and Birate located in different worda's of the zone. Both East Wollega and H.G.Wollega have two man-made lakes each. The usage of these man-made lakes are for fishery, hydro-electric power, irrigation and sugar cane plantation for sugar factory purpose.

3.3.1.6. TYPES OF SOIL IN BARC FOCUSED ZONES

Table 3.3-6 Types of Soil

Nº	East Wollega	H.G.Wollega	West Shewa
1	Acrisol	Loam Soil	Chromic and Pelvic Vertisol
2	Cambisol	Kiticha	Chromic and Arthicluisol
3	Nitosol	Sandy Soil	Nitosol
4	Vertisol	Red Soil	Haphlic and Luvic Phaeozem
5	Rendizenas	Black Soil	Rendizenas

Nº	East Wollega	H.G.Wollega	West Shewa
6	Phaeozem	Aerosol	
7	Cambic Arenosol	Cambic Arenosol	
8		Haplic Phaeozem	

There are different types of soils found in three zones. Acrisols, cambisols, nitosols, vertisols, rendizenas, phaeozems and cambic aerosols found in **East Wollega** zone. The distribution of each soil in the districts of the zone can be put as follows. Central parts of limu, small portions of Gidda Ayyana and Kiremu districts, Northern Sibusire, small portions of Guto Gidda and Wayyu Tuka districts in the zone are covered by Orthic Acrisols. Northern Portion of Ebantu & Gidda Ayyana and Western and Central portion of Limmu are covered by cambisols. Eutric. Nitosols occur in Eastern Gudeyya Bila & Gobbu Sayyo districts. Dystric Nitosols occur almost throughout the zone. These soils have rather good potential for agriculture.

There are different types of soils found in H.G.Wollega zone. Namely: Loam Soil, Kiticha, Sand Soil, Red soil, Black Soil, and Aerosols. Cambic Arenosols occurs in Abay Chomen, Guduru, Amuru and Jarte Jardega districts. Haplic Phaeozems occur in Amuru, Jarte Jardega, Abay Chomen, Jima Geneti, Horo and Guduru districts.

According to the socio economic profile of 2007, "There were four major soil units in **west shewa** zone that includes

- chromic and pelvic Vertisols 4974.2km²
- chromic and arthicluvisols 1530.5km²
- district nito sols 4974.2km²,
- And haplic and luvic phaeozem 374.3km².

Vertisols cover the largest part of the West Shewa zone's total area (72.3%). The vast area of the Dano, Dendi, Ade'y Vertisols. A vertisols soil is too difficult agricultural and preparations do have a difficult task. It is cracks during dry season and has water logged and expanding character during wet season. Those extreme cases contributed for limiting agricultural potentialities of the soil but it is very fertile soils for crop production. While

liaisons do confine to central part of Cheliya Ambo & Ejere and Welmera districts. Most liaisons have good agricultural potentialities.

Rendzinas, Haply and Logic pharoses soil is limited to the northern part of the zone districts namely Gindeberet, Ade'a Berga, Jeldu and Meta Robi. It has good agricultural potentialities.

District Nito sols are found in the western part of Gindeberet, Mida-kegn and Bako Tibe districts. "The major types of soils of the zone in colour wise are found to be Black, Red and mixed. Although, it requires in detail research to identify which type of soil is suitable for type of crops, all types of soils are suitable for agriculture".

3.3.1.7. RELIEF OF BARC FOCUSED ZONES

East Wollega Zone is mainly of low plateau with some isolated ranges of 1,200 to 2,960 meters above sea level such as Jima Arjo district. However, there are high peaks of over 2,960 meters above sea level, Ifata Mountain found in Wayyu Tuka district.

Horo Guduru Welega zone is mainly of low plateau with some isolated ranges of 2,000-2,500m such as Jima Rare-Jima Ganati. However there are high peaks of over 3,000m (Guddane (in Jima Ganati) mountain 3230m) and e.t.c

There are many mountains in our zone to mention some of the major ones mount Weilo in Midakeny, Mount Haboro in Jeldu districts are the lowest and mount Dendi is the highest in Dendi district. The range of heights of these mountains found to be between 200m and 3,288m respectively.

3.3.1.8. MAJOR VEGETATION /NATURAL FOREST/ EXIST IN BARC FOCUSED ZONES

Table 3.3-7 Natural Resources

Nº	East Wollega	Hectare	H.G.Wollega	Hectare	West Shewa	Hectare
1	Chato Forest	NA	Cato Forest	NA	Jibat Forest	11,058
2	Sengi Forest	NA	Gango forest	NA	Chilimo Forest	7,834
3	Dengeb Forest	49,056	Joka Forest	NA	Gura Forest	5,576

Nº	East Wollega	Hectare	H.G.Wollega	Hectare	West Shewa	Hectare
4	Konchi Forest	1,176	Harbu sololo forest	NA		
5	Komto Forest	NA	lome forest	NA		
6	Waja Forest	NA	Tulu lafto forest	NA		
7	Tsige Forest	9516	Bigit forest	NA		

NB: - NA = Data not available

The natural vegetation of the area mainly categorized under forest, woodland and shrubs and bushes According to **East Wollega** zonal agricultural office there are seven major forest areas in the zone Chato, Sengi, Dengeb (49,056 hectare), Konchi (1,176 hectare), Komto, Waja, Tsige (9,516 hectare) and others found in the zone following the distribution of natural forest.

Horro Guduru Wollega Zone is also endowed with different types of vegetation covered with about seven natural forest (Cato, Gango, Joka, HArbu Sololo, Lome, Tulu Lafto and Bigit forests) which’s potential for the host of many endemic mammal and birds.

According to the data of **West Shewa** zonal agricultural office the known forests in the zone are Jibat forest, chilimo and Gura forest which cover 11058hectare, 7833.61hectare and 5576.37hectare of land respectively.

3.3.1.9. LAND USE PATTERN OF BARC FOCUSED ZONES IN HA

Table 3.3-8 Land Use Pattern

Nº	Land Use Type	East Wollega	H.G.Wollega	West Shewa
1	Arable Land	463,814	365,935	880,212
2	Forest Coverage	83,918	49,613	104,799
3	Woodland Coverage	25,049		
4	Shrub land Coverage	23,854	14,952	
5	Bushland Coverage	3,710		
6	Swamp Area Coverage	36,892	48,012	
7	Grassland Coverage	74,156	152,670	
8	Water Part		14165	
9	Irrigation and Crop Land		62,956	618,210
10	Urban Center		65317	

Nº	Land Use Type	East Wollega	H.G.Wollega	West Shewa
11	Degraded		17,778	
12	Total	7 11,393	791,398	1,603,221

The term land use refers to the ways that people use land and the natural resources it provides. It is the best allocation of land for its best alternative uses. Land use potential is necessary to select the land characteristics needed for any production. Some of the major factors that determine the potentiality of the land are temperature, length of growing period, moisture availability, flood hazard, soil degradation, toxicity, rooting condition, etc.

Arable land is a land that is ideal and economical for the cultivation of crops. Arable land is an area with more than 90 days of dependable growing period, soil depth of more than 25 cm and surface stoniness of less than 50 to 90 %. Arable is pertaining to tillable land that is suitable for tillage and crop production.

3.3.1.10. MAJOR WILD LIFE EXIST IN BARC FOCUSED ZONES

Table 3.3-9 Wild Life

Nº	East Wollega	H.G.Wollega	West Shewa		
1	Hyena	Hyena	Spotted Hyena	Black Pig	Common Duiker
2	Monkey	Monkey	Monkey	White Pig	Buck Angus Baboon
3	Pig	Pig	Bush Pig	Wild Pig	Vevier Monkey
4	Ape	Ape	Bush Dunker	Leopard	Utu
5	Fox	Fox	Hares Fox	African Civet	Boohoo
6	Lion	Lion	Lion	Reedbuck	
7	Tiger	Tiger	Tiger	Hare Bush	
8	Civet	Civet	Black Backed Jackal	Common Jack	
9	Baboon	Baboon	Baboon	Aardvarks	
10	Buffalo	Buffalo	Warthog	Abyssinian Black	
11	Others	hippopotamus	Bushbuck	Squirrel	
12		Different types of Birds	Hedgehog	Porcupines	

Wildlife is found in the zones following the distribution of natural forest. Based on the profile of climate and relief in the zones provided a wide variety of wild animals are located in the

zones. But, now a days the number of these wild animals is decreasing due to increase in human population, deforestation, shifting of forest land to cropland, absence of wild life conservation and uncontrolled or illegal hunting.

Wildlife includes wild animals and wild birds. Wild animals feature are directly related to natural vegetation or forests as it known throughout the regional state of oromia, forest in these zones are also decreasing in size and content; because of these many wild life species being exposed to extinction.

Wild life species that existed in the past have been greatly reduced in number and type as a result of illegal hunting. This hunting of wild animals emanates front two roots. One is a social hunter of Lion, Leopard, Wolf, etc., are given superior social status (prestige of fame) in the society. But now this is reduced to some extent. The other is economic; some of the wild animals are hunted because they harm domestic animals, crops, and sometimes some animals are also hunted for the sake of meat. As a result only limited wild life like bush pig, Lion, monkey, warthog, Leopard, Hypothalamus, spotted hyena, Bush buck, Bush darker, black Backed jackal Civet and etc. are found.

Even though, there is absence of reserved area for wild life conservation, mainly these animals live where high forests and bushes & shrubs are found in the zones.

Therefore, these variety of wildlife animals found in these zones are opportunities which demands conservation and development for the socio economic improvement of the people. Besides this, it is potential for tourist attraction as the zone is nearer the capital city of the region.

3.3.2. POPULATION AND DEMOGRAPHIC CHARACTERISTICS

3.3.2.1. POPULATION SIZE

Table 3.3-10 Population Size

Year (E.C)	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
<i>E/Wollega</i>									
2005 E.C	634,234	624,951	1,259,185	132,404	126,819	259,223	766,638	751,770	1,518,408

Year (E.C)	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
2006 E.C	652,637	644,021	1,296,658	139,160	134,079	273,239	791,797	778,100	1,569,897
<i>H.G.Wollega</i>									
2003 E.C	273,279	273,661	546,940	37,401	35,881	73,282	310,680	309,542	620,222
2004 E.C	280,384	280,776	561,160	38,935	37,352	76,287	319,319	318,128	637,447
<i>W/Shewa</i>									
2007 E.C	1,069,891	1,077,830	2,147,721	153,671	146,879	300,550	1,223,562	1,224,709	2,448,271
2008 E.C	1,090,922	1,098,540	2,189,462	168,665	161,372	330,037	1,259,587	1,259,912	2,519,499

Among these three zones H.G.Wollega zone have low population size than the rest zones. That means H.G.Wollega zone population size in 2003 E.C is 40% of East Wollega's population in 2005 E.C and 25% of the population size of West Shewa in 2007 E.C. East wollegas's population size in 2005 E.C also comprises about 62% of total population sizes of West Shewa Zone in 2007 E.C.

According to the above table about 88% of H.G.Wollega and West Shewa zone population lives in the rural areas. Whereas 83% of the population of East Wollega zone lives in the rural area which is 5% less than that of H.G.Wollega and West Shewa. By dividing the total population of each zones (East Wollega, H.G.Wollega and West Shewa) by their land holding size¹ on average about 1.1, 0.8 and 1.7 person are living on each hectare of land respectively. From this we can simply observe that there is sparsely populated in H.G.Wollega whereas densely populated in West Shewa zones regardless of the land features of the zones.

3.3.2.2. POPULATION PROJECTION

Ethiopia has a population policy which, largely, remains unimplemented. The government currently in power formulated a policy guide for the country in 1993 to bring population growth rates in line with other policy targets and achieve socio economic advancement.

Ethiopia's Central Statistical Authority (CSA) has been issuing population numbers annually by age and administrative divisions beginning in the 1960s when two national

¹ Land holding size of East Wollega 1,410,615 ha, H.G.Wollega 786,964 ha, and West Shewa 1,434,929 ha

sample surveys were conducted – one urban, and one rural. Current estimates (including one for the year 2008) are a continuation of annual projected estimates published by the statistical office on the basis of the 1994 Population and Housing Census. CSA's reports give projections all the way to the year 2030. The projections are based on the assumption of moderate fertility regime and linear growth.

Applying population projection in this study helps the research center to plan and achieve their research with the respect to the growing population which in turn increase the demand for food.

3.3.2.3. GENDER ISSUES

Gender issues are one of the crosscutting issues that should be mainstreamed in all developmental and community-related sectors and activities. Although the term “gender” refers equally to both male and female the focus herein is on female perspectives and on an assessment of the part they play in the division of labor as well as in decision making at different levels, including community and households. Women in the area are the backbone of the family in terms of performing domestic duties such as cooking, housekeeping carrying for children, the elderly and the sick, fetching water and fire wood, milking cows and purchasing items for home consumption like salt, coffee and other provisions. In addition to the above tasks, which society has decreed is solely their duty; they also actively participate in outdoor field work such as planting/sowing, cultivation, weeding harvesting and threshing, as well as herding of all family livestock. Thus, their role is triple i.e. productive works, reproductive work and community services or management role.

The right of women is recognized at national and regional levels of ONRS. On the basis of the regional proclamation number of 130/2007, women have equal rights with men to possess, use and administer the rural land. Husband and wife are holding and common land holding, shall be given a joint certificate on their holdings.

3.3.3. ACCESS TO SOCIAL SERVICES

3.3.3.1. EDUCATION

Education is a base for the development of human society. It provides strength & resilience to people in order to respond to changing situations & enables them to cause & contribute to societal development through development of their attitudes, values, capabilities, knowledge & skills. A healthy & educated people is crucial for economic & social advancement. Education is, therefore an essential investment in people and as such a pre-requisite for equitable & sustainable development.

It is obvious that literate people are more productive than illiterate ones. An educated family has access to a broad range of opportunities, educated farmers are more receptive to new ideas and technology. Therefore, there is no doubt that the socio-economy of the society would be more meaningful if everybody gets access to primary education. The availability of education in project implementing zones contribute for the good performance or application of the newly researched crops.

It is obvious that literate people are more productive than illiterate ones. An educated family has access to broad range of opportunities. For instance, educated farmers are more capable of increasing their productivities and are more receptive to new ideas & technology than uneducated farmer and also educated women tends to have fewer & better educated children & they are also open to the general trends in education.

The number of school giving services in East Wollega Zone in the year 2005 and 2006 were 601 and 621 respectively and having 5,704 and 5,913 classrooms respectively. The number of school for West Shewa in the year 2007 and 2008 were 872 and 903. For H.G.Wollega the data wasn't available.

Table 3.3-11 East Wollega Zone Students Gross Enrollment

<i>Grade</i>	2005 E.C			2006 E.C		
	Boys	Girls	Total	Boys	Girls	Total
<i>Grade 1-4</i>	79,436	72,527	151,963	77,567	80,914	158,481
<i>Grade 5-8</i>	50,284	49,504	99,788	51,652	53,491	105,143
<i>Grade 9-10</i>	17,011	16,641	33,652	21,543	20,636	42,179
<i>Grade 11-12</i>	8,550	8,496	17,046	5,489	5,696	11,185
<i>Total</i>	155,281	147,168	302,449	156,251	160,737	316,988

Table 3.3-12 H.G.Wollega Zone Students Gross Enrollment

<i>Grade</i>	2003 E.C			2004 E.C		
	Boys	Girls	Total	Boys	Girls	Total
<i>Grade 1-4</i>	37,122	40,409	77,531	40,718	40,004	80,722
<i>Grade 5-8</i>	27,190	27,962	55,152	27,636	27,646	55,282
<i>Grade 9-10</i>	11,258	8,961	20,219	11,004	10,001	21,005
<i>Grade 11-12</i>	3,172	2,562	5,734	3,547	2,809	6,356
<i>Total</i>	78,742	79,894	158,636	82,905	80,460	163,365

N.B: Students enrollments only captured the government education schools

Table 3.3-13 West Shewa Zone Students Gross Enrollment

<i>Grade</i>	2007 E.C			2008 E.C		
	Boys	Girls	Total	Boys	Girls	Total
<i>Grade 1-4</i>	171,630	159,062	330,692	182,497	166,455	348,952
<i>Grade 5-8</i>	80,669	74,764	155,433	82,297	75,154	157,451
<i>Grade 9-10</i>	28,108	24,414	52,522	27,146	22,765	49,911
<i>Grade 11-12</i>	7,462	5,543	13,005	7,948	6,017	13,965
<i>Total</i>	287,869	263,783	551,652	299,888	270,391	570,279

The total dropout rate in H.G.Wollega zone in the year 2003 and 2004 were 3.23 (Boys 3.911 and Girls 2.56) and 3.18 (Boys 3.31 and Girls 3.04) respectively showing that a detrimental rate only the rate of girls in 2004. The total dropout rate in West Shewa zone in the year 2007 and 2008 were 10.7 (Boys 10.78 and Girls 10.56) and 21.03 (Boys 20.59 and Girls 21.33) respectively showing that an incremental rate which might be caused by last three years political instability. The data is not available to illustrate the student’s dropout rate of East Wollega zone.

3.3.3.2. HEALTH

Among all needs to be available a healthy society, being well and free from any illness, is of great important for development. All activities whether economic or social, depend on the physical condition (mental, behavioral, internal & external body) of human being. Farmers perform farming activity if they have good health in farming season, trade, teaching, learning, & all other similar activities can be under taken if health care is properly kept.

Table 3.3-14 Health

<i>Zones and Years</i>	Hospital		Health Center		Health post		
	Year	2005	2006	2007	2008	2011	2012
<i>East Wollega</i>	Year	2	2	59	59	309	312
	Year	2003	2004	2003	2004	2003	2004
<i>H.G.Wollega</i>	Year	1	1	46	49	180	180
	Year	2007	2008	2009	2010	2013	2014
<i>West Shewa</i>	Year	6	6	80	80	515	515

The first top ten killing diseases in the zones,

Population that gets access to health service is below the standard but the situation is better compared to the near past period (years). Types of diseases attacking population in this district are mostly by Internal parasites, URTI, Diarrhea, Rheumatic, FUO, Gastritis, Eye diseases, Malaria, Skin diseases, Teeth Gum diseases & other diseases frequently attack the community both in rural & urban but the degree of attacking is different from urban to rural & within the rural and urban dwellers.

The first top Ten killing disease of these zones are; Typhoid Fever, skin infection, Rheumatoid Arthritis, Acute Gastritis, Fighting, Malaria, URTI, Pneumonia, Intestinal parasite and ARI. Now a days, Injuries and different accidents is also taking many lives of the population.

Table 3.3-15 Health Technicians

<i>Zones and Years</i>	Doctors		Nurses		Health Officers		Sanitarians		Laboratory technicians		Pharmacy technicians		x-ray tech.		
	Year	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
<i>East Wollega</i>	Year	40	36	822	731	105	135	44	45	108	109	76	86	6	5
	Year	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
<i>H.G.Wollega</i>	Year	6	7	258	354	26	49	17	6	24	24	13	32	1	1
	Year	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
<i>West Shewa</i>	Year	27	40	718	1387	130	258	24	48	113	215	63	114	3	3

Health problems of the Zones

Shortage of pure water, Shortage Electricity, Road and sanitations problems were some of health problems in the Zone. In addition, Shortage of infrastructure facility and Shortage of health professional are some of the major constraints that affect the health sector of each zones.

3.3.3.3. WATER SUPPLY

Water is an indispensable resource for the survival of life on earth. Every movement of living things, either from one place to another or growth in a specific area is attached to the availability of water. The value (price) given for water is not according to its usefulness for its presence everywhere & full year flow. The available underground water is the great future potential of development.

Table 3.3-16 Potable water Supplied for Rural BARC Focused Population

<i>Zones and Years</i>	Total rural population		Rural population supplied with potable water		Percent of rural population supplied with potable water		
	<i>Year</i>	2005	2006	2005	2006	2005	2006
<i>East Wollega</i>		1,191,219	1,240,523	736,130	945,342	61.15	68.17
<i>Year</i>	2003	2004	2003	2004	2003	2004	
<i>H.G.Wollega</i>		544860	596803	151798	256924	27.86	43.05
<i>Year</i>	2007	2008	2007	2008	2007	2008	
<i>West Shewa</i>		2,147,722	2,189,462	1,127,554	1,228,030	52.5	56.08

H.G.Wollega zone is the least zone i.e., 27.86 and 43.05 in the year 2003 and 2004 respectively in addressing potable water for rural population as compared to the other even though it's difficult to compare these data while their years are different. But, we can clearly say that West Shewa zone who is on the slow motion in supplying potable water for rural population as the data is recent than others.

3.3.3.4. ENERGY

In rural areas, firewood, animal dung, crop residues and charcoal are major sources of domestic energy supply. Similarly; kerosene, electricity, firewood and charcoal are major sources of domestic energy supply in urban areas. Regarding electric supply, most of the districts in each Zone were supplied with it.

3.3.3.5. ASSOCIATION, INSTITUTION AND SOCIAL SERVICES

Financial Institutions: There are many financial institutions now a days providing credit services for the people. Some of them are OCSSCO, ESHET, WISDOM, etc. They provide credit from a minimum of Birr 1,000 to a maximum amount of Birr 2,000 by the first and second and from Birr 1,000 to Birr 5,000 by the third institution, respectively. They provide credit which is repayable within one year period and no collateral is requested by both.

The services of financial institutions would help the farmers so that they need to provide more loans to the beneficiary farmers through their association. Specifically, the farmers may require short term loans to fulfill their input requirements under the project case.

Research and extensions: Each zones can benefit from the output of the research activities undertaken in *Bako Agricultural Research Center*. In these zones there are many universities and research centers exist to help and solve the taboo of rural and urban population specifically living in these zones. BARC is an exemplary. Nearer to the society there are three DAs within a Kebele who have natural resource, animal science, and plant science professional backgrounds. These DAs are responsible to provide agricultural extension service. In addition to that, there is farmers’ training center where the farmers getting class-room and practical field level trainings. Development Agents are the sole source of information and advice on prevention and treatment of plant diseases and pests as well as for promotion of modern farming systems for the farmers in the Kebele. Households have frequent contacts with the Development Agents in their respective Kebeles. The implementation of the project could also be largely benefited from the availability of these facilities.

3.3.4. ECONOMIC BASE OF BARC FOCUSED ZONES

3.3.5. AGRICULTURAL SECTOR

Table 3.3-17 Agricultural Extension of BARC Focused Zone in Different Years

<i>DA and FTC</i>	East Wollega		H.G.Wollega		West Shewa	
<i>Year</i>	2005	2006	2003	2004	2007	2008

<i>DA and FTC</i>	East Wollega		H.G.Wollega		West Shewa		
	<i>Year</i>	2005	2006	2003	2004	2007	2008
<i>Number of development centers</i>		266	279	175	175	NA	NA
<i>Number of development agents (DAS)</i>		945	977	549	526	1295	1341
<i>Number of development centers having DAS</i>		NA	NA	174	175	NA	NA
<i>Number of beneficiaries (households)</i>		NA	NA	86,997	81,428	NA	NA
<i>Number of Woreda covered by the service</i>		18	18	10	10	18	18
<i>No of plots in extension package</i>		NA	NA	260,506	236,557	293,062	277,455

NB: - NA = Data not available

The role of farmers training centers and development agents is great towards ensuring food self-sufficiency of the zones. The number of development agents in each zone is depend on the number of kebele’s in each zones. Agricultural technology dissemination and modern agricultural practices have been given attention by government. In this regard, many institutions, research centers, professionals and extension agents have been playing vital roles in order to increase the quality and quantity agricultural production of the zone.

3.3.5.1. FARMING SYSTEM

Table 3.3-18 Major Crop Types Produce in BARC Focused Zones

<i>Type of crop</i>	East Wollega		Horro Guduru Wollega		West Shewa	
	2006 E.C		2004 E.C		2007/8 E.C	
	Area (in hectare)	Production (in quintal)	Area (in hectare)	Production (in quintal)	Area (in hectare)	Production (in quintal)
<i>Cereals</i>	286,936	11,534,897	177,956	5,263,396	514,347	15,088,273
<i>Teff</i>	57,428	1,234,545	47,155	691,276	156,380	3,029,665
<i>Barley</i>	12,054	305,010	15,620	320,978	71,718	1,907,765
<i>Wheat</i>	14,033	452,039	39,192	1,226,230	132,210	3,736,899
<i>Maize</i>	125,865	7,180,303	58,410	2,556,775	94,787	4,711,830
<i>Sorghum</i>	49,124	1,672,880	15,207	438,083	59,252	1,702,114
<i>Millet</i>	27,859	677,600	1,879	25,196		

<i>Type of crop</i>	East Wollega		Horro Guduru Wollega		West Shewa	
	2006 E.C		2004 E.C		2007/8 E.C	
	Area (in hectare)	Production (in quintal)	Area (in hectare)	Production (in quintal)	Area (in hectare)	Production (in quintal)
<i>Oats</i>	356	4,537	493	4,858		
<i>Rice</i>	218	7,984				
<i>Pulses</i>	120,912	363,005	21,267	189,225	39,720	754,518
<i>Horse Beans</i>	4,352	17,425	11,565	118,955	25,758	550,014
<i>Field Peas</i>	15,814	34,157	6,726	49,093		
<i>Haricot Beans</i>	34,567	133,880	2,753	19,343	1,879	32,562
<i>Feba Bean</i>	63,495	91,788			9,505	134,700
<i>Chick Peas</i>	723	13,609	213	1,788	2,578	37,242
<i>Lentils</i>	307	6,082	10	46		
<i>Vetch /Grass Peas</i>	1,655	66,066				
<i>Oil Seeds</i>	72,875	336,083	50,243	335,454	28,460	255,241
<i>Niger Seed</i>	13,401	82,016	28,836	192,898	22,079	196,927
<i>Linseed</i>	696	5,249	1,025	5,846		
<i>Rape Seed</i>	2,922	30,466	2,210	5,003		
<i>Ground nut</i>	3,654	72,477	2,342	20,767		
<i>Sun flower</i>	70	683				
<i>Sesame</i>	52,131	145,182	15,830	110,940	6,381	58,314
<i>Fenugreek</i>	1	10				
<i>Fruits & Vegetables</i>	0	0	20,449	844,507	2,453	28,357
<i>Root crop</i>			10,224	695,578		
<i>Fruit</i>			445	59,891		
<i>Vegetables</i>			9,510	10,488	2,453	28,357
<i>Sugar cane</i>			270	78,550		
<i>Grand Total</i>	480,723	12,233,984	269,915	6,632,582	584,980	16,126,389

Based on the above table which shows each zones crop production with respect to the area of land for each crop varieties. Each zone basically based on subsistence and not based on market demand. Cereals are the most predominant production with very insignificant amount of cash crops such as oilseeds, coffee and chat. Seasonally, most of the production falls in 'Meher' season while Belg production is not common and is irregular. As the data aggregated here is for different years, it's difficult to compare and contrast the categories

of cereals, pulses, oil seeds and fruit and vegetation between the zones. The data depicted to give insight on what type of crops are produced in each zones.

3.3.5.2. LIVESTOCK, POULTRY AND BEEKEEPING PRODUCTION

Livestock play a key role in day-to-day life of the society, especially in the peasant sector. They provide meat & milk, transport, manure, skin & hide, furnish regular & easily realizable cash income. But in contrast to the size of the livestock population, physical & value productivity are low. The following table indicates the size of livestock and poultry in each zones.

Table 3.3-19 Livestock and Poultry Production in thousands

Zones and Yrs.	Cattle		Goat		Sheep		Donkey		Horse		Mule		Poultry	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
<i>East Wollega</i>	1,796	1,919	261	280	340	414	146	153	23	28	19	21	NA	NA
<i>H.G.Wollega</i>	748	835	117	120	217	223	53	56	41	49	4	7	336	344
<i>West Shewa</i>	2,537	2,797	510	495	711	913	177	240	79	296	28	40	1,084	1,711

Poultry Farming is commercial rearing of chickens for their meat and eggs. Concerning production of poultry farming, in case of lack of management and disease, its productivity is low in the zones. Because of unavailability of data, the zonal planning, population and statistics experts were unable to explain details of its production and productivity East Wollega zone.

Beekeeping is management of bees for the production of honey and other beehive products and for the pollination of crops. It is also refers to the husbandry of the honey bee. This sector is not equally practiced throughout the districts of the zones.

3.3.6. MAJOR CONSTRAINTS OF AGRICULTURE AND LIVESTOCK PRODUCTION

The major problems hindering agricultural productivities in these zones are land degradation, erosion, uneven distribution of rainfall, small size land holding and

fragmentation, backwardness of agricultural activities and lack of access roads to bring agricultural products to either local or central markets. Furthermore, poor and insufficient irrigation schemes, low emphasis to market system and poor infrastructure, and lack of credit facilities as well as lack of technical support are some of the constraining factors that adversely affect agricultural productivity.

The major constraints of agriculture in these zones are;

- Fluctuation of rainfall
- Increased costs of agricultural input
- Shortage of the supply of agricultural inputs in quantity and time.
- Large number of unproductive labor or disguised labor
- Backward work culture
- Low saving rate
- Land degradation & loss of fertility
- Deforestation due to expansion of agricultural land and increased population size
- Unimproved agricultural technology
- Absence of local research and encouragement on farmers plot/farm
- Absence of traditional and modern irrigation scheme
- Absence of crop diversification
- Population pressure increased the deforestation, soil erosion
- Lack of land for youth
- Shortage of full delivery of agricultural extension service
- Climatic condition: variability in the amount and the distribution of rain (erratic rain fall)
- Market problem, the decrease of crop prices at the time of harvesting or when farmers need to sell and vice versa.

3.3.7. MINING AND INDUSTRY

Mining is the process of extracting useful minerals from the surface of the earth, including the seas. One of the economic activities with the great role in economic development of a nation is mining. The following table explains the major minerals exist in the zone with

their location. These zones have a plenty of minerals for instance in East Wollega Zone Gold, Iron, Platinum, Mineral Water, Mercury, Silver Glass, Coal, Sandstone, and Construction Mineral, in H.G.Wollega Zone Metallic (Iron) and Construction Mineral and in West Shewa Zone Ambo Sandstone, Scoria, Gypsum, Limestone, Sand, Clay soil, River Gravel, and Basalt were the major ones.

Industry is one of the important productive sectors to bring about sustainable economic development. It consists of manufacturing, mining and construction. Despite its paramount importance in economic development at large, the contribution of industry in these zones is very insignificant due to shortage of capital, technology, market, skilled man power and infrastructural facilities.

Although, there is no available and tangible data on small scale industries in the zone, there are considerable number of flour mills, saw mills, meat processing industries and brick and block manufacturing industries available in these zone in the mentioned year under non-government ownership.

Among medium and large industries Fincha Sugar Factory, Ambo mineral water factory and others are the most prominent manufacturing industry owned by government in these zones.

3.3.8. TRANSPORT, TRADE, TOURISM AND SPORT

3.3.8.1. TRANSPORT

Now a day, the development of transport network is very essential for sustainable development. Without road it is impossible to exchange goods and services, international aids, information, and technology to the region. In these Zones there are still problems of road networks where road density is yet small.

3.3.8.2. TRADE

The new trade regulation requires business enterprises to be licensed and get their licensed renewed every year to be considered as legal businesses and operational. According to the available data of East Wollega Zone, about 9,504 traders were licensed of

whom 1,813 were females, 2,599 was given new licenses of whom 435 were females, 11,374 licenses were renewed of whom 1,660 were females while 933 (178 were females) members were revoked their license due to illegal operation during the year 2006. The type of trade undertaken were wholesale, retail, service and others while retail share the larger number of traders during the year 2006 E.C. For H.G.Wollega and West Shewa zones the figural data were not available.

3.3.8.3. TOURISM

Tourism is an industry that brings about both direct and indirect economic and social benefits, and consequently supports other economic sectors. Despite the enormous tourism potential in the zone much was not developed and well recognized yet in the way it contributes to the overall regional development.

There are some existing tourist attraction sites in East Wollega Zone like Wollega Museum, Kumsa Moreda Palace, Sorga Lake and other natural attraction sites like waterfalls, caves, rivers, forest and hot spring. In H.G.Wollega Zone Oda Buluk, Cato forest, Tulu Lafto forest, Gurraa Loppoo forest, Kumburo Water fall, Walage Water fall, Dannab water fall, Sallan Mountain, Tullu Habib Mountain, Guddanne Mountain, Tulu mara mountain, Bakelo Island, Barracha Island, Koko Islad, Imbabo Plain, Finca'a Damp, Amartii Damp and Nashe Damp. In West Shewa Zone like Cultural materials, Historical sites, Game reserves, Water Fall, Natural Caves, Mineral water, Hot springs, Waterfalls, Boku geda sytem, Gudar water fall, Gorfo mountain, Gura forest , Tullu mara mountain, Oda bisil, Hora dirki, Boka sire, Dhaga arba are the known tourist attraction sites we can found in these zones.

3.3.8.4. SPORT

Types of sport activities practiced in these zones were athletics, football, volleyball, boxing, basketball, tennis table, badminton and cultural sport. Facilities satisfied for these activities are sport uniform, ball, referee, coaches and field. The largest stadium in the zone as well as in the country, Wollega Stadium is also under construction to support West Oromia in particular and the whole country in general to promote sport activities one step up. In addition to this there are public library, Cinema hall, hotels and a museum at capital city of each zones.

3.4. FOOD AID AND PREVALENCE OF DROUGHT IN BARC FOCUSED ZONES

Basically, there is no country, region or locality that is self-sufficient in food and nonfood items especially in developing countries like Ethiopia. Regarding the zone in consideration in particular, even though due to traditional farming and rain fed cultivation system, the output of agricultural production is low, food insufficiency is not regular relatively.

However, due to the policy of the government to improve food security and poverty dimension of the region, people from food insecure and degraded areas were settled in to the zone in considerable number. This condition, make the zone more susceptible to food insufficiency and expect food aid;

Although there was no tangible information on the mentioned issues. In the same way, no information available the occasion when drought was so sever in the last five years to the extent that affect the economic base of Horro Guduru Wollega zone.

As of West Shewa Zone, in the last two consecutive years there weren't people who settled in the zone from other areas and drought occurrence in the zone, but some populations of certain districts were affected by hail storm and cold aril hazards.

Accordingly during the year 2007/08 Total 17,849 populations are affected by the mentioned hazard.

Table 3.4-1 Showing the number of affected people by hail storm and cold air from 4 districts of West Shewa Zone

S/N	Zone	House hold	Members	Total
1	Hail storm (2007/08)	3,091	14,758	17,849
2	Cold air (2008/09)	2,118	9,019	11,140
	Total	5,209	23,777	28,989

Source: - From zonal office of risk management

From the above table in the year 2008/09 also from Jeldu 3,038, Elfata 591 and totally 3,629 populations were affected by hail storm hazard. In addition to that from Dendi 2,556, Ejere 4,955 and totally 7,511 populations are affected by extreme cold aril. In aggregate there are about 5,209 households were shocked by different environmental hazards.

Moreover, there was relief aids allocation, distribution for affected populations and the amounts are indicated in the table below.

Table 3.4-2 Relief Aids Allocation and distribution and Number of beneficiaries in year 2007 and 2008 E.C respectively

S.N	Zone	Distribution years	Amount Relief aids distributed in Quantity and Birr	Number beneficiaries		
				Male	Female	Total
1.	West Shewa Zone	2007 E.C	388,792.70	3,282	2,671	5,953
		2008 E.C	20,983.46	9,247	8,602	17,849
		Total	409,776.16	12,529	11,273	23,802

Source: From zonal office of risk management

SUMMARY AND CONCLUSION

The proposed irrigation technology system use pump from Gibe River and expected to develop irrigable land area of 150 hectare. As far as the ownership of the command area belongs to the research center all proposed plot of land going to be used for irrigation. The beneficiaries of the proposed project are indirectly population of the country but directly focusing on the population of three zones (East Wollega, H.G.Wollega and West Shewa) those BARC assigned to undertake research.

BARC covers an area of 1440 hectares. Majority of the land area (66.5%) was allocated for natural and artificial forest and grazing land, 22.5% is allotted for experimental and seed multiplication, the rest 10% is for residential, research block and management office, laboratory, library and recreation centers.

There are no significant socio economic negative impacts that could happen due to the project implementation. On the other hand, the project would have positive impacts and received full support from stakeholders. The surrounding community, the Kebele and two Wereda (Bako-Tibe and Gobu Seyo) officials have positive attitude towards the implementation of the project. Therefore, the implementation of the project is recommended in view of its socio economy findings.

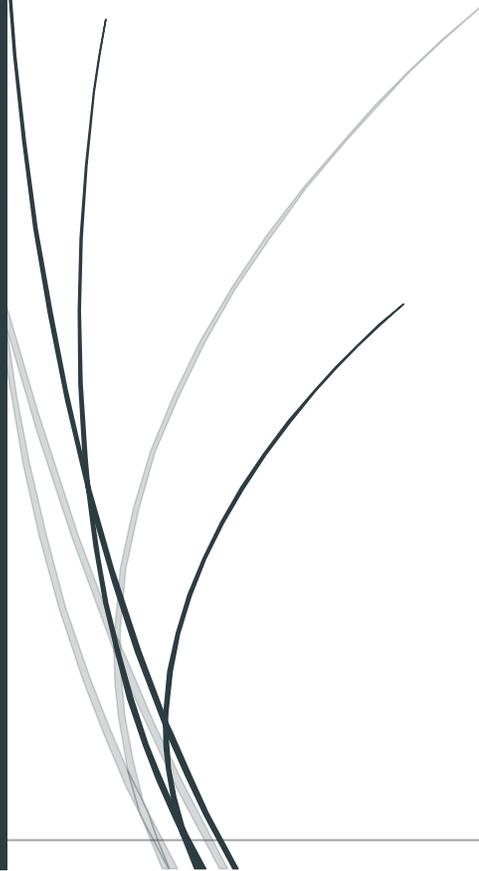
Therefore, the project is so important in transforming the life of many regional as well as the countries poor or small holder farmers. In this regard, the research center should have to clearly apply water saving technologies which will have a positive impact on the downstream irrigation water users and which in turn ensures the sustainability of the project.



4/20/2018

BARC SSIP

Organization and Management



Tewodros Gebeyehu (Economist)

OROMIA IRRIGATION DEVELOPMENT AUTHORITY, FINFINNE

TABLE OF CONTENTS

LIST OF FIGURES.....2

ACRONYMS3

EXECUTIVE SUMMARYError! Bookmark not defined.

1. INTRODUCTION AND BACKGROUND.....4

1.1. Introduction 4

1.1. Objective 4

1.2. Policies and Legal framework 4

1.3. Role and responsibilities 5

2. EXISTING ORGANIZATION AND MANAGEMENT OF BARC8

2.1. Administration Status of the Project Area 8

2.2. Existing Structure 9

 2.2.1. Crop Research Technology Generation Process 9

 2.2.2. Natural Resource Research Technology Generation Process 9

 2.2.3. Live Stock Research Technology Generation Process 9

 2.2.4. Socio-Economics, Research Extension and Gender Research Process..... 9

 2.2.5. Coffee and Tea Research Process..... 9

 2.2.6. Soil and Water Engineering Research Team 10

 2.2.7. Procurement, Finance and Resource Process..... 10

 2.2.8. Center director 10

2.3. BARC Consultation and Participation.....10

3. PROPOSED ORGANIZATIONAL STRUCTURES 11

3.1. General11

3.2. Proposed Organization arrangements11

3.3. Irrigation Water Management Process11

3.4. Training and capacity building13

4. MONITORING AND EVALUATION 15

5. CONCLUSION..... 16

REFERENCE..... 17

LIST OF FIGURES

Figure 1 Existing Organizational Structures at Woreda Irrigation Development Authority Level..... 6

Figure 2 Existing Organizational Structures at Bako Agricultural Research Center..... 8

Figure 3: Proposed Organizational Structure for Irrigation Water Management..... 11

Figure 4: Proposed Organizational Structure for Water Management Process..... 13

ACRONYMS

BARC	Bako Agricultural Research Center
Ha	Hectare
MOWE	Ministry of Water and Energy
MOA	Ministry of Agriculture
O&M	Operation and Maintenance
OIDA	Oromia Irrigation Development Authority
WUA	Water Users Association

1. INTRODUCTION AND BACKGROUND

1.1. INTRODUCTION

In addition to the social and other technical study, Institutional issues are equally important for success or failure of irrigation schemes. Therefore, it is required to assess existing institutional setup and with aims to rectify proposed organization and management arrangement in line with the research center managed irrigation scheme development, operation and management.

Furthermore, favorable legal framework for the administration and management of irrigation water for equitable water distribution as crop requirement and provision of efficient technical support for O & M are among key factors for sustainable development of irrigation schemes to achieve the overall agricultural sector development objectives. As a result, the organization and management assessment included as main part of the feasibility study of the project.

1.1. OBJECTIVE

The overall objective of the organization and management study is to depict existing institutional setup based on which to propose organization system and management options to overtake the responsibilities of sustainable operation and management of the irrigation Project.

1.2. POLICIES AND LEGAL FRAMEWORK

Assessment of the enabling environment, the policy and existing legal framework is one of the significant issues to understand the mandates, roles and responsibilities of the various stakeholders and local decision makers involved in the development of small scale irrigation projects.

In the current institutional and organizational arrangement of the federal government of Ethiopia, Ministry of Water and Energy (MOWE) is responsible for managing and administering of large scale irrigation infrastructures of dams, main canals & roads, dikes and main drains and other major irrigation infrastructure development.

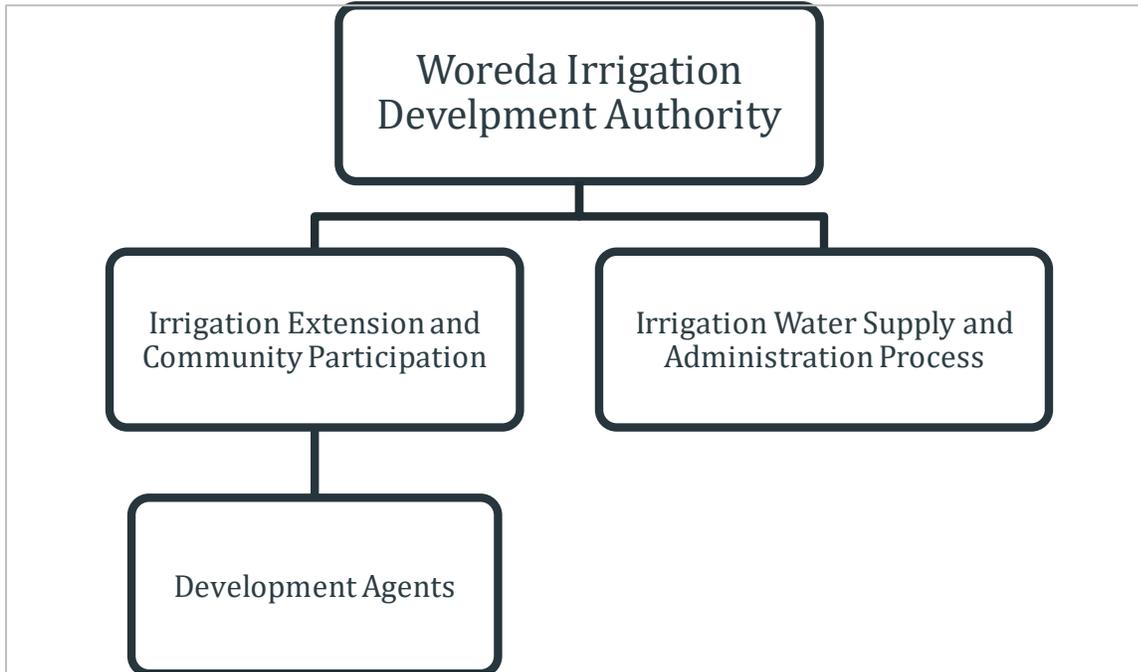
On the other hand, the administration, operation, management and maintenance of small-scale irrigation structures including the traditional schemes are the sole responsibility of the Ministry of Agriculture (MOA) at the national level. Whereas responsibility for similar function at the regional level, is accounted with the Irrigation Development Authority of the Region (OIDA) and Sector stakeholders.

1.3. ROLE AND RESPONSIBILITIES

Organization and management responsibility of water sector changes at federal and regional level from time to time. Still water resource management and responsible stakeholders varies from region to region. As to Oromia Region the organizational structures of Oromia Irrigation Development Authority is responsible to undertake study, design and construction of small scale irrigation projects by participation of the community, transfer completed irrigation schemes to beneficiaries, organize Irrigation Water Users Association and provide technical support for maintenance works beyond community level.

Existing organization structure taken from Bako Agricultural Research Center Office indicates six departments whereas Weredas Irrigation Development Authority has two departments those are depicted as follows.

Figure 1 Existing Organizational Structures at Woreda Irrigation Development Authority Level



As that of the newly established structure the Irrigation Development Authority at woreda level is the direct concerned responsible body for the irrigation development and structured down at Kebele level and the mandate has given for small scale irrigation development extension Services, agronomic improvement and schemes operation and technical support for scheme management.

Under the woreda, Irrigation development Authority organized as one independent woredas Office and currently structured with the assignment professionals of different educational level. Based on the discussion made with woreda staffs some gaps and constraints observed in organization and management of small scale irrigation schemes and among the problems and constraint to mention;

- ▶ Lack of irrigation extension support and in crop calendar time
- ▶ Unavailability of agricultural inputs
- ▶ Increased prices of farm inputs (by individual traders, Unions, and cooperatives)

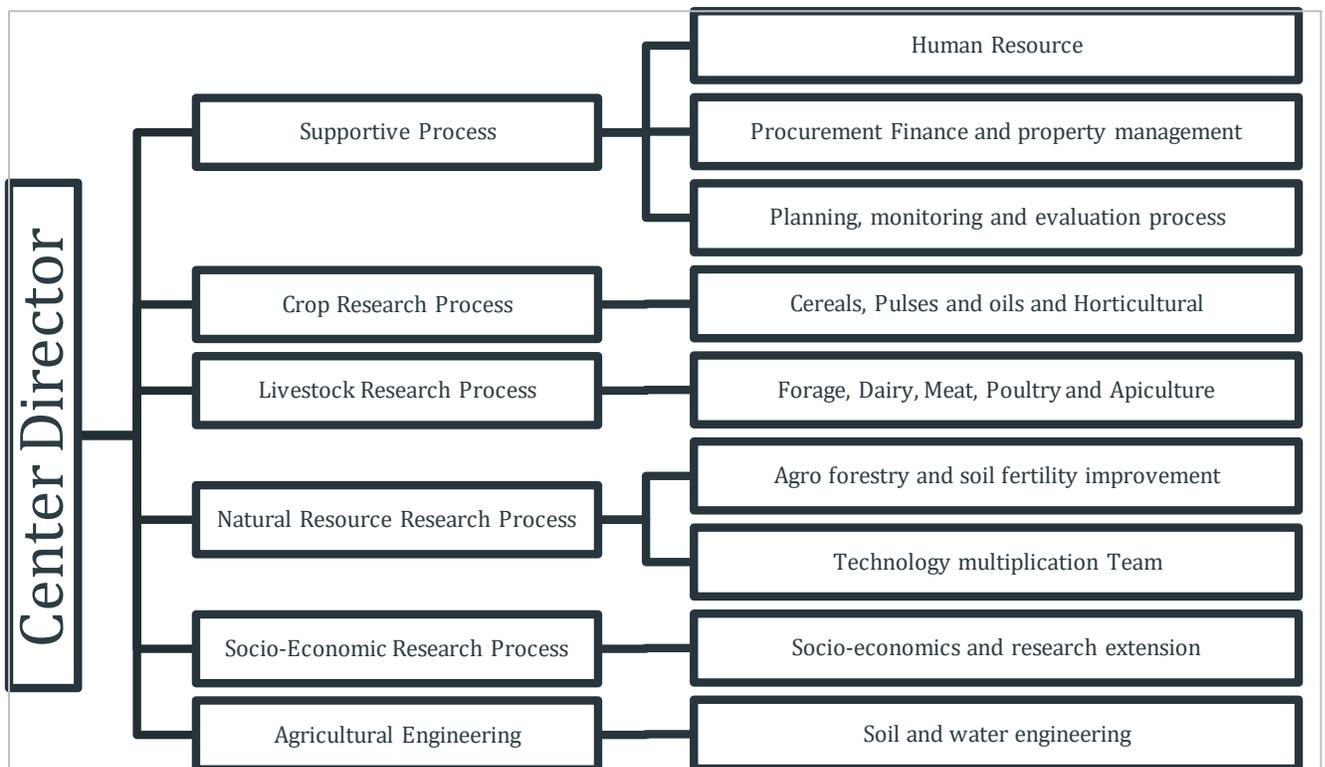
- ▶ Gaps in supply of resistant variety seeds
- ▶ Lack of irrigation extension due to lack of irrigation development extension agents at kebele level
- ▶ No implementation of byelaws to strengthen the WUA on traditional and improved irrigation schemes and
- ▶ Lack of report on irrigation at command post and less attention for the sector
- ▶ Lack of training for irrigation experts
- ▶ Shortage of budget and running expense

2. EXISTING ORGANIZATION AND MANAGEMENT OF BARC

2.1. ADMINISTRATION STATUS OF THE PROJECT AREA

Functional organization starts from clear understanding of the project area and existing organization and administrative setup. The proposed BARC irrigation project diversion site serve the center using pumping system. The whole command area lies in the compound of the center which will not make any difficulties in managing the water.

Figure 2 Existing Organizational Structures at Bako Agricultural Research Center



Since the existing organizational structure is well organized and established the existing organizational setup with a little additional setup they're expected to contribute active participation in implementation and management of the project.

2.2. EXISTING STRUCTURE

Even though there is insignificant irrigation experience to the center; the research center have an ample experience or familiar with processing research on farming using rain fed water. Because of this after the implementation of the project it needs concerted effort of concerned stakeholders to create awareness, capacity building towards irrigated farming practice and gradually establish strong irrigation management structure to operate & maintain irrigation system on sustainable basis.

2.2.1. Crop Research Technology Generation Process

Crop research process has four research teams I) cereal crops II) pulse and oil crops III) horticultural crops and IV) crop farm technology multiplications.

2.2.2. Natural Resource Research Technology Generation Process

This research process has two research teams I) Soil fertility improvement II) Agro-forester.

2.2.3. Live Stock Research Technology Generation Process

The research process has seven research teams I) dairy research II) meat research III) animal feed research IV) apiculture research v) poultry research and VI) animal farm technology multiplication teams.

2.2.4. Socio-Economics, Research Extension and Gender Research Process

The process has two main research teams-socio-economics and research extension where in gender research is undressed under both research teams.

2.2.5. Coffee and Tea Research Process

This process is a newly established one where the center is going to address the research activities on coffee and tea in its mandate areas.

2.2.6. Soil and Water Engineering Research Team

This research team is established under the agricultural engineering research process at head quarter but at BARC it is a research team which started undertaking activities in 2016/17 cropping year.

2.2.7. Procurement, Finance and Resource Process

Is the widest administrative wing having number of management sections, such as transport and garage, general service, and accounting and management sections?

2.2.8. Center director

The center director usually directs the whole research process and managements system of the center. Particularly planning and human resource teams are directly under the team of center director.

2.3. BARC CONSULTATION AND PARTICIPATION

As the organization and management assessment prevails, the researchers in the project area have good knowledge and practice on irrigation and the positive impacts or economic benefits of irrigation farming. Consultation meeting and discussion was made as regards to importance of the project and implementation of the envisaged irrigation project as well as on their roles & responsibility during and after construction of the irrigation scheme.

3. PROPOSED ORGANIZATIONAL STRUCTURES

3.1. GENERAL

The proposed institutional arrangement envisage irrigation project essentially is intended to be government /research center-managed and the command area is expected to be fully involved in the planning and implementation of the scheme, after which they are to own and manage as well as operate and maintain the systems on sustainable manner. With this objective, the organizational structure based on water source, irrigation system based irrigation schemes proposed with available option as required.

3.2. PROPOSED ORGANIZATION ARRANGEMENTS

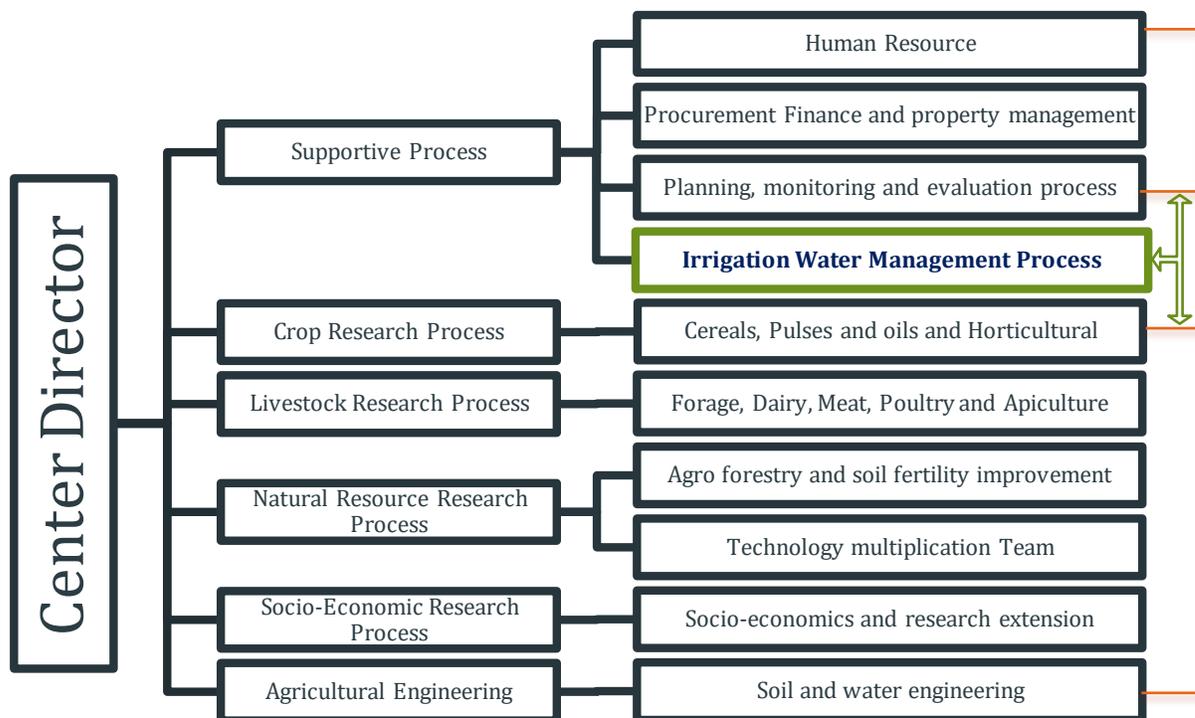
The fact that the project has owned by government; the sustainability of schemes towards achievement of overall agricultural sector objectives should be taken in to considerations. Hence, the management style and organizational structure is to be sound for schemes which the system will supply irrigation water to serve the activities/research exercised in the center.

Because of this irrigation water management is proposed to fully manage and the water and undertake the operation and maintenance of the pump and the scheme as well.

3.3. IRRIGATION WATER MANAGEMENT PROCESS

The following chart shows the proposed organization, its organizational set-up and its link within the department and with other departments.

Figure 3: Proposed Organizational Structure for Irrigation Water Management

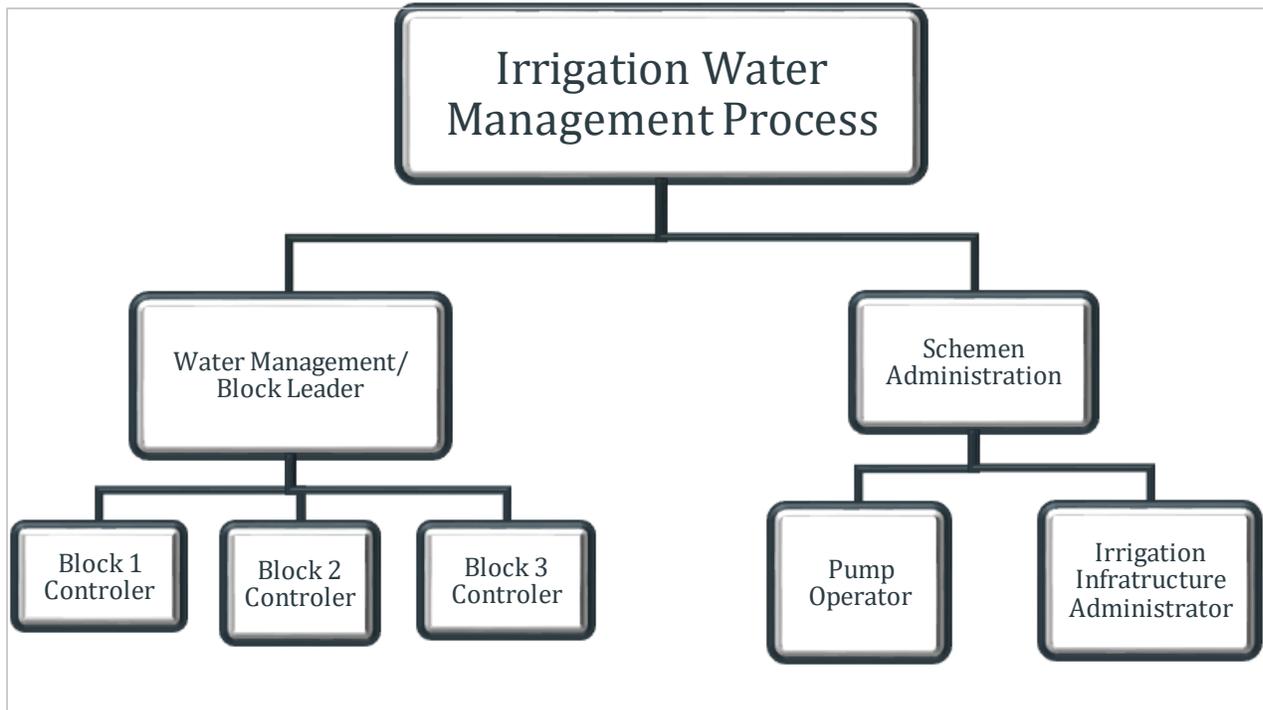


The *irrigation water management process* is the process proposed and added under supportive process in the view of that this process manage every issues related with irrigation water and give support for core process of the research center. This process have at least two links i.e., with in the process and outside the process. Within the process the process owner prepare work plan, budget plan and work progress report for planning monitoring and evaluation process; planning and requesting budget for repair and maintenance of irrigation infrastructure from procurement, finance and property management and the subordinate staffs are also responsible for human resource.

When we come to the outside the process relationship, this process is responsible for the management and provision of irrigation as per the crop water requirement and schedule planned by each research process. As far as water management is concerned the process is

obliged to undertake two main activities managing or leading or controlling the water blocks controller and administering the schemes.

Figure 4: Proposed Organizational Structure for Water Management Process



3.4. TRAINING AND CAPACITY BUILDING

It is highly important to facilitate the transfer and adaptation of modern institutional arrangement and management of small scale irrigation schemes to attain sustainable operation of the system. The woreda and zonal irrigation development authority is also there to give technical support on the management of scheme administration and water usage management for the center. In this regards training and capacity building required at different level including staffs, Block controllers and pump operators that aims to:

- Creating awareness for researchers on proper usage of water.
- Special training on leadership and organization for water management.

- Strengthen technical and management capacity of the process staff to improve and upgrade organization and management efficiency of the project
- Strengthening the pump operator capability on repair and maintenance of pump.

4. MONITORING AND EVALUATION

In the context of proposed irrigation project, evaluations adopts and focus on progress towards realizing sustainable organization and management system that ensure sustainable operation and management of the schemes which is the prime objective and goal. Therefore, periodical evaluation should be undertaken by relevant water management process and the research center, who over take the responsibility after implementation of the project. Evaluation team should be organized from center and undertake ongoing evaluation/ midterm evaluation, terminal and ex post evaluation of the irrigation schemes management. Evaluation framework model developed with due attention that at existing level of staff awareness, education and organizational status, evaluation system considered that;

- ▶ The system should be simple to operate, and designed as to meet the specific requirements of the objective.
- ▶ It should concentrate on key indicators that measure the variables.

5. CONCLUSION

From the experience of small scale irrigation project in Ethiopia, organization and management is one of the challenging areas for sustainable operation of schemes and equally important to give due attention for organization and management aspect that ensure sustainable operation of the system. In this report, project area specific features, experience, staff member attitude were discussed and proposed most viable organization and management arrangement.

The proposed BARC irrigation project planned to use gravity irrigation system and net irrigable command area of 150 ha and expected beneficiaries of three zones. The center have an experience to exercise its research activity through rain fed agriculture and have much developed experience.

Based on the experience they have and an existing organizational setup irrigation water management process is recommended to perform the irrigation water management and to perform the operation and maintenance of irrigation infrastructure and pump.

In general, water centered agricultural development approach is government policy direction and responsible stakeholders should have in their annual plan, not only for the irrigation physical infrastructure development, but also equally for organization and management of the scheme.

The woreda irrigation development authority which assigned to govern each and every activities related to irrigation is also responsible to watch over and give technical assistant for the research center after the implementation of the project.

Reports will be compiled and analyzed monthly, quarterly and yearly in the planning period to indicate the effectiveness of the performance and draw lesson for corrective measures and the future plan of action.

REFERENCE

- Guide line for study of small scale irrigation projects in Ethiopia, Environment and social impact assessment, Continental consultant and Concert engineering (2002), August 2002.
- Project Planning, Implementation, Monitoring And Evaluation, Training Materials And Manuals, Management Institute of Ethiopia (2002)
- Planning and Implementing Sustainable Projects, Audace I. Kanshahu
- Guideline for Establishment and Management of water users Associations (March 2004) Japan International Cooperation Agency (JICA) and Oromia Irrigation Development Authority (OIDA)

8/4/2018

BARC SSIP

Financial Analysis

Tewodros Gebeyehu

TABLE OF CONTENTS

LIST OF TABLES.....	ii
LIST OF APPENDIX.....	ii
LIST OF EQUATION.....	ii
ACRONYMS.....	iii
1. Introduction and Background	1
1.1. INTRODUCTION.....	1
1.2. OBJECTIVE.....	1
1.3. BASIC PRINCIPLES AND CONCEPTS.....	2
2. METHODOLOGY, ASSUMPTIONS AND CONCEPTUAL FRAMEWORK.....	3
2.1. GENERAL.....	3
2.2. INPUTS AND OUTPUTS.....	3
2.3. FINANCIAL AND ECONOMIC VIABILITY INDICATORS AND APPROACH.....	5
2.4. FINANCIAL AND ECONOMIC VIABILITY INDICATORS AND IMPLICATIONS.....	6
3. THE PROJECT.....	7
3.1. TECHNOLOGY.....	7
3.2. COMMAND AREA AND BENEFICIARIES.....	7
3.3. PROJECT COST.....	7
3.3.1. GENERAL.....	7
3.3.2. Irrigation infrastructure and system Investment Cost.....	7
3.3.3. Other farm tools /implements investment cost.....	8
3.3.4. Replacement cost.....	8
3.3.5. Investment schedule.....	9
3.3.6. Operation & Maintenance Cost.....	9
4. FINANCIAL ANALYSIS.....	10
4.1. WITH PROJECT.....	10
4.1.1. Cropping pattern.....	10
4.1.2. Land Development Plan.....	10
4.1.3. Input and farm cost.....	11
4.1.4. Yield build up.....	11
4.1.5. Price of input and output.....	12
4.1.6. Crop budget.....	12
4.1.7. Financial Analysis Results.....	12
4.1.8. Risk and Sensitivity Analysis.....	13
5. CONCLUSION AND RECOMMENDATION.....	14
5.1. CONCLUSION.....	14
Appendix15	

LIST OF TABLES

Table 1 Investment cost- Irrigation infrastructure and system development	8
Table 2 Cropping pattern, with project	10
Table 3: Land development plan and cropping Pattern “with” the project.....	10
Table 4: Yield Build Up for "With" Project Situation.....	11
Table 5: Financial Analysis Result.....	12
Table 6: Financial Sensitivity analysis test.....	13

LIST OF APPENDIX

Appendix 1 "With" the project other investment costs (000 Birr).....	I
Appendix 2 "With" the project Irrigation development Investment & O and M cost (000 Birr)	I
Appendix 3 Quantity of crop production "With" the project situation.....	II
Appendix 4 Value of crop production for the "With" project situation (000 Birr)	II
Appendix 5 "with" the project inputs requirement & cost of production per Hectare	III
Appendix 6 "With" the project production costs.....	III
Appendix 7 Computation of Net Incremental Benefit (000 Birr).....	IV
Appendix 8 Sensitivity Analysis Results (000 Birr) cost increase by 10 %.....	V
Appendix 9 Sensitivity Analysis Results (000 Birr) Benefit decrease by 10 %.....	VI

LIST OF EQUATION

Equation 1 Net Present Value.....	5
Equation 2 Benefit Cost Ratio	5
Equation 3 Internal Rate of Return.....	5

ACRONYMS

BARC	Bako Agricultural Research Center
BCR	Benefit Cost Ratio
FNPV	Financial Net Present Value
IRR	Internal Rate of Return
NPV	Net Present Value
VAT	Value Added Tax

1. INTRODUCTION AND BACKGROUND

1.1. INTRODUCTION

This report refers to financial analysis and feasibility test for Bako Agricultural Research Center irrigation project. The financial analysis is intended to assess the financial impacts on project participants. The analysis will, thus, seek to assess the financial effects of the project on the farm households as private business entity. It showed the rate of return on capital investment in implementing the project, and indicated the degree of financial Viability of the project. The analysis also indicates the net returns, which will accrue to the farmers and project owners.

In making this analysis, all the relevant cost and benefit items with and without the project is identified, evaluated with appropriate prices and come up with reasonable incremental net returns and the financial viability indicators updated accordingly.

Financial cost outflow and income inflow of the project estimated based on crop budget, farm cost and net returns under without and with project situation and based on the unit farm model computed gross and net incremental return of the project.

1.2. OBJECTIVE

Financial and economic analysis study aims to indicate project viability to assist investment decision. The specific objective is to test whether the project meets the basic feasibility criteria in financial terms and justify whether the project is a worthwhile for investment resources. To meet the stated objective, the scope of task includes comprehensive financial analysis prepared for the project. The report contained basic data and provided;

- Cost structure of the project
- Estimate financial and economic annual net returns from the existing and proposed crops in the command area and farm budgets,
- Financial analysis data base that are indicative of resource use and levels of returns,
- Evaluated the project in terms of financial return
- Tested financial Viability of the project including calculations of NPV, IRR and B/C ,

- Indicated source of finance and share of investments
- Sensitivity analysis tested by using the financial criteria by changing for all of the major variable factors.

1.3. BASIC PRINCIPLES AND CONCEPTS

Financial Analysis: The financial analysis is concerned with the individual financial entities participate in the project. In financial analysis outflow/cost and inflow/ benefit primarily use market price. The financial analysis is more concerned investment financial profitability to farm operators as a business entity.

2.1. GENERAL

Accumulated experience on the preparation of similar projects and the guidelines of project analysis technique was used. The analysis considered “without” and “with” project situations and identified involved cost and benefits, crop and farm budgets per models per hectare and developed the project cost and income flow and computed the analysis.

2.2. INPUTS AND OUTPUTS

Engineering cost estimate provided by the irrigation engineer for the pump and irrigation infrastructure. The agronomist report used for cropping patterns, unit requirement of seed rates, fertilizers, pesticides, and labor days required for a hectare of land. Input and output price data is collected at project site that used in cost and benefit/Value projections.

a) Farm Budget

Farm budget was developed from farm models by giving the inflows and outflows monetary values. In order to know the gross and net benefit of the “with” and “without” project conditions details of gross, net and incremental net benefit, farm budget was prepared per hectare basis first and transformed to the whole area of the proposed project.

b) Comparison Between “With” And “Without” Project

All the relevant cost and benefit items with and without the projects are identified, valued with appropriate prices and incremental net returns with the project computed. Cost inflow and outflow, crop budget, farm cost and net returns computed for with and without the project situation based on the unit farm model and arrived at gross and net incremental return of the project. In making the analysis, incremental project costs were calculated by deducting costs of the “without” project from the “with” project condition. Similarly incremental benefits were determined by deducting the gross benefits of the “without” project situation from the gross benefits of the “with” project condition. The comparison of the financial situation “without” and “with” the project situation clearly stated. Finally, net

incremental benefits were calculated by deducting incremental costs from incremental benefits.

c) Prices of Inputs and Outputs

Prices in the financial analysis for both cost and benefit streams are those, which are actually received and spent by the project at the farm site commonly called “farm-gate” prices. Prices information are one of the determinants in cost and benefit projection and used site specific as collected in and around the project area. Prices of output are that are actually received by farmers and are attributable to their crop production activities. Price information was collected for the existing and proposed crops and analyzed for appropriate price in the analysis.

Similarly, input price information collected at project sites mainly cost of fertilizer, improved seeds, prices of tools, equipment and packing materials, wage for unskilled labor power cost assessed at the project area for consideration in the analysis.

d) Project Period

One of the indicators for the length of the project period for which analysis has to be carried out is the technical life of the major capital assets. The project life of small scale irrigation with pump estimated between 20-25 years. Therefore, project life is taken 25 years, which is acceptable determined by the technical life of the major capital items of the proposed project.

e) Opportunity Cost Of Capital

The opportunity cost of capital is taken to be 10.23 %, which is recommended 10 % to 12 % by the Ministry of Finance and Economic Development of the Federal Democratic Republic of Ethiopia. In accordance with the findings of the study on Commercial Bank of Ethiopia this cut of discount rate is 10.23 % and this has been accepted for financial analysis of most projects.

2.3. FINANCIAL AND ECONOMIC VIABILITY INDICATORS AND APPROACH

Financial Net Present Value (FNPV), Internal Rate of Return (IRR) and Benefit Cost Ratio (BCR) are the parameters generally used to determine the financial viability of a project. In this study, the three measures of project viability were used to determine the viability of the project.

The three commonly used indicators of project viability were computed using the following formulae:

a. Net Present value

Equation 1 Net Present Value

$$NPV = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

Where B_t = benefit in year t;
 C_t = cost in year t;
 t = 1, 2, 3...
 n = number of years;
 i = interest (discount) rate

b. Benefit Cost Ratio

Equation 2 Benefit Cost Ratio

$$\frac{B}{C} = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}}$$

This indicator is equivalent to the ratio of the present value of benefits to the present value of costs. If there is no limitation of funds, the decision criterion is to accept any project having B/C ratio greater than 1.

c. Internal Rate of Return

Equation 3 Internal Rate of Return

$$IRR = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t} = 0 \quad \text{Or}$$

$$IRR = LDR + (UDR - LDR) \left(\frac{NPV_1}{NPV_1 - NPV_2} \right)$$

Where; LDR = lower discount rate at which its NPV is positive;
 UDR = upper discount rate at which its NPV is negative;
 NPV1 = Net Present value at the lower discount rate; and
 NPV2 = Net Present value at the upper discount rate

The internal rate of return is a widely accepted criterion in project analysis and it is a very useful measure of project evaluation. The formal selection criterion for the internal rate of return measure of project worth is to accept all independent projects having an internal rate of return equal to or greater than the opportunity cost of capital (10.23 %). The decision criterion in the Ethiopian context is to accept a project if it's IRR is above the cutting edge of 10.23 %, opportunity cost of capital.

2.4. FINANCIAL AND ECONOMIC VIABILITY INDICATORS AND IMPLICATIONS

Net present value (NPV), internal rate of return (IRR), and B/C ratio are used to determine the viability of the proposed project. Although, data base for the financial and economic viability test differs, the approach and implication of viability indicators are the same.

Net Present Value /NPV: The NPV measures the attractiveness of a project and the decision criteria is to accept all projects where NPV positive when discounted at the opportunity cost of capital. The NPV earns back all the capital and operating costs expended upon it and pay a given percent for the use of the money in the meantime.

Internal Rate of Return /IRR: The selection criterion with IRR is to accept where IRR result is greater than the opportunity cost of capital that justifies the project earns more than its opportunity cost and worth to implement.

Benefit -Cost Ratio (B/C): It is defined as the ratio of the present worth of benefits to the present worth of costs. The selection criteria in financial B/C ratio are accepting all projects where the B/C ratio is greater than discounted at the opportunity cost of capital.

3. THE PROJECT

3.1. TECHNOLOGY

Depending on land topography and other considerations, project cost primarily depends on topographic nature of the area, system design and irrigation technology options (pumps, diversion, dam sprinkler, drip). Technology type is one factor determining irrigation project cost and the project under study adopt diversion irrigation system from Gibe river source.

3.2. COMMAND AREA AND BENEFICIARIES

The benefits and cost flow depend on net irrigable land area and land development plan. Although, total potential irrigable area is over 150 ha, due to water availability and other limit factor, the net irrigable area of 150 ha to be effective under irrigation system. The project expected to make a research on the existing land size. Based on this basic ground, benefit and cost accruing estimated under “without” and “with” project.

3.3. PROJECT COST

3.3.1. GENERAL

Financial analysis requires data on capital cost of the project as well as the yearly ‘operation & maintenance cost’. The capital cost includes cost of construction of all engineering structures and developing infrastructure required for implementation of the project, including access road if necessary.

Catchment development cost and others has not been loaded on the project for the purpose of financial analysis. Similarly, accruing benefits due to other economic effect have not been considered for financial analysis.

3.3.2. IRRIGATION INFRASTRUCTURE AND SYSTEM INVESTMENT COST

The irrigation infrastructure and system development cost estimated to birr 26,671,071.01. The total investment cost including VAT (15%) estimated to birr 30,671,731.66.

Table 1 Investment cost- Irrigation infrastructure and system development

S.No	Description of Activities	Total cost(Br)
1	Mobilization & Demobilization	200,000.00
2	Camping	387,939.10
3	Irrigation System	7,488,441.40
4	Irrigation System Structures and Fittings	1,864,918.07
5	Drainage System	379,500.00
6	Pump House	434,851.44
7	Delivery Tank	141,250.00
8	Generator House	351,615.00
9	Construction of Night Storage	9,297,186.00
10	Electromechanical Cost	6,125,370.00
	Sub-Total Cost	26,671,071.01
	Vat (15%)	4,000,660.651
	Grand Total	30,671,731.66

Source: Engineering cost estimate/BOQ

3.3.3. OTHER FARM TOOLS /IMPLEMENTS INVESTMENT COST

With development of the irrigation system, improved farm tools and implements required. Farm tools are estimated based on the area planned for development (all tools 3/ha). Required list of farm tools and other investment cost estimated to birr 743,000.00 in the 1st operation year of project and birr 158,000.00 and birr 45,000.00 alternatively in the rest of the project period as given appendix 1. These costs are used as project operation and maintenance costs which is financed by users and clients in terms of tools and capacity development alternative.

3.3.4. REPLACEMENT COST

Bako Agricultural Research Center Irrigation Projects operates with two water abstraction technologies, pump and gravity system where replacement costs are considered in the project period costs every year, that will fully replaces the total cost of pump and generator part of the irrigation infrastructure every 5 years for project life time in 15 years. Operation and maintenance presented as other investment costs in terms of farm tools, capacity

development and fuel consumption costs, which are estimated in appendix 2. Other cost is part of operation and maintenance and expected to cover directly by government.

3.3.5. INVESTMENT SCHEDULE

In most case small scale irrigation project are planned to complete in one year period. Thus considering the land area of 150 ha planned for development, the project tends to small scale irrigation and taking unforeseen constraints the project assumed to complete in one year and investment cost spread assuming 100% in first year and zero year of the financial analysis.

3.3.6. OPERATION & MAINTENANCE COST

Irrigation project expected to wear and tear out and maintenance required ensuring sustainable operation of the system. This includes replacement cost for purchase and changing major irrigation equipment. Operation cost is the other cost intended for operation and running project as stipulated in project plan and this cost includes experts/staffs training as capacity building and other running cost. Operation cost assumed 3 % of investment cost for two consecutive years which is *935,150 Birr*. Training cost is assumed for the first two years as capacity building. Maintenance cost in most project analysis assumes 2-5 % of investment cost and this project considered 5 % of investment cost of irrigation infrastructure as maintenance cost assumed from the third years of the project which is *1,558,590.00*. These costs are expected to incur annually and assumed to be financed by government. Handing over of the project requires training capacity building for expert/staff who assigned on the irrigation on roles and responsibility to administer the system of the irrigation scheme.

4. FINANCIAL ANALYSIS

The analysis considered two scenarios, with and without project. The financial analysis computed by considering cropping pattern, benefit and cost flow under the two scenarios.

4.1. WITH PROJECT

4.1.1. CROPPING PATTERN

Wet and dry season production considered and there are diversified crops proposed in addition to the existing crop under with project development.

Table 2 Cropping pattern, with project

<i>Ser. No</i>	<i>Crop Type</i>	<i>Cropping Pattern %</i>
1	Tomato	23.33
2	Pepper	20.00
3	Maize	16.67
4	Sorghum	12.00
5	Millet	10.00
6	Banana	6.00
7	Avocado	6.00
8	Mango	6.00
	Total	100

Source: Agronomy report

4.1.2. LAND DEVELOPMENT PLAN

The project as small scale project it is assumed and planned to complete the construction in one year period. So that, it is to be assumed no complex construction shall be under taken and it is expected to complete the construction activities in first implementation year and land development plan assumed to reach full capacity utilization in the 1st operation year period 100%. Based on this understanding, land area to be under irrigation will be expected fully 150 ha.

Table 3: Land development plan and cropping Pattern “with” the project

<i>Ser. No</i>	<i>Crop Type</i>	<i>Cropping Pattern %</i>	<i>Land Development by project years (ha)</i>				
			<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5to15</i>
1	Tomato	23.33	35	35	33	33	35
2	Pepper	20.00	30	30	32	32	30
3	Maize	16.67	25	25	24	23	25

<i>Ser. No</i>	<i>Crop Type</i>	<i>Cropping Pattern %</i>	<i>Land Development by project years (ha)</i>				
			<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5to15</i>
4	Sorghum	12.00	18	18	19	20	18
5	Millet	10.00	15	15	15	15	15
6	Banana	6.00	9	9	9	9	9
7	Avocado	6.00	9	9	9	9	9
8	Mango	6.00	9	9	9	9	9

Source: computed based on cropping pattern proposed and land development plan in the Agronomy report

4.1.3. INPUT AND FARM COST

Development of the irrigation project expected to increase yield and productivity with optimum application of agricultural input. Farm input and cost as well as expected gross and net return under the with-project situation computed.

4.1.4. YIELD BUILD UP

Crop yield is mainly estimated based on the level of crop management, required practices, availability of agricultural inputs, proper extension activities, and existing climatic situations for crop production and other considerations like observation of existing yield condition, anticipated research outputs...etc. Considering these parameters, the following yield projection is given by the agronomist as shown in table 4 below.

Table 4: Yield Build Up for "With" Project Situation

<i>Ser.No</i>	<i>Crop Type</i>	<i>Yield build-up by project years (Qu/Hectare)</i>				
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5 to15</i>
1	Tomato	245	255	270	290	320
2	Pepper	25	35	50	60	65
3	Maize	95	100	110	120	130
4	Sorghum	40	45	50	55	60
5	Millet	25	25	30	35	40
6	Banana	175	180	190	210	240
7	Avocado	195	200	220	240	270
8	Mango	205	215	235	255	285

4.1.5. PRICE OF INPUT AND OUTPUT

Price used in the analysis is farm gate price that farmers receive as farm income and hence price of output used the farm gate price collected at project area. Sometimes price collected tends to reflect the retail price and in such case retail price changed to producer price by deducting 10 % as market cost from the retail price.

4.1.6. CROP BUDGET

Crop budget for wet and dry season prepared for each crops from which unit farm income and cost of each crops changed to farm budget. The crop budget of each crop is given in Annex 3, 4, 5 and 6.

4.1.7. FINANCIAL ANALYSIS RESULTS

The financial analysis was carried out after developing all the project cost and benefit flow and gross and net returns accruing to the farmers and/or project owners. Summary of the financial analysis results is shown in table 5 below and the detail data table in Appendix 7. The Net Present value is Birr 221,346.08 which is highly positive and based on the IRR criteria, the IRR results indicate 77 %, which is more than the opportunity cost of capital (10.23 %), indicating the viability of the project. Based on the B/C ratio criterion, it result 6.86, which is much above one and meet the viability criteria in all yardstick indicators. Summary result indicated in table as follows:

Table 5: Financial Analysis Result

<i>Viability Indicators</i>	Results
<i>NPV</i>	221,346.08
<i>IRR</i>	77 %
<i>B/C</i>	6.86

Looking the overall performance of the viability criteria, the project is highly Variable and worth for implementation.

4.1.8. RISK AND SENSITIVITY ANALYSIS

Risk and sensitivity analysis involves identifying the Variables that most influence a project's net benefits and quantifying the extent of their influence, and assessing the probable effects of the result of uncertainties and risks associated with the project. The sensitivity analysis was thus carried out under the following major Variables, using financial values;-

- Increasing Investment cost by 10% maintaining other factors constant
- Decreasing Benefit of the project by 10% maintaining other factors constant

The results show the project is still viable under all the sensitivity test scenarios and meet viability requirement as the summary of sensitivity test result indicated in Table 6 below.

Table 6: Financial Sensitivity analysis test

Nº	Scenarios	FNPV	FIRR	FB/C
1	Base case	221,346.08	77 %	6.86
2	Increasing Investment cost by 10% and Other things remaining constant	220,010.76	71 %	6.23
3	Gross return decreased by 10%	178,722.76	63 %	5.50

5. CONCLUSION AND RECOMMENDATION

5.1. CONCLUSION

Bako Agricultural Research Center Irrigation project use diversion system from Gibe river source and expected to develop irrigable command area of **150** hectare. The irrigation infrastructure and system development cost estimated to birr **30,671,731.66** including Vat 15%.

With and without project return and cost analysis computed and the results of financial the financial viability test result indicated Net Present value /**NPV**/ of birr **221,346.08** Financial Internal rate of return /**IRR**/ **77 %** which is much above the opportunity cost of capital, **B/C ratio of 6.86** which is above one to bring added value for investment capital and under the financial viability indicators worth for implementation. The project is still viable assuming increase in investment cost by 10 % and decrease in benefit by 10 %. The project is still viable even assuming simultaneous adverse change in both Variables and advisable to implement in line with proposed development plan.

With and without project return and cost analysis computed and the results of financial analyses show viability of the project from financial & economic aspect and recommend for investment.

Appendix 3 Quantity of crop production "With" the project situation

Ser. No	Crop Type	Year 1			Year 2			Year 3			Year 4			Year 5 to 15		
		Yield (Qu/ha)	Area (ha)	Prod _n (Qu)	Yield (Qu/ha)	Area (ha)	Prod _n (Qu)	Yield (Qu/ha)	Area (ha)	Prod _n (Qu)	Yield (Qu/ha)	Area (ha)	Prod _n (Qu)	Yield (Qu/ha)	Area (ha)	Prod _n (Qu)
1	Tomato	17150	35	600250	17850	35	624750.0	18900.0	33	623700.0	20300.0	33	669900	22400.0	35	784000.0
2	Pepper	1500	30	45000	2100	30	63000.0	3000.0	32	96000.0	3600.0	32	115200	3900.0	30	117000.0
3	Maize	4750	25	118750	5000	25	125000.0	5500.0	24	132000.0	6000.0	23	138000	6500.0	25	162500.0
4	Sorghum	1440	18	25920	1620	18	29160.0	1800.0	19	34200.0	1980.0	20	39600	2160.0	18	38880.0
5	Millet	750	15	11250	750	15	11250.0	900.0	15	13500.0	1050.0	15	15750	1200.0	15	18000.0
6	Banana	3150	9	28350	3240	9	29160.0	3420.0	9	30780.0	3780.0	9	34020	4320.0	9	38880.0
7	Avocado	3510	9	31590	3600	9	32400.0	3960.0	9	35640.0	4320.0	9	38880	4860.0	9	43740.0
8	Mango	3690	9	33210	3870	9	34830.0	4230.0	9	38070.0	4590.0	9	41310	5130.0	9	46170.0

Appendix 4 Value of crop production for the "With" project situation (000 Birr)

Ser. No	Crop Type	Price per Qu (Birr)	Year 1		Year 2		Year 3		Year 4		Year 5 to 15	
			Prod _n (Qu)	Value (Birr)								
1	Tomato	1.2	17150	20580	17850	21420	18900	22680	20,300	24360	22400	26880
2	Pepper	5	1500	7500	2100	10500	3000	15000	3,600	18000	3900	19500
3	Maize	0.7	4750	3325	5000	3500	5500	3850	6,000	4200	6500	4550
4	Sorghum	0.8	1440	1152	1620	1296	1800	1440	1,980	1584	2160	1728
5	Millet	0.6	750	450	750	450	900	540	1,050	630	1200	720
6	Banana	1	3150	3150	3240	3240	3420	3420	3,780	3780	4320	4320
7	Avocado	1.2	3510	4212	3600	4320	3960	4752	4,320	5184	4860	5832
8	Mango	1.2	3690	4428	3870	4644	4230	5076	4,590	5508	5130	6156

Appendix 5 "with" the project inputs requirement & cost of production per Hectare

Ser. №	Crop Type	Seed (plant Mater)			Fertilizer					Chemicals							Packing Materials			Total Cost of Production ha (Birr)
		Rate (Qu/ha)	Price /Qu (Birr)	Total cost/Ha (Birr)	NPS (Qu)	Unit Price (Birr)	UREA (Qu)	Unit Price (Birr)	Total Cost (Birr)	Pesticides			Fungicide				Qty (№)	Unit Price (Birr)	Total Cost (Birr)	
										Qty (Lt)	Unit Price (Birr)	Total Cost (Birr)	Qty (Kg)	Unit Price (Birr)	Total Cost (Birr)	Total Chem. Cost (Birr)				
1	Tomato	0.02	1500	30	0.5	1315	0.5	1270	1292.5	2	120.0	240		149	0	240	78400	10	784000	785562.50
2	Pepper	0.02	250	5	0.5	1315	1	1270	1927.5	2	120.0	240	1	149	149	389	11700	10	117000	119321.50
3	Maize	0.25	1400	350	0.5	1315	0.5	1270	1292.5	1	120.0	120		149	0	120	16250	10	162500	164262.50
4	Sorghum	0.16	900	144	0.5	1315	0.5	1270	1292.5	2	120.0	240		149	0	240	3888	10	38880	40556.50
5	Millet	0.15	0	0	1	1315	1.5	1270	3220.0	2	120.0	240		149	0	240	1800	10	18000	21460.00
6	Banana	0	0	0	0.5	1315	1	1270	1927.5		120.0	0		149	0	0	3888	10	38880	40807.50
7	Avocado	0	75	0	1	1315	1	1270	2585.0	2	120.0	240		149	0	240	4374	10	43740	46565.00
8	Mango	0	0	0	0.5	1315	0.5	1270	1292.5		120.0	0		149	0	0	4617	10	46170	47462.50

Appendix 6 "With" the project production costs

Ser. №	Crop Type	Cost of Prod. /ha (000Birr)	Year 1		Year 2		Year 3		Year 4		Year 5 to 15	
			Area ha	Cost of Prod. /ha (000Birr)	Area ha	Cost of Prod. /ha (000Birr)	Area ha	Cost of Prod. /ha (000Birr)	Area ha	Cost of Prod. /ha (000Birr)	Area ha	Cost of Prod. /ha (000Birr)
1	Tomato	785.56	35	27494.69	35	27494.69	33	25923.6	33	25923.6	35	27494.69
2	Pepper	119.32	30	3579.65	30	3579.65	32	3818.3	32	3818.3	30	3579.65
3	Maize	164.26	25	4106.56	25	4106.56	24	3942.3	23	3778.0	25	4106.56
4	Sorghum	40.56	18	730.02	18	730.02	19	770.6	20	811.1	18	730.02
5	Millet	21.46	15	321.90	15	321.90	15	321.9	15	321.9	15	321.90
6	Banana	40.81	9	367.27	9	367.27	9	367.3	9	367.3	9	367.27
7	Avocado	46.57	9	419.09	9	419.09	9	419.1	9	419.1	9	419.09
8	Mango	47.46	9	427.16	9	427.16	9	427.2	9	427.2	9	427.16

Appendix 7 Computation of Net Incremental Benefit (000 Birr)

Project Years	Without Project Total costs	With project cost					Incremental Projects costs	Gross value of prodn.				Net incremental benefit before finance	Financing			Net Incremental Benefit after Financing
		Total Inv't costs	Total Oper. costs	Base line cost	Physical conting 5%	Total Project costs		"Without" project	"with project	salvage value	Incremental Benefit		Loan	Pay't of Interest	Repay't of Principal	
0		31,171.73	0.00	31,171.73	1,558.59	32,730.32	32,730.32				0.00	-32,730.32				-32,730.32
1	107.59	74.25	513.27	587.52	29.38	616.90	509.31	22,398.50	44,797.00		22,398.50	21,889.19				21,889.19
2	16.84	0.00	513.27	513.27	25.66	538.94	522.10	24,685.00	49,370.00		24,685.00	24,162.90				24,162.90
3	16.84	0.00	164.13	164.13	8.21	172.34	155.50	28,379.00	56,758.00		28,379.00	28,223.50				28,223.50
4	36.09	15.75	164.01	179.76	8.99	188.75	152.66	31,623.00	63,246.00		31,623.00	31,470.34				31,470.34
5	16.84	0.00	165.59	165.59	8.28	173.87	157.03	34,843.00	69,686.00		34,843.00	34,685.97				34,685.97
6	71.84	45.00	165.59	210.59	10.53	221.12	149.28	34,843.00	69,686.00		34,843.00	34,693.72				34,693.72
7	36.09	13.50	165.59	179.09	8.95	188.04	151.95	34,843.00	69,686.00		34,843.00	34,691.05				34,691.05
8	33.34	0.00	165.59	165.59	8.28	173.87	140.53	34,843.00	69,686.00		34,843.00	34,702.47				34,702.47
9	16.84	15.75	165.59	181.34	9.07	190.40	173.57	34,843.00	69,686.00		34,843.00	34,669.43				34,669.43
10	36.09	45.00	165.59	210.59	10.53	221.12	185.03	34,843.00	69,686.00		34,843.00	34,657.97				34,657.97
11	71.84	0.00	165.59	165.59	8.28	173.87	102.03	34,843.00	69,686.00		34,843.00	34,740.97				34,740.97
12	16.84	15.75	165.59	181.34	9.07	190.40	173.57	34,843.00	69,686.00		34,843.00	34,669.43				34,669.43
13	36.09	0.00	165.59	165.59	8.28	173.87	137.78	34,843.00	69,686.00		34,843.00	34,705.22				34,705.22
14	16.84	0.00	165.59	165.59	8.28	173.87	157.03	34,843.00	69,686.00		34,843.00	34,685.97				34,685.97
15	16.84	0.00	165.59	165.59	8.28	173.87	157.03	34,843.00	69,686.00	7,792.93	42,635.93	42,478.90				42,478.90
Total	546.84	31396.73	3176.15	34572.88	1728.64	36301.52	35754.69	490358.50	980717.00	7792.93	498151.43	462396.75	0.00	0.00	0.00	462396.75

Appendix 8 Sensitivity Analysis Results (000 Birr) cost increase by 10 %

Project Years	Without Project Total Cost	"With project cost					Cost Increase by10%	Incremental project costs	Incremental Benefit	Net incremental benefit Before finance	Financing			Net Incremental Benefit after Financing
		Total Inv't Cost	Total Oper. Cost	Base Line Cost	Physical conting5%	Total Project Cost					Loan	Payment of Interest	Repayment of Principal	
0		31,171.73	0.00	31,171.731	1558.587	32730.318	36003.349	36003.349	0.00	-36003.349				-36,003.34931
1	107.59	74.25	513.27	587.522	29.37611	616.898	678.588	570.999	22,398.50	21827.501				21,827.50079
2	16.84	0.00	513.27	513.272	25.66361	538.936	592.829	575.990	24,685.00	24109.010				24,109.00954
3	16.84	0.00	164.13	164.131	8.206571	172.338	189.572	172.733	28,379.00	28206.267				28,206.26726
4	36.09	15.75	164.01	179.758	8.987885	188.746	207.620	171.531	31,623.00	31451.469				31,451.46889
5	16.84	0.00	165.59	165.588	8.27938	173.867	191.254	174.415	34,843.00	34668.585				34,668.58536
6	71.84	45.00	165.59	210.588	10.52938	221.117	243.229	171.390	34,843.00	34671.610				34,671.61036
7	36.09	13.50	165.59	179.088	8.95438	188.042	206.846	170.757	34,843.00	34672.243				34,672.24286
8	33.34	0.00	165.59	165.588	8.27938	173.867	191.254	157.915	34,843.00	34685.085				34,685.08536
9	16.84	15.75	165.59	181.338	9.06688	190.404	209.445	192.606	34,843.00	34650.394				34,650.39411
10	36.09	45.00	165.59	210.588	10.52938	221.117	243.229	207.140	34,843.00	34635.860				34,635.86036
11	71.84	0.00	165.59	165.588	8.27938	173.867	191.254	119.415	34,843.00	34723.585				34,723.58536
12	16.84	15.75	165.59	181.338	9.06688	190.404	209.445	192.606	34,843.00	34650.394				34,650.39411
13	36.09	0.00	165.59	165.588	8.27938	173.867	191.254	155.165	34,843.00	34687.835				34,687.83536
14	16.84	0.00	165.59	165.588	8.27938	173.867	191.254	174.415	34,843.00	34668.585				34,668.58536
15	16.84	0.00	165.59	165.588	8.27938	173.867	191.254	174.415	42,635.93	42461.518				42,461.51811
Total	546.8356	31396.731	3176.147	34572.878	1728.6439	5006.556	39931.674	39384.839	498151.433	458766.594	0.000	0.000	0	458,766.59394

Appendix 9 Sensitivity Analysis Results (000 Birr) Benefit decrease by 10 %

Project Years	Without Project Total Cost	With project TC Including Physical Contingency 5%	Incremental Project Costs	Gross value of production				Net Incremental Benefit Before Financing	Financing			Net Incremental Benefit Before Financing	
				"Without" Project	"With" Project	Salvage Value	benefit decrease by 10%		Incremental Benefit	Loan	Payment of Interest		Repayment of Principal
0		32,730.32	32,730.32				-	-	(32,730.32)				(32,730.32)
1	107.59	616.90	509.31	22,398.50	44,797.00		40,317.30	17,918.80	17,409.49				17,409.49
2	16.84	538.94	522.10	24,685.00	49,370.00		44,433.00	19,748.00	19,225.90				19,225.90
3	16.84	172.34	155.50	28,379.00	56,758.00		51,082.20	22,703.20	22,547.70				22,547.70
4	36.09	188.75	152.66	31,623.00	63,246.00		56,921.40	25,298.40	25,145.74				25,145.74
5	16.84	173.87	157.03	34,843.00	69,686.00		62,717.40	27,874.40	27,717.37				27,717.37
6	71.84	221.12	149.28	34,843.00	69,686.00		62,717.40	27,874.40	27,725.12				27,725.12
7	36.09	188.04	151.95	34,843.00	69,686.00		62,717.40	27,874.40	27,722.45				27,722.45
8	33.34	173.87	140.53	34,843.00	69,686.00		62,717.40	27,874.40	27,733.87				27,733.87
9	16.84	190.40	173.57	34,843.00	69,686.00		62,717.40	27,874.40	27,700.83				27,700.83
10	36.09	221.12	185.03	34,843.00	69,686.00		62,717.40	27,874.40	27,689.37				27,689.37
11	71.84	173.87	102.03	34,843.00	69,686.00		62,717.40	27,874.40	27,772.37				27,772.37
12	16.84	190.40	173.57	34,843.00	69,686.00		62,717.40	27,874.40	27,700.83				27,700.83
13	36.09	173.87	137.78	34,843.00	69,686.00		62,717.40	27,874.40	27,736.62				27,736.62
14	16.84	173.87	157.03	34,843.00	69,686.00		62,717.40	27,874.40	27,717.37				27,717.37
15	16.84	173.87	157.03	34,843.00	69,686.00	7,792.93	70,510.33	35,667.33	35,510.30				35,510.30
Total	546.84	36,301.52	35,754.69	490,358.50	980,717.00	7,792.93	890,438.23	400,079.73	364,325.05	-	-	-	364,325.05