

**MINISTRY OF AGRICULTURE AND COOPERATIVES  
THE GOVERNMENT OF THE REPUBLIC OF ZAMBIA**

**THE STUDY  
ON  
THE CAPACITY BUILDING AND  
DEVELOPMENT  
FOR  
SMALLHOLDER IRRIGATION SCHEME  
IN  
NORTHERN AND LUAPULA PROVINCES  
IN  
THE REPUBLIC OF ZAMBIA**

**APPENDIXES**

**JULY 2011**

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
SANYU CONSULTANTS INC., JAPAN**



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## ACRONYMS AND ABBREVIATIONS

ADSP	Agriculture Development Support Programme (WB)
AMIC	Agricultural Marketing Information Center
ASP	Agricultural Support Programme (SIDA)
AfDB	African Development Bank
COBSI	Community Based Smallholder Irrigation (this Study undertakes)
CBO	Community Based Organization
CSO	Central Statistical Organization
DACO	District Agricultural Coordinator
DAM	Department of Agribusiness and Marketing (under MACO)
DC	Department of Cooperatives (under MACO)
DF	Department of Fisheries (under the Ministry of Livestock and Fisheries)
DFID	Department of International Development (UK)
DOA	Department of Agricultural
DPP	Department of Policy and Planning (under MACO)
DSA	Debt Sustainability Analysis
DVLD	Department of Veterinary and Livestock Department
EU	European Union
FAO	Food and Agriculture Organization
FoDiS	Food Crop Diversification Support Project for Enhancement of Food Security
FISP	Farmer Input Support Programme
FNDP	Fifth National Development Plan (of Zambia, 2006 – 2010)
FSP	Fertilizer Support Programme
GOJ	Government of Japan
GRZ	Government of Republic of Zambia
HDI	Human Development Index
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
HIPC	Highly Indebted Poor Country
HRA	Human Resources Administration (under MACO)
IDA	International Development Association
IDF	Irrigation Development Fund
IFMIS	Integrated Financial Management and Information System
IMF	International Monetary Fund
IRRI	International Rice Research Institute
JICA	Japan International Cooperation Agency
JSPRF	Justice and Solidarity for Poverty Reduction Fund, a Catholic Fund
MACO	Ministry of Agriculture and Cooperatives
MDG	Millennium Development Goal
MIS	Management Information System
MTEF	Mid Term Expenditure Framework
NAP	National Agricultural Policy (2004 – 2015)
NAIS	National Agricultural Information Services (under MACO)
NERICA	New Rice for Africa
NGO	Non-Government Organization
NIP	National Irrigation Plan (2006 – 2011)

NPK	Nitrogen, Phosphate, Potassium
NPV	Net Present Value
PACO	Provincial Agricultural Coordinator
PAO	Provincial Agricultural Officer
PaViDIA	Participatory Village Development in Isolated Areas (JICA)
PCM	Project Cycle Management
PIE	Provincial Irrigation Engineer
PLARD	Program for Luapula Agricultural and Rural Development (Government of Finland)
PRA	Participatory Rural Appraisal
PRBS	Poverty Reduction Budget Support
PRP	Poverty Reduction Programme
RIF	Rural Investment Fund, the World Bank
PRGF	Poverty Reduction and Growth Facility
SWAP	Sector Wide Approach
SAO	Senior Agricultural Officer
SCCI	Seed Control and Certification Institute
SIWUP	Smallholder Irrigation and Water Use Programme (FAO)
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TOT	Training of Trainers
TSB	Technical Services Branch (the principal counterpart organization at the DOA HQs)
WS	Workshop
WFP	World Food Programme
ZESCO	Zambia Electricity Supply Company
ZNCB	Zambia National Commercial Bank
ZMK	Zambian Kwacha
ZARI	Zambia Agricultural Research Institute

### **UNIT CONVERSION**

1 meter (m)	=	3.28 feet
1 kilometer (km)	=	0.62 miles
1 hectare (ha)	=	2.47 acres
1 acre	=	0.405 ha
1 inch (in.)	=	2.54 cm
1 foot (ft.)	=	12 inches (30.48 cm)
1 ac-ft	=	1233.4 cum

### **CURRENCY EQUIVALENTS (AS AT MARCH 2011)**

US\$ 1.00	=	ZMK 4,808 (TTB)
US\$ 1.00	=	81.73 Japanese Yen (TTB)
ZMK 1.00	=	0.017 Yen

### **ZAMBIA FINANCIAL YEAR**

January 1 to December 31

# **APPENDIX-I**

## **IMPLEMENTATION ARRANGEMENT OF THE STUDY**





## **I.1 JICA TEAM MEMBERS AND COUNTERPART PERSONNEL**

### **I.1.1 JICA TEAM MEMBERS**

Kosei HASHIGUCHI (Mr.)	Team Leader/ Irrigation Development Planning
Tatsuya IEIZUMI (Mr.)	Co-leader/ Irrigation Technology/ GIS
Hideaki HIRUTA (Mr.)	Farm Management/ Farmers' Training/ Water Management/ IEC2
Tomoko NISHIGAKI (Ms.)	Farmers' Organization/ Agricultural Produce Marketing/ IEC2
Yasuharyu YOTSUMOTO (Mr.)	Logistics/ Irrigation Facilities (in 2009)
Yoshihiro SAGAWA (Mr.)	Logistics/ Irrigation Facilities/ IEC (in 2010)
Ryu TOSHIMA (Mr.)	Logistics/ Irrigation Facilities/ IEC (in 2011)

### **I.1.2 COUNTERPART PERSONNEL**

#### **At the MACO Headquarters**

Mr. Henry Sichembe	Deputy Director, Technical Services, DOA
Mr. George W. Sikuleka	Chief Irrigation Engineer, DOA
Mr. Cornelius M. Sitali	Principal Irrigation Engineer, DOA

#### **At the MACO Northern Province**

Mr. Kenneth Zulu	Provincial Irrigation Engineer, Northern Province
Mr. Kelvin Simukoko	Senior Technical Officer, Northern Province
Mr. Frank Mwansa	Campassman, Northern Province
Mrs. Annie Bulaya K.	Junior Technical Officer, Northern Province

#### **At the MACO Luapula Province**

Mr. Alex L. Kabwe	Provincial Irrigation Engineer, Luapula Province (in 2009)
Mr. Emmanuel Siwale	Provincial Irrigation Engineer, Luapula Province (in 2010-11)

### **I.1.3 STEERING COMMITTEE MEMBERS**

Mrs. Mary M. Chipili	Director of Agriculture, DOA, MACO
Mr. J.J. Shawa	Director of Policy and Planning, MACO
Mr. G. Mbozi	Director of Agribusiness and Marketing, MACO
Mrs. M.A. Sitwala	Director, Cooperative, MACO
Dr. M Mwale	Zambia Agriculture Research Institute, MACO
Mr. A. Hussien	Director, Department of Water Affairs
Mr. H. Sichembe	Deputy Director, Technical Service Branch, DOA
Dr. R.M. Kamona	Deputy Director, Advisory, DOA
Mr. A. Daka	Deputy Director, Crops, DOA
Mr. G. Sikuleka	Chief Irrigation Engineer, Technical Service Branch, DOA
Mrs. O. Chisala	Provincial Agricultural Coordinator, Luapula Province
Mr. L. Liyembani	Provincial Agricultural Coordinator, Northern Province
Mr. Kenneth Zulu	Provincial Irrigation Engineer, Northern Province

I.2 PERSON-MONTH INPUT FOR THE STUDY

Person-Month Input: The Study on the Capacity Building and Development for Community-based Smallholder Irrigation Scheme

Expertise	Name	2009												2010												2011																																													
		F	M	A	M	J	J	A	S	O	N	D	J	F	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J																																	
Team Leader / Irrigation Development Planning	Kosei HASHIGUCHI	Phase 1												Phase 2																																																									
		24	5	24	9									1	11											29	12											1	13											2	19	24	3																		
Co-leader / Irrigation Technology / GIS	Tatsuya IEIZUMI	Phase 1												Phase 2																																																									
		7												13	20											29												13	20											2	19	24	3																		
Farm Management / Farmers' Training / Water Management / IEC2	Hideaki HIRUTA	Phase 1												Phase 2																																																									
		27												29	11											22												13	27	8	12									2	19	24	3																		
Farmers' Organization / Agricultural Produce Marketing / IEC2	Tomoko NISHIGAKI	Phase 1												Phase 2																																																									
		23																								22												14	21											28	13																				
IEC	Yoshihiro SAGAWA	Phase 1												Phase 2																																																									
																																						4												14	21											28	13								
Secretary / Irrigation Facilities	Yasuharu YOTSUMOTO Yoshiro SAGAWA Ryu TOSHIMA	Phase 1												Phase 2																																																									
		7												7	11											11												11	28											23	19	24	3																		
Report		Phase 1												Phase 2																																																									
		ICR April 9												ITR1 April 26 (M)												PRR2 August 10 (Tue)												PRR3 December 10 (Fri)																																	
Major Activities		Phase 1												Phase 2																																																									
		Situation Analysis Identification of Smallholder Irrigation Development Pilot Project (Demonstrative; Temporary Weirs) Formulation of Draft Action Plan												Extension of Pilot Project (Temporary Weirs) Upgrading of Temporary Ones Rehabilitation of Existing Ones Finalization of Action Plan																																																									

■ : Work in Zambia  
□ : Work in Japan


**I.3 SCOPE OF WORK AND MINUTES OF MEETINGS FOR THE STUDY**

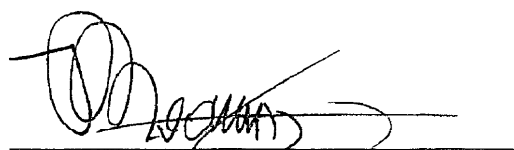
**SCOPE OF WORK  
FOR  
THE STUDY  
ON  
THE CAPACITY BUILDING AND DEVELOPMENT  
FOR COMMUNITY-BASED SMALLHOLDER IRRIGATION SCHEME  
IN  
NORTHERN AND LUAPULA PROVINCES  
IN  
THE REPUBLIC OF ZAMBIA**

**AGREED UPON  
BETWEEN**

**MINISTRY OF AGRICULTURE AND COOPERATIVES  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY**

Lusaka, June 27, 2007

  
Kazuo NISHIMAKI  
*Member of Preparatory Study Team,  
Japan International Cooperation Agency*

  
Mr. Richard M. CHIZYUKA  
*Permanent Secretary (Agriculture)  
Ministry of Agriculture and Cooperatives  
The Republic of Zambia*

## **I INTRODUCTION**

In response to the request of the Government of the Republic of Zambia (hereinafter referred to as "GRZ"), the Government of Japan (hereinafter referred to as "GOJ") has decided, in accordance with the relevant laws and regulations in force in Japan, to conduct the Study on the capacity building and development of community-based smallholder irrigation scheme in Northern and Luapula Provinces in the Republic of Zambia (hereinafter referred to as "the Study").

Based on the decision of GOJ, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs, will undertake the Study in close cooperation with the concerned authorities of the GRZ.

The present document sets forth the Scope of Work with regard to the Study.

## **II OBJECTIVES OF THE STUDY**

The overall goal of the Study is to secure the Food security in the Republic of Zambia through promoting irrigated agriculture in the community-based smallholder irrigation schemes.

The specific objectives of the Study are:

1. To formulate Action Plan (hereinafter referred to as the "A/P") to promote community-based smallholder irrigation scheme development for improving the agriculture productivity in Northern and Luapula Provinces.
2. To transfer and build the capacity in community-based smallholder irrigation development for Zambian counterpart personnel and concerned communities.

## **III STUDY AREA**

The Study area for the A/P shall cover Northern and Luapula Provinces of the Republic of Zambia. (See ANNEX I)

## **IV SCOPE OF THE STUDY**

In order to achieve the objectives above, the Study shall consist of the following items:

(Phase 1)

1. Identification of the potential area of the target area regarding community-based smallholder irrigation development.
  - 1-1. To collect and analyze related data and information in the field of irrigation development (e.g. the existing project(s), study results, irrigation development policy and strategies, and environmental policy);
  - 1-2. To collect and analyze relevant data and information of the nature, society and market

condition in the target area;

1-3. To compile the resource map regarding the nature, society and market condition of the target area;

1-4. To classify the potential area for community-based smallholder irrigation schemes;

1-5. To classify the natural resource condition and type of the target farmers;

1-6. To propose the recommendation crops for the community-based smallholder irrigation schemes; and,

1-7. To formulate an inventory of the existing irrigation schemes.

2. Formulation of packages\* for the community-based smallholder irrigation schemes.

\* : This package is a comprehensive process and implementation mechanism with low input technology.

2-1. To select high potential candidacy area for community-based smallholder irrigation schemes.

2-2. To conduct field survey in the high potential area for technical aspect, socio-cultural aspect, economical aspect, and so on;

2-3. To specify the local human and material resources (Arrangement of extension officer, local construction supplies and presence of local contractor.).

2-4. To formulate draft package of methodologies of development, rehabilitation, operation and maintenance for the smallholder irrigation schemes;

2-5. To select pilot areas to implement the verification studies; and,

2-6. To conduct baseline survey and formulate draft implementation plan for verification studies.

3. Formulation of draft A/P.

(Contents of draft A/P)

3-1. Plan for community-based smallholder irrigation scheme development;

3-2. Plan for farm management;

3-3. Plan for water management improvement;

3-4. Plan for extension service;

3-5. Plan for implementation and budget

(Phase 2)

4. Verification study for the model package of methodologies for development rehabilitation and operation & maintenance for the exiting community-based smallholder irrigation schemes.

4-1. To formalize the agreement with farmers in the verification study area to join the verification study;

- 4-2. To conduct and monitor the verification studies; and,
- 4-3. To verify the validity of the methodologies for development, rehabilitation and operation & maintenance for the community-based smallholder irrigation schemes; and,
- 5. Capacity Development in the course of the verification study.
- 6. Finalization of the A/P by feeding back the results of the verification study.

**V STUDY SCHEDULE**

The Study will be carried out in accordance with the attached tentative schedule. (See ANNEX II)

**VI REPORTS**

JICA shall prepare and submit the following reports in English to GRZ.

- Inception Report: Thirty (30) copies at the commencement of the Study
- Interim Report: Thirty (30) copies at the middle of the Study
- Progress Report(s): Thirty (30) copies at the course of the Study
- Draft Final Report: Forty (40) copies at the end of the field work; GRZ will provide JICA with its comments on the Draft Final Report within one (1) month of the receipt of the Draft Final Report
- Final Report: Fifty (50) copies within two (2) months of the receipt of GRZ's comments on the Draft Final Report

**VII UNDERTAKING OF THE GRZ**

- 1. To facilitate the smooth conduct of the Study, GRZ shall take necessary measures:
  - (1) To permit the members of the Study Team to enter, leave and sojourn in the Republic of Zambia for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees;
  - (2) To exempt the members of the Study Team from taxes, duties and any other charges on equipment, machinery and other material brought into the Republic of Zambia for the implementation of the Study;
  - (3) To exempt the members of the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with the implementation of the Study; and
  - (4) To provide necessary facilities to the Study Team for the remittance as well as utilization of

*A*



the funds introduced into the Republic of Zambia from Japan in connection with the implementation of the Study.

2. GRZ shall bear claims, if any arise, against the members of the Study Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the Study Team.
3. Ministry of Agriculture and Cooperatives, at its own expense, where necessary, provide the Study Team with the following, in cooperation with other organizations concerned:
  - (1) Security and safety of the Study Team and the relevant information;
  - (2) Information as well as assistance in obtaining medical service;
  - (3) Available data (including maps and photographs) and information related to the Study;
  - (4) Counterpart personnel;
  - (5) Suitable office space with furniture and telephone facilities; and
  - (6) Credentials or identification cards.

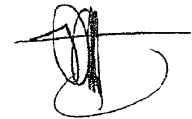
#### **VIII UNDERTAKING OF JICA**

For the implementation of the Study, JICA shall take the following measures:

1. To dispatch, at its own expense, a study team to the Republic of Zambia, and
2. To pursue technology and skills transfer to Zambian counterpart personnel as well as the communities in the course of the Study.

#### **IX CONSULTATION**

JICA and Ministry of Agriculture and Cooperatives shall consult with each other in respect of any matter that may arise from or in connection with the Study.







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### TENTATIVE STUDY SCHEDULE

MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30																																																																						
PHASE	Phase 1												Phase 2																																																																																							
WORK IN Zambia	[Wavy pattern bar]												[Wavy pattern bar]																																																																																							
WORK IN JAPAN	[Empty box]												[Empty box]																																																																																							
REPORT	①	△	②	△	③	△	④	△	⑤	△	⑥	△	⑦	△	⑧	△	⑨	△	⑩	△	⑪	△	⑫	△	⑬	△	⑭	△	⑮	△	⑯	△	⑰	△	⑱	△	⑲	△	⑳	△	㉑	△	㉒	△	㉓	△	㉔	△	㉕	△	㉖	△	㉗	△	㉘	△	㉙	△	㉚	△	㉛	△	㉜	△	㉝	△	㉞	△	㉟	△	㊱	△	㊲	△	㊳	△	㊴	△	㊵	△	㊶	△	㊷	△	㊸	△	㊹	△	㊺	△	㊻	△	㊼	△	㊽	△	㊾	△	㊿	△

- ① Inception Report
- ② Progress Report 1
- ③ Interim Report
- ④ Progress Report 2
- ⑤ Progress Report 3
- ⑥ Draft Final Report
- ⑦ Final Report


MINUTES OF MEETING  
ON  
SCOPE OF WORK  
FOR  
THE STUDY  
ON  
THE CAPACITY BUILDING AND DEVELOPMENT  
FOR COMMUNITY-BASED SMALLHOLDER IRRIGATION SCHEME  
IN  
NORTHERN AND LUAPULA PROVINCES  
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THE REPUBLIC OF ZAMBIA

AGREED UPON  
BETWEEN

MINISTRY OF AGRICULTURE AND COOPERATIVES  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

Lusaka, June 27, 2007

  
\_\_\_\_\_  
Dr. Kazuo NISHIMAKI  
*Leader of Preparatory Study Team,  
Japan International Cooperation Agency  
Japan*

  
\_\_\_\_\_  
Mr. Richard M. CHIZYUKA  
*Permanent Secretary(Agriculture)  
Ministry of Agriculture and Cooperatives  
The Republic of Zambia*

## I INTRODUCTION

In response to the request from the Government of the Republic of Zambia (hereinafter referred to as "GRZ"), the Japanese preparatory study team (hereinafter referred to as "the Team") headed by Dr. Ryuzo NISHIMAKI was sent to the Republic of Zambia by the Japan International Cooperation Agency (hereinafter referred to as "JICA") from 19<sup>th</sup> to 27<sup>th</sup> June, 2007 for the purpose of discussing and confirming the Scope of Work for the Study on the Capacity Building and Development for community-based smallholder irrigation scheme in Northern and Luapula Provinces in the Republic of Zambia (hereinafter referred to as "the Study").

The Team held a series of discussions with representatives of the Ministry of Agriculture and Cooperatives (hereinafter referred to as "MACO").

The following are the main issues discussed and agreed upon by both sides in relation to the Scope of Work. A list of participants in the series of meetings is attached as Annex I.

## II RESULTS OF DISCUSSION

### 1. Target Year of the Study

Both sides agreed that in the course of the Study the Action Plan should be in line with the National Irrigation Plan (NIP) and the National Agricultural Policy (NAP).

### 2. Counterpart Personnel

Both sides agreed that MACO should take responsibility for assigning appropriate number of qualified counterpart personnel prior to the arrival of the JICA Study Team in Zambia.

MACO will include proposals in the current Mid Term Expenditure Framework (MTEF) to fund the travel expenses of the counterpart personnel.

### 3. Coordination Mechanism

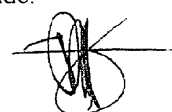
Both sides agreed to establish a Technical Working Group consisting of the Study Team and the Zambian counterparts, and personnel from related Zambian institutions where necessary, in order to share technical information and to support the Study. MACO agreed to make necessary arrangements to avail and organize members of the Technical Working Group.

### 4. Necessary Equipment and Facilities for the Study

MACO agreed to provide the Study Team with suitable office space and furniture in MACO, Northern and Luapula Provinces and exclusive use of telephone lines.

Both sides agreed that MACO would provide the telephone facilities and that the bills for the use of the telephone would be paid by the Study Team.

MACO requested that GOJ provides some equipment needed for the Study. These include:



- 1) Vehicle and relevant equipments
- 2) Copy machine and supplies;
- 3) Fax machine;
- 4) Personal computer(s) and accessories;
- 5) Printer(s);
- 6) Other equipment necessary for smooth implementation of the Study and for ensuring the outputs of the Study.

The Team made commitment to convey the request to GOJ.

#### **5. Training of Counterpart Personnel and Others**

Considering the importance of capacity building in the Study, both sides agreed that the training activities of those concerned with the Study should be fully initiated in Zambia as well as in other countries (i.e. Tanzania, Kenya, Malawi, and Japan).

#### **6. Reports**

Both sides agreed that all the reports of the Study would be made available to stakeholders and open to the public.



## LIST OF ATTENDANCE

### Ministry of Agriculture and Cooperatives

Mr. CHIZYUKA Richard M.	Permanent Secretary (Agriculture)
Mr. AKAYOMBOKWA Imataa	Director, Department of Agriculture
Mr. SICHEMBE Henry	Deputy Director, Technical Service Branch
Mr. SIKULEKA George	Chief Irrigation Engineer, Technical Service Branch
Mr. ZULU Kenneth	Provincial Irrigation Engineer, Northern Province

### Preparatory Study Team

Dr. NISHIMAKI Ryuzo	Team Leader
Mr. MIYASAKA Minoru	Rural Development
Mr. UCHIJIMA Mitsutaka	Project Planning/Preliminary Evaluation
Mr. ITO Masaki	Irrigation

### JICA Zambia Office

Mr. INUI Eiji	Resident Representative
Ms. MASUOKA Mahomi	Assistant Resident Representative
Mr. CHIBBAMULILO Patrick	Senior Programme Officer




**I.4 Minutes of Meetings Concluded in the Process of the Study**

**MINUTES OF THE MEETING  
OF  
INCEPTION REPORT  
ON APRIL 24, 2009  
FOR THE STUDY  
ON  
THE CAPACITY BUILDING AND DEVELOPMENT  
FOR  
SMALLHOLDER IRRIGATION SCHEMES  
IN  
NORTHERN AND LUAPULA PROVINCES  
IN  
THE REPUBLIC OF ZAMBIA**

**Lusaka, Zambia  
April 24, 2009**

## **LIST OF THE PARTICIPANTS**

### THE GOVERNMENT OF REPUBLIC OF ZAMBIA

1. Mr. Julius J. Shawa Director, Department of Policy and Planning (PPD), MACO
2. Mrs. Mary M. Chipili Director of Department of Agriculture (DOA), MACO
3. Dr. Watson Mwale Director, Zambia Agriculture Research Institute (ZARI),  
MACO
4. Mr. Henry Sichembe Deputy Director, Technical Services, DOA, MACO
5. Dr. Richard Kamona Deputy Director, Agriculture Advisory Services, DOA,  
MACO
6. Mr. George W. Sikuleka Chief Irrigation Engineer, DOA, MACO
7. Mr. Mwase Phiri Chief Vegetables and Floriculture officer, DOA, MACO
8. Mr. Luhamba Liyembani PACO, Northern Province, MACO
9. Mr. Charles Kapalasha PAO, Northern Province, MACO
10. Mr. Kenneth Zulu Provincial Irrigation Engineer, Northern Province, MACO
11. Mr. Alex L. Kabwe Provincial Irrigation Engineer, Luapula Province, MACO
12. Dr. Junji Takahashi JICA Advisor, MACO/ JICA
13. Mr. Atsushi Suzuki JICA Expert, FoDis / JICA

### JICA Zambia OFFICE

1. Mr. Yuichi MATSUSHITA Assistant Resident Representative, JICA Zambia Office
2. Mr. Patrick Chibbamulilo Senior Program Officer, JICA Zambia Office

### JICA STUDY TEAM

1. Mr. Kosei HASHIGUCHI Team Leader/ Irrigation Development Planning
2. Mr. Tatsuya IEIZUMI Co-leader/ Irrigation Technology/ GIS
3. Mr. Hideaki HIRUTA Farm Management / Farmers' Training / Water  
Management
4. Ms. Tomoko NISHIGAKI Farmers' Organization / Agricultural Produce  
Marketing
5. Mr. Yasuharu YOTSUMOTO Irrigation Facilities/ Secretary





## INTRODUCTION

Following the Scope of Works (SW) agreed between the Preparatory Study Team of the Japan International Cooperation Agency (JICA) and the Ministry of Agriculture and Cooperatives (MACO) on June 27, 2007, JICA fielded a Study Team to Zambia on March 7, 2009 for the implementation of “the Study on the Capacity Building and Development for Smallholder Irrigation Scheme in Northern and Luapula Provinces in the Republic of Zambia.” The Study Team, headed by Mr. Kosei HASHIGUCHI of Sanyu Consultants Inc., consists of six members, of which two members arrived in Lusaka on March 8, 2009.

The Study Team submitted 30 copies of the Inception Report (ICR) to MACO, the counterpart agency, following which a steering committee meeting was convened on April 9, 2009. Mr. Julius J. Shawa, Director, Department of Policy and Planning (PPD), who chaired the steering meeting, expressed his appreciation for the participants to attend. He pointed out that the objectives of the Study tie in very well with the emphasis of the Government in promoting food security, and thanked the Government of Japan for its assistance.

In the meeting, in accordance with the SW, the Team explained the plan of approach, plan of operation and the procedures for the implementation of the Study including the pilot projects. The list of the participants in the meeting is shown in the attachment.

## DISCUSSIONS

Based on the Inception Report submitted to MACO and the presentation made by the team leader of the Study Team, following were discussed and confirmed by the both parties:

1. MACO received 30 copies of the Inception Report from the Study Team.
2. Zambian side agreed with the study strategies, methodologies, procedures and schedules presented in the Inception Report with the following comments:

- 1) Sustainability of Simplified Irrigation Facilities

The Director of Department of Agriculture (DOA) expressed her concern on the relevancy of simplified weirs as an entry point of the Study in Luapula and Northern provinces where water resources are abundant. In such environment, simplified weirs constructed with local materials such as wooden logs, grasses, and clay soils can be easily washed away and farmers have to build them again and again. The director mentioned that even a concrete weir was once washed away in Luapula province due to heavy rain.

The team leader agreed that the weirs may be washed away. To deal with it, he explained that farmers have to dismantle the structure of the weirs after they have finished the irrigation of the season so that they can utilize major parts of the materials to reconstruct in the next season. He also referred to his similar experiences in a

neighboring country, in which 30-40 farmers constructed a simplified weir with a width of around 20m in just two days, implying that these weirs can be easily handled and reconstructed even by farmers.

The Director again expressed her concern over the sustainability of simplified weirs, that is, farmers may not appreciate repeating construction of the weirs every season. As an irrigation engineer, the team leader replied, he totally understands the necessity and effectiveness of permanent irrigation facilities but if the parties focus only on such facilities that requires a lot of inputs, farmers may have to wait for a longer period of time.

2) Rationality in Selecting a Study Area with Abundant Water

In relation to the first comment, a member of the committee raised an issue why these two provinces with abundant rainfall should have been selected as the study area rather than an area with inadequate water. Another member of the committee answered to that point that, in the national irrigation policy and strategies, especially the strategy number nine, existing water potential like *dambo* should be fully utilized for promoting food security, and Luapula and Northern provinces are the ones where a lot of *dambo* are available. He added that an important point in this circumstance is to capacitate farmers to utilize the resources. As one of the weaknesses this county associates with is the lack of construction materials, it is meaningful to utilize locally available resources through capacity development of the farmers.

3) Effectiveness of Step-wise Approach

One member praised that the step-wise approach of the Study in which simple structure is first constructed and be upgraded to a modern type; this is in line with the national strategy to promote gravity irrigation.

4) Importance of Agricultural Development in Addition to Irrigation Development

The chairperson of the committee emphasized the importance of agricultural development; once irrigation becomes available, production should be focused, including agronomy, extension, and diversification of crops. He also addressed the importance of studying the potential of each crop with regard to the marketability of the crops.

The team leader replied to the comments that irrigation is a means to the production; the team is going to carry out a market survey to recommend potential crops for irrigated agriculture. He stated that the team will address agriculture, on-farm irrigation, organizing of farmers in a series of trainings through the pilot projects. To this end, he said, the team would like to incorporate the ideas from Zambian side especially Zambia Agriculture Research Institute.

5) Counterpart Personnel at the Central Level

The team leader requested Zambian side to nominate counterpart personnel at the



central level in addition to the ones already assigned at the provincial/ district levels so that they can join and supervise what is going on at the provincial/ district/ camp levels. A member of the committee answered that, at the central level, at least the steering committee is monitoring the activities how the Study is going on.

6) Financial Arrangement by the both Parties

The Director of Agriculture raised an issue of financial arrangement that was referred to in the presentation; what kinds of contributions are requested to Zambian government, and what kind of, and how much of contribution JICA can make. She added that, for the personnel, human resources are available for the monitoring from Zambian side.

The team leader replied that, for the first financial year, with the budget arranged by JICA Headquarters, the Study can support the pilot project on a demonstrative basis including logistics for counterpart personnels, materials/ equipment required for the construction, etc. For the next financial year, he continued, no commitment has been made as any contents or the designs for the pilot project are not decided. It was also emphasized that, if the Study tries to implement the pilot projects in a wider range of area covering every corner of the provinces in the next phase, financial contribution from Zambian government would greatly facilitate it.

In response to the team leader's request, the director of DOA added that as for the first phase, the Zambian budget specifically for the irrigation development could hardly be available, although Zambian government would like to put contributions. She further mentioned that human resources are available, and therefore to gain some budget to mobilize them for the next phase, the Study should be successful in the first phase so that everyone could agree to go for it.

The committee also pointed out that it should be clarified how many and how long the human resources should be deployed for what specific activities in the Study. To this comment, the team leader mentioned that the team is going to try presenting the necessary arrangements when the team drafts up the contents of pilot projects to be implemented during phase two.

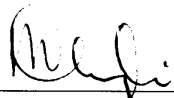
7) Environmental Impact Assessment

A member of the committee noted that there may be no experts in the study team who take charge of environmental issues, although full Environmental Impact Assessment (EIA) may not be required in the context of the Study.

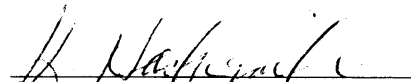
The team leader confirmed that environmental "examination" should be carried out, and it is possible for the study team to do as the team leader and some of other experts have decent experiences in the basic environmental examination. In addition, the team, as needs arise, will contact concerned department of environment, and may have to take into consideration engaging of local experts to take care of the environmental issue.

## Way Forward

1. Zambian side designated the members of the steering committee as listed in the attachment by issuing an official letter of the Permanent Secretary of MACO, “Appointment as Member in the Steering Committee for Smallholder irrigation Development Support in Northern and Luapula Provinces” dated March 27, 2009.
2. Pilot projects should be implemented by a close collaboration between the parties as its basic operation principle. Expected implementation arrangement is: designing by the team and core counterparts, frontline initiative by camp extension officers, day-to-day monitoring by the camp extension officers, evaluation by both parties, and financial arrangement to be elaborated as the Study progresses as discussed in the above No. 6) “Financial Arrangement by Both Parties”.
3. As stated in the SW, the Study shall be carried out in line with the National Irrigation Plan (NIP) so that the outcomes of the Study can be built in NIP for the next phase and the contents of the third category, Smallholder Irrigation Development, of NIP can be elaborated.
4. JICA Study Team expressed gratitude for the site office already allocated at PACO compound of Northern Province, MACO, with a telephone line for the team’s sole use. The office will be for the team up till the end of the Study.



Mrs. Mary M. CHIPILI  
Director, Department of Agriculture  
Ministry of Agriculture and Cooperatives  
The Government of Republic of Zambia



Mr. Kosei HASHIGUCHI  
Leader of the Study Team,  
Japan International Cooperation  
Agency (JICA)

## **LIST OF THE STEERING COMMITTEE MEMBERS**

1. Mrs. Mary Chipili, Director of Agriculture, MACO (the Chairperson)
2. Mr. J.J Shawa, Director of Policy and Planning, MACO
3. Mr. G. Mbozi, Director of Agribusiness and Marketing, MACO
4. Mrs. M.A. Sitwala, Director of Cooperatives, MACO
5. Dr. M. Mwale, Director, Zambia Agriculture Research Institute, MACO
6. Mr. A. Hussen, Director, Department of Water Affairs, Ministry of Water Affairs
7. Mr. H. Sichembe, Deputy Director, Technical Service Branch, MACO
8. Dr. R. M. Kamona, Deputy Director, Agriculture Advisory Services, MACO
9. Mr. A. Daka, Deputy Director, Crops, MACO
10. Mr. G. Sikuleka, Chief Engineer Irrigation, MACO
11. Mrs. O. Chisala, Provincial Agricultural Coordinator, Luapula Province, MACO
12. Mr. L. Liyambani, Provincial Agricultural Coordinator, Northern Province, MACO
13. Mr. Kenneth Zulu, Provincial Irrigation engineer, Northern Province, MACO
14. Mr. Alex L. Kabwe, Provincial Irrigation Engineer, Luapula Province, MACO



**MINUTES OF THE MEETING  
OF  
PROGRESS REPORT ONE  
ON  
AUGUST 6, 2009  
FOR  
THE STUDY  
ON  
THE CAPACITY BUILDING AND DEVELOPMENT  
FOR  
SMALLHOLDER IRRIGATION SCHEMES  
IN  
NORTHERN AND LUAPULA PROVINCES  
IN  
THE REPUBLIC OF ZAMBIA**

**Lusaka, Zambia  
August 6, 2009**

## **LIST OF THE PARTICIPANTS**

### THE GOVERNMENT OF REPUBLIC OF ZAMBIA

1. Mrs. Mary M. Chipili Director of Department of Agriculture (DOA), MACO
2. Mr. Adam. Hussen Director, Department of Water Affairs, Ministry of Energy and Water Development
3. Mr. Alick Daka Deputy Director, Crops, DOA, MACO
4. Mr. Henry Sichembe Deputy Director, Technical Services, DOA, MACO
5. Mr. Mwase Phiri Chief Vegetables and Floriculture officer, DOA, MACO
6. Mr. Cornelius M. Sitali Principal Irrigation Engineer, DOA, MACO
7. Mrs. Odineya Chisala PACO, Luapula Province, MACO
8. Mr. Luhamba Liyembani PACO, Northern Province, MACO
9. Mr. Kenneth Zulu Provincial Irrigation Engineer, Northern Province, MACO
10. Mr. Alex L. Kabwe Provincial Irrigation Engineer, Luapula Province, MACO
11. Mr. Atsushi Suzuki JICA Expert, FoDiS/ JICA
12. Ms. Hitomi Yamamoto JICA Expert, FoDiS/ JICA
13. Mr. Goichi Sasaki JICA Expert, PaViDIA/ JICA
14. Dr. Akira Sugimoto JICA Advisor, MACO/ JICA

### JICA Zambia OFFICE

1. Mr. Yuichi MATSUSHITA Assistant Resident Representative, JICA Zambia Office
2. Mr. Patrick Chibbamulilo Senior Program Officer, JICA Zambia Office

### JICA STUDY TEAM

1. Mr. Kosei HASHIGUCHI Team Leader/ Irrigation Development Planning
2. Mr. Tatsuya IEIZUMI Co-leader/ Irrigation Technology/ GIS
3. Mr. Hideaki HIRUTA Farm Management / Farmers' Training / Water Management



1



## INTRODUCTION

In accordance with the Scope of Works (SW) agreed between the Preparatory Study Team of the Japan International Cooperation Agency (JICA) and the Ministry of Agriculture and Cooperatives (MACO) on June 27, 2007, JICA fielded a Study Team to Zambia on March 7, 2009 for the implementation of “the Study on the Capacity Building and Development for Smallholder Irrigation Schemes in Northern and Luapula Provinces in the Republic of Zambia (hereinafter referred to as “the Study”).” Accordingly, the Study Team, headed by Mr. Kosei Hashiguchi of Sanyu Consultants Inc., has completed the first period of the Phase one Study during March to July 2009.

Based on the activities during the said period, the Study Team compiled the First Progress Report (PR1) and submitted 30 copies of the PR1 to MACO, the counterpart agency, following which a steering committee meeting was convened on August 6, 2009. Mrs. Mary M. Chipili, Director of Department of Agriculture (DOA), MACO, who chaired the steering committee meeting, expressed her appreciation for the participants to attend. She stated her eagerness to learn about the progress and achievement of the Study so far made.

The meeting commenced with a review and correction of the minutes of the last meeting held on April 24, 2009 on Inception Report of the Study. After confirming a minor correction including a formatting of the minutes, the Team explained the findings from the situation analysis, outline of the draft action plan, and the advancement of the pilot project that encompasses the development of smallholder irrigation schemes and irrigated agriculture in the pilot sites.

## DISCUSSIONS

Based on the First Progress Report submitted to MACO and the presentation made by the team leader of the Study Team, following were discussed and confirmed by the both parties:

1. MACO received 30 copies of the First Progress Report from the Study Team.
2. Zambian side agreed and confirmed with the results from the situation analysis and the contents, strategies, and achievement of the pilot project presented in the First Progress Report with the following comments:

- 1) Area to be Irrigated

One of the attendants showed his interest in the data on the area under irrigation, which is derived from existing irrigation schemes in the Study area as these data can contribute to clarifying the agricultural potential. The chairperson came into line with her interest and further requested more specific data by provinces and districts so that the ministry itself can benefit from the data.

The team leader of the Study Team made it clear that the specific data are actually



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compiled in the Table 3.6.1 on page 3-44 of the PR1, summarizing the existing irrigation schemes by province and further by district.

Another participant asked to clarify if the data was confirmed by the Study team at the site. Then the team leader replied that the data were collected with the cooperation from CEOs at the district level because it is virtually impossible for the Study Team to actually visit every single one of the existing sites. He added that the number of the sites described in the Table is reliable as CEOs in the area usually know the command area, however, the area of each scheme may have some inaccuracy as CEOs do not have any means to measure it.

This issue was further addressed by the other member of the committee; he emphasized the importance of determining the area under irrigation in the study by using GIS based specification, for example.

Accordingly, the team leader explained that a GIS based platform is being prepared in the Study, showing where there are existing irrigation schemes and also potential areas for irrigation. However, he added that there is difficulty in identifying very specific location and the size of potential areas based on the LANDSAT data. This is because LANDSAT image does not show topographic information. He then proposed that a rough estimation should be incorporated into the next report of the Study.

## 2) Water Right and Usage

Irrigation is often associated with water right among the beneficiaries, a committee member stated. He showed his interest in knowing if the issue of water right is addressed in the Study so that unnecessary conflict among the parties can be avoided and also usage of irrigated water can be rationalized. Especially, if big change is expected, arrangement of water right becomes crucial.

Some members of the committee responded to this issue, saying that water user association was the one who manages the distribution of irrigation water. At the provincial level, MACO staff closely collaborates with counterparts from the Department of Water Affairs in the province applying a common platform aimed at improving the water usage. Concerning the level of usage, this is why the approach taken in the Study is appropriate; by starting from the temporary structures, people can measure how farmers are harnessing the water.

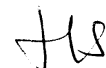
Related to this issue, the importance of capturing trend in water flow is pointed out by a member of the committee. The team leader responded that the precise measurement of the water discharge is difficult as measure gage is not usually available especially for small streams. Then, participants agreed that traditional method can be applied to see the water shortage in the dry season and to identify the irrigable areas.

## 3) Involvement of Other Sub-Sectors

A committee member mentioned that irrigated water can also be used for other



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purposes including fishery and domestic water and suggested to have a close collaboration with fishery sector of the Ministry. Then, a provincial counterpart made sure of the existence of some data in the PRI regarding fishery sector.

4) Share of Agriculture in the National GDP

In the presentation, it was addressed that the share of agriculture sector was quite small in the National GDP. However, it was pointed out that, according to an economic report, the contribution of agriculture to the National GDP should be about 18%, which includes crop production, livestock, fishery and forestry.

5) Provisional Achievement

In accordance with the provisional achievement of the smallholder irrigation schemes in the pilot project, it was questioned why the target as well as the achievement of improvement site, which is supposedly easier than new development, is smaller than that of new development site. Some of the committee members who actually participated in the pilot project activities explained that new redevelopment was focused in the early stage, while the improvement site is to be focused in the later stage of the season.

Also, it was mentioned that the mode of construction in improvement site may be slightly different from the one in new development, which can eventually make a lot of difference in the number of achievements. Therefore, it was suggested to clarify the mode of construction or definition of temporal structure.

6) Market Oriented Development

A committee member emphasized the importance of marketing in agricultural development. He said, aside from subsistence farming, marketing is a crucial factor to improve the livelihood of farmers. Only by knowing real situation of the market issue, type of necessary intervention can be identified. The team leader replied that the agriculture marketing survey has been carried out and some of the findings are already covered in the PRI, and full set of information will be compiled in the next report.

7) Budget Arrangement

Zambian counterparts of the committee requested JICA to open the information of budget available for the next financial year so that MACO can make a commitment for the counterpart funding to the pilot project. The chairperson said it is impossible to estimate the necessary cost and to manage the budget without capturing how much the partner can commit. Each one of them emphasized how important it is to complement each other and to have certain flexibility in budget allocation.

The team leader explained that, for this phase of the Study, approximately US\$30,000 to US\$40,000 will be spent as the operation cost for the pilot project implementation exclusive of the consulting fee. He added that he assumes JICA's commitment may not become available until early next year. Then, Zambian side requested the Study



Team to have a discussion with JICA headquarters to see JICA's financial arrangement on the implementation of pilot project for the next financial year and report to Zambian side.

8) CEO's Meal Allowance

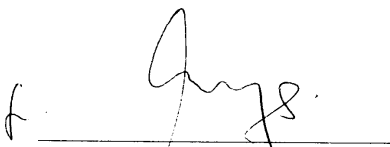
Zambian side explained a common arrangement of CEO's meal allowance, in which CEO who worked in one's own camp is not entitled to the meal allowance. They will be however entitled when worked in other camp for more than eight hours of time per day. It was also confirmed that the principle of "pro-rural budget," in which rural area is given higher priority for the allocation of operation budget, remains in the next financial year as well.

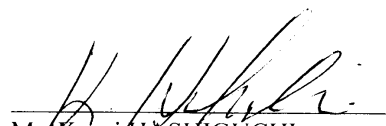
9) Reporting From the Provinces

The chairperson requested PACO of both provinces to come up with the challenges in pursuing smallholder irrigation development and report to the MACO headquarters so that more solid plan can be formulated internally in MACO. Also requested was to receive comments from Permanent Secretary of the provinces, which should be of primary importance to fit this program into the provincial development strategies.

**Way Forward**

Zambian side proposed to have a steering committee meeting in November or December 2009 to share the achievement of the phase 1 study, and discuss how to collaborate with each other for the implementation of the pilot project in the next financial year. The team leader then proposed to hold the meeting at the beginning of December just before the Study Team completes the phase 1 Study.

  
Mrs. Mary M. CHIPILI  
Director, Department of Agriculture  
Ministry of Agriculture and Cooperatives  
The Government of Republic of Zambia

  
Mr. Kosei HASHIGUCHI  
Leader of the Study Team,  
Japan International Cooperation  
Agency (JICA)

**MINUTES OF THE MEETING  
OF  
INTERIM REPORT ONE  
ON  
APRIL 26, 2010  
FOR  
THE STUDY  
ON  
THE CAPACITY BUILDING AND DEVELOPMENT  
FOR  
SMALLHOLDER IRRIGATION SCHEMES  
IN  
NORTHERN AND LUAPULA PROVINCES  
IN  
THE REPUBLIC OF ZAMBIA**

**Lusaka, Zambia  
April 26, 2010**

## **LIST OF THE PARTICIPANTS**

### THE GOVERNMENT OF REPUBLIC OF ZAMBIA

1. Mrs. Mary M. Chipili Director of Department of Agriculture (DOA), MACO
2. Mr. Henry Sichembe Deputy Director, Technical Services, DOA, MACO
3. Dr. R. M. Kamona Deputy Director, Agriculture Advisory Services, MACO
4. Mr. Ndawambi Daka Deputy Registrar, Department of Cooperative, MACO
5. Dr. Kayoya Masuhwa Chief Agriculture Officer, DOA, MACO
6. Mr. Cornelius M. Sitali Principal Irrigation Engineer, DOA, MACO
7. Mr. Anayawa Mutemwa Principal Economist, Agro-business Department, MACO
8. Mr. Luhamba Liyembani PACO, Northern Province, MACO
9. Ms. Odineya Chisala PACO, Luapula Province, MACO
10. Mr. Kenneth Zulu Provincial Irrigation Engineer, Northern Province, MACO
11. Mr. Emmanuel Siwale Provincial Irrigation Engineer, Luapula Province, MACO
12. Dr. Akira Sugimoto JICA Advisor, MACO/ JICA
13. Mr. Takahiro Miyoshi JICA Expert, RESCAP/ JICA

### JICA Zambia OFFICE

1. Mr. Yuichi MATSUSHITA Assistant Resident Representative, JICA Zambia Office
2. Mr. Patrick Chibbamulilo Senior Program Officer, JICA Zambia Office

### JICA STUDY TEAM

1. Mr. Kosei HASHIGUCHI Team Leader/ Irrigation Development Planning
2. Mr. Hideaki HIRUTA Farm Management / Farmers' Training / Water Management/ Information Education and Communication (IEC)



1



## INTRODUCTION

In accordance with the Scope of Works (SW) agreed between the preparatory study team of the Japan International Cooperation Agency (JICA) and the Ministry of Agriculture and Cooperatives (MACO) on June 27, 2007, JICA fielded a Study Team to Zambia on March 7, 2009 for the implementation of “the Study on the Capacity Building and Development for Smallholder Irrigation Scheme in Northern and Luapula Provinces in the Republic of Zambia.” Accordingly, the Study Team has completed the phase one Study during March to December 2009.

Based on the activities during the phase one, the Study Team compiled the First Interim Report (ITR1) and submitted 30 copies of it in April 2010 to MACO, the counterpart agency of the Study. Accordingly a steering committee meeting was convened on April 26, 2010, which was chaired by Mrs. Mary M. Chipili, Director of Department of Agriculture (DOA), MACO.

The meeting commenced with a review and correction of the minutes of the last meeting on Progress Report One which was held on August 6, 2009. After confirming minor corrections, the team leader explained the findings from the situation analysis, outline of the draft action plan, and the achievement of the pilot project on smallholder irrigation schemes implemented in the last year 2009.

## DISCUSSIONS

Based on the First Interim Report submitted to MACO and the presentation made by the team leader of the Study Team, following were discussed and confirmed by the both parties:

1. MACO received 30 copies of the First Interim Report from the Study Team.
2. Zambian side confirmed the results from the situation analysis and the contents, strategies, and achievement of the pilot project with the following comments:

- 1) Level of Damages to the Temporary Structures During the Rainy Season

It was asked how much percentage of temporary weirs constructed in 2009 had remained after the rainy season. The team leader replied that, as far as he had observed, at least two-thirds of those weirs remained. The team is to conduct further investigation with the more numbers of samples.

- 2) Application of Conservation Farming Concept

JICA advisor pointed out that MACO promoted conservation farming and envisioned to have the half of the national farmers to be involved in it by 2015 especially during rainy season. He asked if the Study was moving toward the same direction. The team leader explained that, currently, most of the irrigated areas were cultivated only one time and different farm plots were used during the rainy season, suggesting that



situation at this moment was not so critical to introduce the conservation agriculture.

3) Concern on Temporary Weirs

The chairperson raised an issue of farmers' concern on temporary weirs; farmers would not like to continue repairing the structure every year. She added that this issue was associated with sustainability. Team leader explained his idea that, in the past, irrigation development had been seen as an experts' job and thus extension officers had been excluded from it. He believed temporary weir should be a good tool to make the best use of CEOs and BEOs. Furthermore, a JICA advisor stated that farmers could first develop basic skills and knowledge through temporary irrigation schemes before upgrading to permanent-type irrigation schemes. He continued that everyone definitely wanted permanent weirs, given only two options e.g. permanent or temporary, but the issue should be how much funding can be facilitated by the GRZ and donors.

4) Funding Sources

The chairperson questioned who could be the funding source for the future development plan which was shown in the presentation as "preliminary planning." She claimed that KR2 counterpart fund could not be used for irrigation purpose as the government already had different priority. For the funding arrangement, she continued, the government and JICA had to discuss. A JICA advisor agreed with her that current KR2 was considered to be used for mechanization program. He, however, suggested, for brainstorming, that a forthcoming counterpart fund of KR2 might be used to this program in the future.

5) Consistency with the National Irrigation Plan (NIP)

A committee member suggested that concerning the future plan, it should be consistence with what is stated in the National Irrigation Plan (NIP). The chairperson further questioned if temporary irrigation scheme was what the government should give higher priority. She pronounced that the government was to put its budget into permanent structure based on NIP.

6) Preliminary Planning as Recommendation by the Study Team

It was claimed by the chairperson and the deputy director of Technical Services that preliminary planning should not be presented at this stage of the Study. Instead, such future plan that involves development policy and its financial arrangement should be presented at the end of the Study as a form of the recommendation from the Study Team. They insisted that anything beyond the work schedule of the Study could not be approved in this steering committee meeting. In other word, anything but the preliminary planning was acceptable.

7) Needs of Investment

The chairperson and the deputy director of Technical Services concluded that what



was necessary was investment; Zambian farmers want no more study but implementation. Ideally, MACO is supposed to increase the investment in the irrigation sector. To this end, it was stressed that the Study Team should consider the ratio between temporary and permanent structures in the future plan.

8) Consideration of All Aspects in the Water Sector

A MACO officer made it clear that all the aspects in the water sector should be addressed. In this concern, it was good that on-farm water management was addressed in the Study. Furthermore, he mentioned that up-skill technologies including other types of irrigation should be covered in the Study.

9) Capacity of MACO Personnel

Upon the comments that there was a limitation in the number of MACO staff to implement permanent structure in the wider range of area in a short time, the deputy director of Technical Services stressed that both provinces maintained senior engineers who were highly competent.

10) Necessity of a Good Model

A JICA advisor pointed out that a model should be established in which farmers can mobilize their contribution including loan arrangement. A participant from MACO pointed out that farmers were supposed to contribute up-front, e.g. preparation of sand, cobbles, and other available materials in their locality by themselves; they can be counted as their contribution.

11) Budget Allocation

It was confirmed by the participants that 107 million ZMK was requested by JICA for Northern province and 97 million ZMK was pledged by MACO. Also, 73 million was requested for Luapula province and 70 million was pledged. The Study Team showed its appreciation to MACO's commitment and contribution. The deputy director of Technical Services confirmed that the principle of budgeting was approved and thus details should be discussed with both PACOs.

12) Poverty Line

A committee member suggested ultimate goal of irrigation development was to tackle poverty; the plan should be able to raise the livelihood of the beneficiaries. The team leader answered that the Study Team had established its own poverty line. He also showed the impact of smallholder irrigation scheme in comparison with the poverty line for the farmers. It was then requested by a committee member that different sets of comparison should be presented based on different sources of information including the GRZ, World Bank and UNDP.

13) Land Tenure

A committee member asked if the land tenure issue was concerned. The team leader



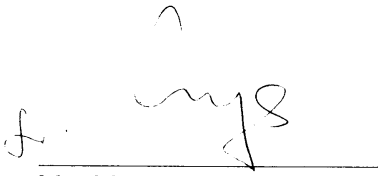
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explained that the Study had rarely faced any problems associated with land tenure. It was further explained that as far as village headman discharges his authority in demarcating land, no land tenure issue arises and this was most of the cases. Another committee member advised that any problem could be created if it was in private land. In such cases, good solution should be sought for sustainable development.

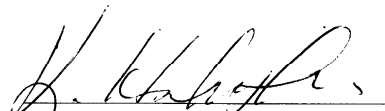
#### Way Forward

1. The next Steering Committee meeting was tentatively set on August 10, 2010, which will be re-confirmed through an official letter to MACO from the Study Team.



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Mrs. Mary M. CHIPILI  
Director, Department of Agriculture  
Ministry of Agriculture and Cooperatives  
The Government of Republic of Zambia



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Mr. Kosei HASHIGUCHI  
Leader of the Study Team,  
Japan International Cooperation  
Agency (JICA)

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**MINUTES OF THE MEETING OF PROGRESS REPORT (NO.2) PRESENTATION HELD ON THE 10<sup>th</sup> AUGUST, 2010 FOR THE STUDY ON THE CAPACITY BUILDING AND DEVELOPMENT FOR SMALLHOLDER IRRIGATION SCHEMES IN NORTHERN AND LUAPULA PROVINCES IN THE REPUBLIC OF ZAMBIA**

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**1.0 MEMBERS PRESENT**

1. Mr. Henry Sichembe Deputy Director, Technical Services, DOA, MACO
2. Mr. George W. Sikuleka Chief Irrigation Engineer, DOA, MACO
3. Mr. Charles Kapalasha Provincial Agricultural Officer, Northern Province, MACO
4. Mr. Ernest C. Shingalili Provincial Agricultural Officer, Luapula Province, MACO
5. Mr. Kenneth Zulu Provincial Irrigation Engineer, Northern Province, MACO
6. Mr. Emmanuel Siwale Provincial Irrigation Engineer, Luapula Province, MACO
7. Dr. Akira Sugimoto JICA Advisor, MACO/ JICA
8. Mr. Yuichi MATSUSHITA Assistant Resident Representative, JICA Zambia Office
9. Mr. Kosei HASHIGUCHI Team Leader/ Irrigation Development Planning, JICA Study Team
10. Mr. Tatsuya IEIZUMI Co-leader/ Irrigation Technology/ GIS, JICA Study Team
11. Mr. Hideaki HIRUTA Farm Management / Farmers' Training / Water Management/ Information Education and Communication (IEC), JICA Study Team
12. Mr. Yoshihiro SAGAWA Irrigation Facilities/ Secretary/IEC, JICA Study Team

**1.1 APOLOGIES**

1. Mrs. Mary Chipili Director, DAO, MACO
2. Mr. Cornelius Sitali Principal Irrigation Engineer, DOA, MACO
3. Mr. Luhamba Liyembani Provincial Agriculture Coordinator- Northern Province
4. Ms. Odineya Chisala Provincial Agriculture Coordinator- Northern Province

**2.0 AGENDA**

1. Opening Remarks
2. Corrections of Previous Minutes of Steering Committee Meeting
3. Matter Arising
4. Presentation of the Report (Progress Report No.2)
5. Any Other Business

**3.0 OPENING REMARKS**

- 3.1 The Meeting was called to order at 10:30 hours. In his opening remarks the Chairperson welcomed members to the meeting.

**4.0 CORRECTION OF PREVIOUS MINUTES**

- 4.1 The minutes were read and corrected accordingly by the committee. Specific topics discussed were as follows:
- 4.2 *Application of Conservation Agriculture Concept:* The Chair enquired whether there was any noticeable change in the implementation of conservation agriculture as compared to the situation before the previous meeting. The Irrigation Engineer of Northern Province mentioned

that the Senior Land Husbandry officer who has been posted to the Province (Mr. Innocent Mulauzi) is very much involved in this activity, and is promoting the same in selected districts such as Isoka and Mpika of Northern Province. Additionally, the Irrigation Engineer of Luapula Province also indicated that the conservation agriculture is being up-scaled in the Province.

- 4.3 The Chair further expressed his views on the need to promote concepts of conservation agriculture such as the use of manure as many farmers encounter problems associated with the use of chemical fertilizers, e.g. cost implications and soil degradation. He further sited farmers in Nseluka village who produce the same crop (tomato) year in and year out as having to diversify their cropping system if the concept is to be appreciated.
- 4.4 The JICA advisor explained his original idea mentioned in the last meeting. In the smallholder irrigation schemes, farmers form ridges and furrows, while farmers dig holes and conserve water and may practice minimum tillage farming under the concept of conservation agriculture. Now, it is probably necessary to come up with the idea to bring the two concepts together.
- 4.5 The team leader of the Study Team pointed out that there may be a difficulty in linking irrigation and minimum tillage practice but compost can be well incorporated in irrigation agriculture. He further stated that a session in the follow-up training to be held in November 2010 will address the conservation farming.
- 4.6 *Funding Sources:* A member of the Steering Committee suggested brainstorming on the issue of funding sources. The JICA Advisor offered to make a follow up with JICA Zambia Office and to confirm if the KR2 counterpart value fund is meant to increase the production of underprivileged people which is currently allocated to Farm Power Mechanization and Fertilizer Program.
- 4.7 The Chair agreed with the suggestion and explained that both JICA “peri-urban” study and the COBSI study came up with the same idea of using KR2 counterpart value fund. He added that if KR2 counterpart value fund is available, the Ministry would request for it. Therefore, a part of this fund could be used to continue with the smallholder irrigation development project. It was additionally suggested by the JICA Advisor for the Ministry to submit a proposal to JICA Zambia Office.
- 4.8 *Farmers’ Concern on Temporary:* It was questioned by a committee member if the concept of temporary schemes should be still continued given the argument over the sustainability of this concept. Then, the Chair declared that the whole set of trainings on temporary weirs should be continued as it will be a foundation of promoting permanent ones.
- 4.9 *Budget Allocation:* The Chair requested to confirm if the budget allocation by the Zambian government to the Pilot Project activities is already in the process. Then, the Irrigation Engineers of both provinces confirmed that the process was already started.

## **5.0 MATTER ARISING**

- 5.1 The Study Team Submitted the Second Progress Report and the Team Leader made a presentation of the same and the Zambian counterparts confirmed the results of the situational analysis and the contents, strategies, and mid- term achievement of the pilot project with the following comments expressed:
- 5.2 *Terminology of “Temporary” Structures:* The JICA Advisor suggested that, instead of using the term “temporary” which may have a negative connotation, applying another term, such as “simple” that has a positive perspective, should be encouraged.
- 5.3 *Timeline of the Two Modalities:* On the concept of development modalities that was shown as a single graph in the presentation, the Chair addressed the problem of comparing temporary and permanent schemes in one graph as lifetimes of those structures are different. Then, given supplementary explanation by the Team Leader and the JICA Advisor, the floor confirmed that the graph explains not the timeline of individual structure but the investment timeline as a whole.

- 5.4 *Location Effect to the Net Income Figures:* The Chair asked the Study Team if the location effect was fully considered in the analysis of net income in each village surveyed. The Team Leader explained that while the original income shown in the figure was calculated based on the actual figures of each village, the net income was rather based on the total average of all samples derived from the harvest survey.
- 5.5 *Definition of the Poverty Line:* The Chair asked the Study Team to confirm the definition of the poverty line if it is disposable income or savings of a household. It was explained by the Team Leader that there is always an issue of the poverty line associated with income and expenditure. In fact, poverty line is usually calculated based not on income but expenditure. Therefore, theoretically there is no direct correlation between the poverty line and the income though the poverty line can somewhat be related to the level of their income.
- 5.6 *Impact to the Poverty Line:* The JICA Advisor asked whether or not the impact derived from the smallholder irrigation schemes brings the beneficially farmers up to the poverty line. Then, the Team Leader explained that the impact is not strong enough to bring them over the poverty line. He added that to cross the poverty line, farmers need some more income.
- 5.7 *Percentage of Cost against Income:* The JICA Advisor questioned why the percentage of cost per net income is significantly higher in bean leaves than the one in beans itself. Then, a study team member explained that the number of samples in bean leaves was limited and hence reliability may not be so highly dependable. Also, the income level of bean leaves is quite low so that even a small amount of cost shares high percentage. The Team Leader confirmed the necessity of further survey on this issue.
- 5.8 *Share of the D-Compound in the Production Cost:* The Chair argued that the share of D-compound in the production cost is not balanced with that of Urea stated in the presentation. The study team member explained that the figure represented the average of all the crops including the ones which may not need much chemical fertilizer. Accordingly, the JICA Advisor recommended showing the data only on the major crops that are highly profitable.
- 5.9 *Issue of Seeds Circulation:* The Chair advised the Study Team to address the issue of seed recycling. It was observed that most rural areas lacked improved seed. The Study Team member gave an example of potato seed, for which most farmers in rural areas are experiencing difficulties in getting quality seed. The only available potato seed on the market is all from Tanzania.
- 5.10 *Practical Evidence on the Ground:* A committee member expressed interest in the actual current situation of temporary schemes on the ground so as to ascertain the benefits of that concept. The Team Leader promised to present the actual status of the last year's pilot project activities in the next Steering Committee meeting in December 2010.
- 5.11 *Documentation of Smallholder Irrigation Development Schemes:* The Chair stressed the necessity of documenting the smallholder irrigation development schemes being promoted by this Study. Specifically, a team of three to four members consisting of Journalists and Engineers should be able to manage a 15-30 minutes documentary programme. To this effect, he also emphasized the need for co-financing the activity.

## **6.0 ANY OTHER BUSINESS**

- 6.1 The Chair acknowledged that the leaflet on irrigated agriculture which was additionally prepared in this term was well compiled with simple language.

## **7.0 WAY FORWARD**

- 7.1 The next Steering Committee meeting was tentatively set for December 10, 2010, which will be re-confirmed through an official letter by the Study Team to be submitted to MACO.

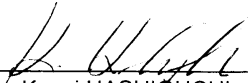
**8.0 CLOSING REMARKS**

- 8.1 The Chairperson thanked members for attending the meeting. The meeting ended at 12:00 hours.



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Mrs. Mary M. CHIPILI  
Director, Department of Agriculture  
Ministry of Agriculture and Cooperatives  
The Government of Republic of Zambia



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Mr. Kosei HASHIGUCHI  
Leader of the Study Team,  
Japan International Cooperation  
Agency (JICA)

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**MINUTES OF THE MEETING OF PROGRESS REPORT (NO.3) PRESENTATION HELD ON THE 10<sup>th</sup> DECEMBER, 2010 FOR THE STUDY ON THE CAPACITY BUILDING AND DEVELOPMENT FOR SMALLHOLDER IRRIGATION SCHEMES IN NORTHERN AND LUAPULA PROVINCES IN THE REPUBLIC OF ZAMBIA**

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**1.0 STEERING COMMITTEE MEMBERS PRESENT**

1. Mr. Henry Sichembe Deputy Director, Technical Services, DOA, MACO
2. Mr. E.C.J. Kalaba Deputy Director, Policy and Planning, DOA, MACO
3. Mr. L.L. Kaluba Ag. Chief Agricultural and Extension Officer, DOA, MACO
4. Mr. Cornelius M. Sitali Principal Irrigation Engineer, DOA, MACO
5. Ms. Odineya Chisala PACO, Luapula Province, MACO
6. Mr. Kenneth Zulu Provincial Irrigation Engineer, Northern Province, MACO
7. Mr. Rodgers Phiri Technical Officer, Mungwi District, Northern Province, MACO
8. Mr. Emmanuel Siwale Provincial Irrigation Engineer, Luapula Province, MACO
9. Dr. Akira Sugimoto JICA Advisor, MACO/ JICA
10. Mr. Patrick Chibbamulilo Senior Programs Officer, JICA Zambia Office
11. Mr. Kosei HASHIGUCHI Team Leader/ Irrigation Development Planning, JICA Study Team
12. Mr. Hideaki HIRUTA Farm Management / Farmers' Training / Water Management/ Information Education and Communication (IEC), JICA Study Team

**1.1 APOLOGIES**

1. Mrs. Mary Chipili Director, DOA, MACO
2. Mr. Luhamba Liyembani PACO, Northern Province, MACO
3. Mr. Enerst Shingalili Provincial Agricultural Officer, Luapula Province, MACO
4. Mr. Charles Kapalasha Provincial Agricultural Officer, Northern Province, MACO

**2.0 AGENDA**

1. Opening Remarks
2. Correction of Previous Minutes of Steering Committee Meeting
3. Matter Arising
4. Presentation of the Third Progress Report
  - ✓ Achievements of the Pilot Project
  - ✓ Impact from the Pilot Project
  - ✓ Planning (Provisional)
5. Any Other Business
6. Closing Remarks

**3.0 OPENING REMARKS**

- 3.1 The meeting was called to order at 10:30 by the Chairperson who warmly welcomed members of the Steering Committee.

**4.0 CORRECTION OF PREVIOUS MINUTES**

- 4.1 The minutes were read and corrected after which they were proposed and seconded for adoption.

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## 5.0 MATTER ARISING

- 5.1 Profitability: The Chair raised an issue regarding the net profits from irrigated agriculture, which were observed as being on the higher side. The Chair expressed serious concern as the figures alluded to contradicted with those from other research data which were rather on the lower side.
- 5.2 The Team Leader indicated to the members that the data was reliable as it was based on the harvest survey covering more than 400 samples on the ground.
- 5.3 The Chair also questioned whether marketing challenges initially mentioned were considered in coming up with the figures. The Team Leader informed the members that more than 90% of the produces in the sampled villages were found to have ready market.
- 5.4 A concern was raised not to generalize the estimated profit figures as the ones highlighted in the Report were project specific in the Study Area.
- 5.5 Poverty Line: The Chair requested the Team Leader to explain more on the poverty line because it was different from the one estimated by a government organization (CSO). The Team Leader briefed the members that Zambia's poverty line of US\$2,339/household is above that estimated by the Study Team, US\$1,531/household, because the former includes the urban population who consume more than the rural populace.
- 5.6 The Chair added whether or not the figure includes the saving and/or is defined by the disposal income. The Team Leader answered that the poverty line presented here is focused only on the level of household expenditure inclusive of the monetary value of what is produced and consumed by the household.
- 5.7 Inclusion of the Achievement in MACO's Report: The JICA Advisor suggested including the achievement of the pilot project under the Study, such as the area irrigated, in the reports of both provinces, since the level of achievement in the past two years was significant. The Chair confirmed that the issue was taken.
- 5.8 Temporary Scheme as a Means to Capacity Development: The JICA Advisor commented that the cost of temporary schemes might exceed the cost of permanent structure in the very long run; however, through the active participation of the farmers in the development process, they can harness the sense of ownership and develop their capacity in operation and management. Therefore, by starting from the temporary schemes, the probability of successful implementation, operation and management in the permanent schemes can be also pursued.
- 5.9 Target of Smallholder Irrigation Development: A committee member asked if there is any target in terms of area irrigated in these schemes. The Team Leader clarified that due to the scarce population density, 10-15 people/km<sup>2</sup>, number of irrigators is only about 30 to 40 members per site and thus the irrigated area may not exceed more than 5 ha in either scheme.
- 5.10 The Principal Irrigation Engineer suggested indicating the minimum area that the farmers should irrigate to reap out of the poverty line. He also shared his experience in Kandabue Irrigation Scheme, in which very small portion of the area was irrigated per farmer because of too many members in the scheme.
- 5.11 Cost of Operation and Maintenance: The Chair asked the Study Team to address the necessary cost conceived for the operation and maintenance of the smallholder irrigation schemes, especially for the permanent structures. The Team Leader replied that, as gravity irrigation is concerned in the schemes, canal itself is taken care of by the beneficiary farmers themselves. For the periodical maintenance of the main structure, three to five sacks of cement per year may be necessary, indicating quite manageable for the farmers.
- 5.12 Economic Return: Given a lot of discussion over the economic impact of the schemes, a JICA officer asked how much economic return can be conceived. The Team Leader clarified that the Internal Rate of Return (IRR) can be more than 30% for both temporary and permanent schemes. Concerning the opportunity cost of 12% in this Country, this IRR can be concluded

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significantly high.

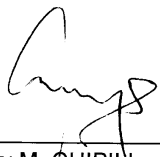
- 5.13 Given a skeptical view by the participants, the Team Leader claimed that the economic return can be this high because unit development cost is relatively lower than conventional schemes and also immediate outcome can be conceived from the first year of the implementation, as compared to more than five years of implementation in conventional mid-large scale irrigation development schemes.
- 5.14 Constraints: The Chair recommended placing an issue of constraints as those outcomes should have stood upon certain assumptions. The Team Leader agreed that there were a variety of constraints associated with the schemes: mobility of the extension officers and not many number of beneficiary farmers per scheme, for example.

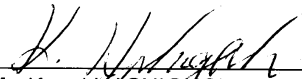
## 6.0 ANY OTHER BUSINESS

- 6.1 Staffing Situation: As concerned with the issue of staff mobility discussed in the meeting, the Irrigation Engineer of Northern Province asked the Chair if new officers will be deployed to the forth coming vacancy after the retirement of current officers. The Chair mentioned that since this was a general issue of MACO, it should be taken care of in the general meeting to be held in the following week, 2011 Budget meeting. The Irrigation Engineer of Luapula Province claimed that nothing was shown in the 2011 budget for irrigation development. The Chair also confirmed that this issue should be discussed in the above mentioned meeting.
- 6.2 Next Opportunity after the Study: PACO of Luapula Province asked if there was any possible project after the Study. If so, any gap between the project and the Study should be avoided as it was addressed in the commencement of the second phase of the Program for Luapula Agriculture and Rural Development (PLARD). The Team Leader suggested that both sides start seeking any opportunity of next project as it was an issue to be discussed between MACO and JICA. The Chair confirmed that by the end of the Study, MACO will express its interest to continue the project especially for permanent schemes.
- 6.3 Attendance of the Team Leader to A Roundtable Meeting: The Chair requested the Team Leader attending the roundtable meeting scheduled in the beginning of February 2011. Otherwise, anyone from MACO should be able to make a presentation. In this meeting, priority of irrigation development in the Country will be discussed with a participation of all the related donors and Cooperating Partners. The Team Leader then answered that he was already engaged in another project in February 2011, and therefore if re-scheduling of other assignment was possible, he would like to attend the meeting.

## 7.0 CLOSING REMARKS

- 7.1 The meeting was officially declared closed at 12:55 by the Chairperson with words of encouragement to the committee members and the date for the next steering committee meeting was tentatively slated for May 2011. The actual date will be officially communicated to all players of the Study.

  
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Agency (JICA)



# **APPENDIX-II**

## **RURAL SOCIETY AND FARMER ORGANIZATION**

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## CHAPTER 1 RURAL SOCIETY IN STUDY AREA

This chapter discusses rural society of the people in the Study area, starting with general description, followed by findings from a series of focus group interviews, village level workshops, and then by the results of a baseline survey.

### 1.1 Structure and Norm in Rural Village

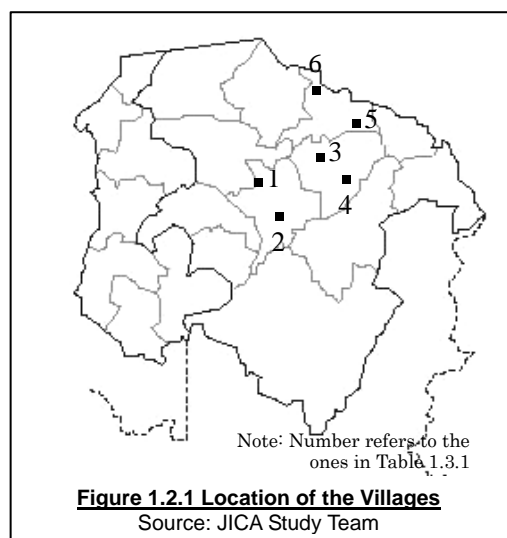
Field observations and interviews reveal that in every village, there is “village committee” chaired by village headman and the committee is the supreme decision making body in the village. Basically, village committee consists of 8 to 10 members such as chairperson (the village headman), vice chairperson, secretary, treasury and members. There are also female members in every committee, and it is learned that the female members are recognized mostly as active farmers in the villages and their opinions are important especially when they have to handle female villager related issues.

The village committee discusses various issues and topics wherein decision is basically made as the committee’s consensus under the chairpersonship of the village headman. Topics discussed are issues relating to village development such as road & bridge maintenance, construction of school and health post, construction and maintenance of village shelter (a public meeting place), establishment of village community fields, etc. The more details are discussed in the Chapter 4.

### 1.2 Issues Identified at Focus Group Interviews and Village Analytical Workshop in 2009

In 2009, the Study team conducted focus group interview and village analytical workshop at six villages in 3 districts of Northern province. The objective of the focus group interview was to understand the overall situation of those villages on a first hand basis and then make necessary arrangement for the village analytical workshop. Participants of the focus group interviews were the ones basically who knew general information of the villages such as village headman, cooperative representatives, members of other groups if any, elders, youth representatives.

The village level analytical workshops were held in order to; 1) collect the basic information on the situation of the target villages to know how smallholder irrigation can contribute to their livelihood improvement, 2) offer a venue for target villages to review their villages’ activities / history / issues by themselves with the facilitation of the Team, and 3) think about for themselves what kind of countermeasures they can undertake. The villages where the interviews as well as the WSs were held are shown in Figure 1.2.1 and Table 1.2.1.



**Table 1.2.1 Target Villages for Focus Group Interviews and Analytical Workshop**

Village name	Camp name	District	Distance from Major Town	Date of WS / Participants No.
1. Lunda	Lukulu North	Kasama	25km from Kasama	29 April, 2009 / 129(F63, M66)
2. Molwani	Chitambi	Kasama	16km from Kasama	20 May, 2009 / 75(F33, M42)
3. Kalemba Chiti	Ngulula	Mungwi	32km from Kasama, 1/	26 May, 2009 / 141 (F74, M67)
4. Chipapa	Misamfu	Mungwi	15km from Kasama, 1/	26 June, 2009 / 72 (F47, M25)
5. Saise	Lunzua	Mbala	192km fr. Kasama, 28 km from Mbala	28 May, 2009 / 55(F26, M29)
6. Mayanga	Luchacha	Mbala	176km fr. Kasama, 11.5 km from Mbala	4 June, 2009 / 78 (F25, M53)

Source: JICA Study team, 1/ Both villages are nearer from Kasama than from Mungwi center.

Table 1.2.2 summarizes the number of households, number of female-headed households, ethnicity, and the year the village was established. Size of village is not so big as recognized in the number of households ranging from as small as only 34 households to 150 households at most with an average of 72 households only. Female-headed household consists of 9% to maximum 29% of the whole households with an average of 21%, indicating as average one out of every 5 households is headed by a female. Major ethnicity is Bemba in three villages and Mambwe in two villages.

**Table 1.2.2 General Information of Six Villages**

Village name	No. of HHs	No. of Female-headed HH		Ethnicity	Year established
Lunda	57	8	14.0%	All Bembas	1947
Molwani	47	5	10.6 %	Bembas and other 3 tribes	1970
Kalemba Chiti	65	11	16.9%	All Bembas	1818
Chipapa	80	20	25.0%	Bembas and Mambwes	1930
Saise	34	3	8.8%	All Mambwes	1986
Mayanga	150	43	28.7%	Mambwes and other 3 tribes	1902
Total	433	90	20.8%		
Average	72	15			

Source: JICA Study team, based on the focus group interviews to village headman, etc.

Village history started as early as in 1818 in the oldest village and the latest one in 1986. Though some of the villages are very old in their history, say more than 100 years, it was learnt that it could hardly become bigger and bigger<sup>1</sup>. The reason why they always maintained their village size as such is associated with their slash-and-burn agricultural practice. Rural population in the Study area still practice Chitemene for some years, and they at the end find that the soils are already depleted and there are no longer much available virgin lands nearby. Then, this is the time some of the villagers start migrating to look for new Chitemene areas. Sometime after they have settled in the new area, one of the potential village leaders is now authorized as the village headman by the traditional authority<sup>2</sup>. In this way, villages have been kept at a handful size.

### 1.2.1 Major Issues

Problem analysis in the analytical workshop was conducted in the last program of the workshop. The core problem employed was “Life is not easy in \*\* (name) village. Team regards irrigation as a part of villagers’ livelihood and thinks that we cannot separate irrigation from their life. In fact, not only agricultural related problems but also social problems were raised in the beginning of problem analysis. Nevertheless, discussion emphasis was put on agricultural problems and went into the deeper analysis considering the time constraint.

Issues picked up during workshops were different depending on villages, but, as a whole, the main issues were summarized as “crop production becomes low” and “livestock production becomes low”. Causes participants analyzed for the former were mainly “we cannot apply fertilizer (because of the high price and the lack of money) “and “we cannot expand the field (because of the lack of input) “and “we do not have water in dry season.” As for latter, main causes discussed were “we do not have enough feeding (because crop production is low), “We cannot buy livestock” (because of lack of money) etc.

<sup>1</sup> The size of Mayanga is relatively big, 150 households. The reason may be associated with job opportunities at Mbala which is located at around 12km from the village. In fact, there are many villagers who market their produce to the town, and this opportunity may drive them to stay in the village, engaged in cash crop cultivation, etc., thereby the village may have become so big. Another reason may be linked with the establishment of villages in Tanzania. The village borders with Tanzania where there are very big size villages established under *Ujama* policy.

<sup>2</sup> When a new village is established, the village headman shall be authorized by chief, senior chief or otherwise the paramount chief. First, one among the new settlers is identified as potential village headman, and then in most cases the village headman in the original village refers him to the chief for seeking the authority.

There were “we do not have water in dry season” cards as a cause of several problems. This implies that although the COBSI cannot tackle on whole issues prevailing in the village, development of irrigation has high chances to mitigate parts of their existing problems.

Issues captured during focus interviews are summarized; e.g., 1) water scarcity in dry season, 2) lack of money for buying fertilizer and sending children to school, 3) distance to school is far, 4) distance to clinic is far, 5) livestock theft, 6) crop diseases, 7) diseases (e.g. malaria, coughing), 8) difficulty of transporting agricultural produce, and 9) orphans.

As for water scarcity, many interviewees shared with the Team that they have been facing problem from around September to November because shallow well where they fetch water for domestic and bucket irrigation are dried up and they have to go to river. In case of Molwani village, committee member mentioned that there used to have been 4 fish ponds, but now all fish ponds are dried up.

Concerning lack of money for buying fertilizer, it seems that farmers are trapped in the vicious cycle that farmer who cannot get access to fertilizer cannot increase the production and cannot get money and cannot invest in fertilizer. Having access to the fertilizer is one of differences between success a farmer and others captured during focus group interviews (see 1.2.7 for details).

The problem of lack of money for sending children to school becomes most serious in January when parents face the difficulty in getting income as mentioned in the next section. This problem is also related to the problem of orphans. For example, there are 16 households with orphans in the focus group interview in Molwani village and it reached to almost one-third of total households (total household number is 47 household as of the interview). Therefore, the more they have orphans, the more problem of paying school fee becomes serious in some households. Nevertheless, there are some activities to support orphans initiated by village committee or women’s group and it relieves the households with orphans.

### 1.2.2 Most Difficult Seasons of Year

Interviewees picked up both dry season and rainy season as most difficult seasons of the year for different reasons. For example, they face water shortage during dry season while in rainy season they face disease problems such as coughing, malaria, diarrhea, and malnutrition. The period from January to March (rainy season) was also identified as the time for food shortage. Most parents face the problem of money for sending their children to school (school in Zambia starts in January) in this period. In addition, it is very cold during rainy season for school children to go to school, and sometimes they get wet, feeling difficulty for going to the school.

There are coping measures for hunger taking place in late rainy season, or just before the harvest season. Many households experience hunger from January to March except bumper yield years and some of farmers can get only one meal per day or even almost nothing. To avert this hunger, they usually start drying cassava chips in the dry season for assuring their staple food (Nsima) even late in the rainy season. They also preserve leaves of pumpkin, cowpeas, beans, okra and sweet potato by drying them to make sure of food in rainy season available.

Further, one farmer in Saise village, Mbala district shared with the Team during the focus group



*Full bowl of caterpillars. Villager of Chipapa shared with the Team that they experienced bumper harvest of caterpillar in 2008. 1 gallon of caterpillars was exchanged with 2 gallons of maize in Nov and Dec. Caterpillar is regarded as important income source to prevent hunger.*



interview that villagers started to grow cassava in the area after they had experienced the severe hunger in 1995.

Some farmers go to work in other farmers' fields for food instead of cultivating their own fields, which creates vicious cycles for them. There are some cases farmers ask other farmers to "borrow" food. Wild food stuffs such as caterpillars, natural mushroom and wild & domestic fruits are also important produce which can attract urban market. Collecting and selling of these non-timber forest products (NTFPs) contributes to generating income for female because this is recognized as female activity.

### 1.2.3 Sever Hunger in the Village History

In every village, agriculture related issues such as fertilizer distribution, crop damage by heavy rain / drought, livestock theft etc. were included in main parts of the village history. This shows the agriculture has been center of the target villages' livelihood and "rain-fed" dependent agriculture caused severe hunger in the villages.

In all the six villages, after confirming the year the village was established, years of severe hunger they have faced were identified together with the reasons. Table 1.2.3 summarizes the results, and here pointed out is that there were heavy rainfalls which damaged or even devastated their crops than did drought. Examples are; Lunda village has had 3 times of year 1962, year 1963 and year 1972 after the village establishment of 1947, Molwani village has had 2 times of year 1978 and 1997 after the establishment of year 1970, and Mayanga village did 3 times of year 1962, 1996 and 1997, during which their crops were severely damaged by heavy rainfalls, and thereby resulted in severe hunger.

As is the case in most African countries, there were times when they also faced drought, giving again damages to their crops. The years identified for drought are 1842 in Kalembe Chiti village, 1994 in Chipapa village, and 1995 and 2004 in Saise village. In addition, it was reported that wild animals in two villages, policy change wherein subsidized fertilizer distribution was changed, a pest of cassava mealie bug were causes of severe hungers they have faced in their histories.

Note that though the Study area is well known blessed with rich rainfall as compared to other parts of the Country, the rainfall has on the other hand caused heavy damages on their crops, resulting in some cases in food relief. Another point is that such heavy rainfall and even drought have caused damages on all the villages at the same time. In a year, a village was heavily damaged by heavy rainfall, however other villages were not; this is the case often observed in the Study area. This implies that climatic condition in the Study area is sporadic by area and also by time.

**Table 1.2.3 Years of Village Establishment and Years of Severe Hunger**

Village name	Establishment	Severe hunger year (reasons)
Lunda	1947	1962, 1963 and 1972 (heavy rainfall damaged crops)
Molwani	1970	1978 and 1997 (heavy rainfall damaged crops)
Kalembe Chiti	1818	1842(drought), 1957(wild animal destroyed cops) and 1983(policy change for fertilizer distribution affected maize production)
Chipapa	1930	1985 (Cassava mealie bug) and 1994 (short rainfall. Relief food was given)
Saise	1986	1995 (drought. Relief food was given), and 2004 (drought)
Mayanga	1902	1962 (heavy rain and wild animal attack), 1996 and 1997 (heavy rain. Relief food was given in 1996)

Source: JICA Study team, referred to the village analytical workshop results, May-June 2009

### 1.2.4 Success Story and Happiest Moment

Participants of the workshop also discussed success stories / proud events to which they contributed village development. In most cases, every group (female, male and youth) chose same kind of activities such as construction of communal buildings (school, clinic, church and community shelter), fields, bridge and maintenance of road from which whole community members can benefit. On the other hand, how they contributed differed among groups, namely by sex and age and it became a good occasion for all groups to know / re-confirm their individual role / contribution in the village. There were also some activities to support specific villagers such as widows, handicapped, orphans and aged whom villagers recognize as “vulnerable”. Village members participate in communal field cultivation (which is mainly meant to help them), sewing school uniform, supporting school fees and food etc.

*Harvest; happiest moment at the same time hard time for women of Polygamism society.* In one Mambwes dominant villages, where Polygamism are prevailing, women said with hesitation during success story exercise that “harvest itself is really happiest moment for us, but, we, wives then have to worry about our husband may try to find another wife with the money from the harvest, so it is somehow dilemma for us...” (Based on the interview at Village analytical workshop)

As a part of success story, happiest moment was also discussed. Villagers happily presented the moment when they got marriage, had first child, passed exam, had bumper harvest, and managed to send all children to school etc. Some groups also presented “the day we finally had our own communal furrow and saw water flowing” as their happiest moment when farmers constructed the weir and water furrow after COBSI intervention.

### 1.2.5 Dry Season’s Activities

During rainy season, most of the villagers are engaged in rain-fed agriculture, of course. It starts with land preparation and concludes in harvest. Harvest is carried out at the onset of dry season or sometime after the onset of the dry season. What kind of activities the villagers engage themselves in during dry season were explored to know their extent of works and how this would be affected if irrigated agriculture was introduced. Dry season is commonly recognized as the best season for holding wedding because they can prepare plenty of foods for the participants. It is also good time for visiting remote relatives because road condition is better than that of rainy season.



*Branches piled up for drying as preparation for Chitemene system. Farmers start cutting tree in around April and collect them from May.*

In addition, they are engaged in such activities, though overall workload may be lighter than the counterpart activities during rainy season, as; 1) still harvesting rain-fed crops at an early time of dry season, 2) participating in communal work such as road maintenance, construction of school etc., 3) construction of granaries, 4) house maintenance (cutting grass for thatching, molding brick, digging pit latrines and waste pits, construction of dish rack), 5) watering garden vegetables by bucket, and 6) preparation for *Chitemene* system.

### 1.2.6 Gender Role in Agriculture

According to the focus group interviews, there are some gender roles in agriculture activities though both husband and wife go to field together. For example, as to *Chitemene*, men cut the branches and women collect the branches and pile them together for drying and burning. Men do bush clearing as well. Men do land preparation including making of ridge, female does the planting, and both do the harvest in most of crops cultivated. Therefore, many villagers mentioned that it is very difficult for female-headed household to do these activities.



*A set of device for brewing local beer. Brewing local beer is often recognized as women's activity.*

Some widows do all the work by themselves or are helped by relatives, children and neighbors. If they ask neighbors for support, they often prepare local beer for them as an expression of gratitude. Local beer brewing is recognized as one of female activities.

There are some activities, which are done together such as watering the garden vegetables and marketing. Both male and female go fetch water for gardens, do the watering and also do marketing of agricultural produce together. Some women even ride on bicycle for taking their produce to the market even if the distance is long. If the distance to the market is quite far, men take charge of ferrying the produce by bicycle, though.

### 1.2.7 Advanced Farmers

In every village, there are 6 to 10 farmers who are recognized as “advanced” farmers. Advanced farmers whom fellow villagers identified are not only male farmers but female farmers were also included during the interview. The features which fellow farmers pointed out as “advanced” farmers were: 1) holding larger cultivation area and hiring casual labor for intensive agriculture, 2) having access to fertilizer, 3) production pattern is diversified by growing several crops, 4) possessing many numbers of livestock, 5) applying larger amount of fertilizers, 6) possessing of fertile soil (many first settlers have larger and fertile soil), 7) being hard workers, 8) able to make sound plan, 9) high adaptation ability for new agricultural technologies etc.

#### *Trials by advanced farmers*

Most farmers grow beans once or twice at onset of rainy season and around January to 15th February. The beans planted at onset of rainy season which is harvested at beginning of January attracts much money because there is scarcity of beans in the market. This is usually grown on upland. However, in Saise village, some farmers grow beans during the dry season in the Dambo when there is less infestation of diseases and pests. The crop is grown utilizing the residual moisture. Farmers harvest their crops when the demand for the beans is high and sell them in town like Kitwe, Ndola and Lusaka at higher price. Further, one farmer in Mayanga succeeded in growing *Jatropha* and got income from them while others abandoned because they did not believe how profitable it is and preferred to grow food crops when NGO came to village and tried to introduce them. Further, participants of focus group interview in the Lunda village mentioned that there are 7 farmers who can be recognized as “advanced” farmer in their village. Interviewees explained to the Team that these farmers are joining cooperative in another village (there is no own cooperative in

These advanced farmers are recognized as rather rich and wealthy people in the village, and the

symbols of richness according to the interviewed villagers are; house with iron sheet, having assets such as motor bike, radio, bicycle, TV, ploughing cattle, grinding mill, having money for fertilizer, sending “all” children to school, etc. They are often members of the village committee, members of the cooperative committee (who can access cheaper subsidized fertilizer), and also stand as contact villagers, aside from the village headman, to whom CEOs and donors first approach for promotion of agriculture related activities.

### 1.2.8 Major Income Sources

Taking advantage of the workshop registration, their major income sources were also asked. Most income sources can be found in agricultural produces such as maize, cassava, beans, groundnuts, finger millet, vegetables, etc. In fact, it was only 6 % of the workshop participants who indicated they had non-agricultural income source as their major source. In general, if a village can access FSP / FSIP through their cooperative, they can and tend to produce maize. In this case, a part of the maize production can be sold, becoming one of their major income sources.

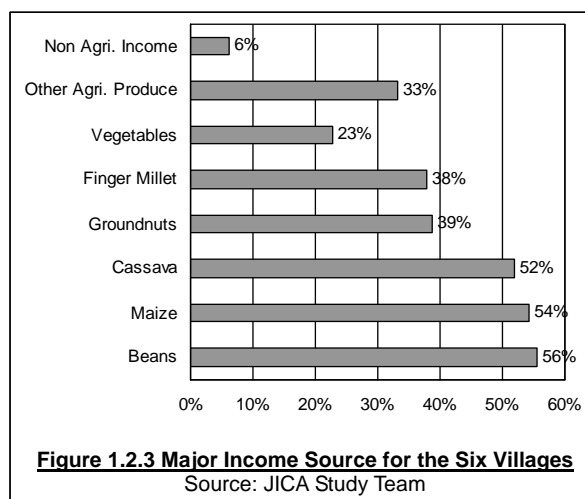
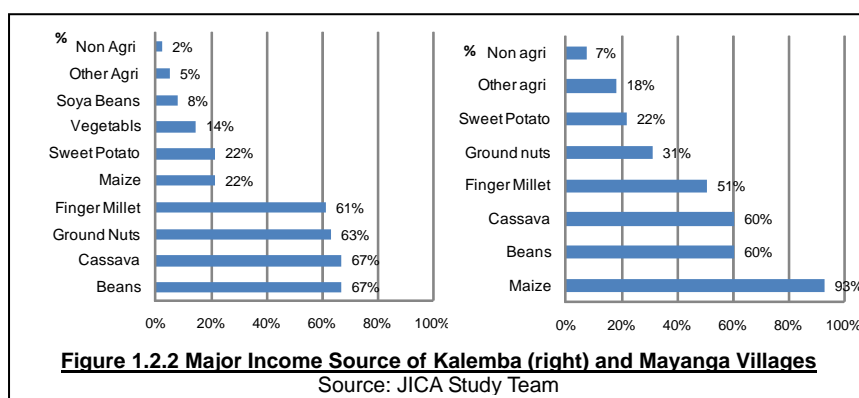
The above example can be found in Chipapa village and Mayanga village where 76% (see Figure 1.2.2) and 93% of the workshop participants gave maize as one of their major income sources. A unique example is Saise village where there is no cooperative. They access subsidized fertilizer through neighbor village’s

cooperative so that maize was identified as the top major income source for them. On the other hand, those villages of Lunda and Kalemba (see Figure 1.2.2) do not have a cooperative and nor access to neighbor village’s cooperative. In these villages, top two major income sources were beans and cassava, both of which do not require fertilizer.

Putting together all the major income sources listed from the workshop participants of the six villages, Figure 1.2.3 summarizes the major income sources by percentage of who have replied them (in this question, plural answers were allowed if they have any). Top three income sources for the six villages are beans, maize, and cassava, all of which were listed by more than 50% of the WS participants. Followed were groundnuts (39%), finger millet (38%), and vegetables (23%), etc. Note is that the chart does not scale how much in monetary term they get from those income sources, but only indicate the kind of sources.

### 1.2.9 Trend analysis

During the workshop, participants also discussed the trend of agricultural production, livestock production, water level of nearest stream and diseases. Followings are the findings based on the



analysis;

-Maize production: government policy on fertilizer distribution had much influence for production of the maize: Maize production was peaked at 1980 to 1990 when farmers had easier access to fertilizer, and then decreased because government changed the policy for distribution of fertilizer on credit. In addition, timing of delivering fertilizer was also delayed for this period.

-Cassava production: trend of the cassava production has been related to maize production in two ways, namely, if the production of maize decreased, cassava production increased. This is mainly because farmers who could not afford fertilizer changed maize production to cassava production. There is an opposite case observed in Molwani. Both cassava and maize production was quite high and this is because there were abundant maize stock and farmers managed to take time to wait for cassava to mature (when there is nothing to eat or sell, farmers have to uproot cassava even when it is not mature).

-Finger millet: trend differs among villages. One trend is that finger millet production has been increased because the profit from finger millet has been realized and become popular, and another is trend of decrease. This is because trees for Chitemene have been decreased and number of farmer who practices has been decreased

Further, rainfall and soil condition also affected production of crops above, of course.

-Water level: Water level of river / stream has been decreased in every village because of drought and some villagers are diverting water from the stream to their field by cutting tree randomly.

-Livestock production: Production has been decreasing in most villages because of high incidence of livestock theft (thieves come from other villages according to the interview result) and disease.

-Diseases: Both diarrhea and malaria has been drastically decrease in every village. One reason is that farmers got knowledge for keeping their surrounding clean and encouraged to construct toilet and to clear the grass. Another reason is the mosquito net distribution from Ministry of Health and NGOs.

The record of the workshop of each village is summarized in the Attachment.

### 1.3 Findings from Baseline Surveys

Baseline surveys were conducted in two dry seasons of 2009 and 2010. First batch of the baseline survey was conducted in the six villages where focus group interviews and village level analytical workshops were also held. The additional batch of the baseline survey was conducted in order to have further information especially for the villages in Luapula province which were not covered in the first batch of baseline survey. The primary objective of the baseline survey

**Table 1.3.1 Villages Covered by Baseline Survey**

District	Village name	No. of H/Hs	Distance from District Center	Remarks
Kasama	1. Lunda	30	25km	1 <sup>st</sup> batch conducted in FY 2009 (182 in total)
Kasama	2. Molwani	31	16km	
Mungwi	3. Kalembe	30	32km	
Mungwi	4. Chipapa	30	15km	
Mbala	5. Saise	31	28km	
Mbala	6. Mayanga	30	12km	
Luwingu	7. Mumba etc.	31	45km	2 <sup>nd</sup> batch conducted in FY 2010 (189 in total)
Mpika	8. Makashi etc.	30	20km	
Mporokoso	9. Kawikisha etc.	30	3km	
Kawambwa	10. Chisheta etc.	30	15km	
Mansa	11. Mutiti etc.	31	8km	
Nchelenge	12. Mulonda etc.	37	20km	
Total		370		

Source: JICA Study Team Note: more than 1 village were involved in the surveys carried out in Luwingu, Mpika, Mporokoso, Kawambwa, Mansa, and Nchelenge district, for which major village represents the others.

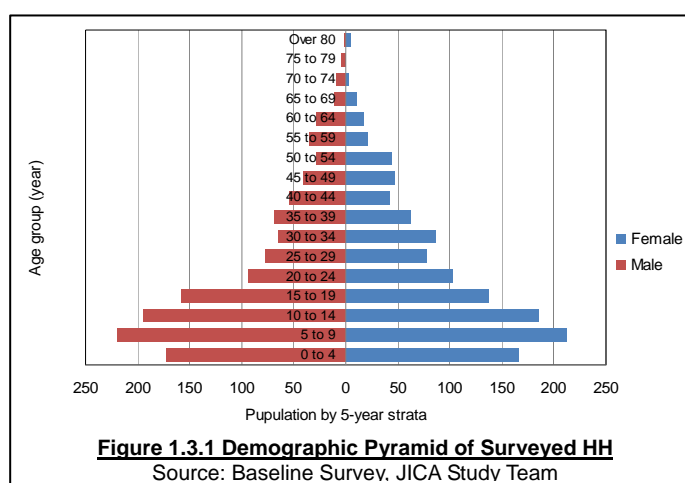
was to set the baseline in order to measure the impact by smallholder irrigation. This sub chapter summarizes the baseline survey results.

### 1.3.1 Villages and Samples Covered

Basically, 30 households were covered for the survey in both batches. The households were selected randomly covering different locations of the villages, and the survey team encouraged both husband and wife to join the survey together in order to get information as correctly as possible. Table 1.3.1 shows the villages covered by the baseline survey, indicating the name, number of households covered, distance from the relevant district center.

### 1.3.2 Family Structure

Figure 1.3.1 shows the demographic pyramid by 5-years strata for surveyed households. The number of male is slightly larger than that of female (F: 592, M: 605) and almost half the population falls in under-15 years (46%). There is an indication that young villagers work outside the villages as shown in the population numbers in the years of 25-29 and 30-34 for male and of 25-29 for female. According to some interviews, villagers often have their elder children working in district centers and even in Lusaka and Copperbelt.



One may see the population in 0 to 4 years old very less. Though the reason is not certain, one may say there is already low birthrate mainly due to family planning now promoted by the Ministry of Health. Or otherwise, since the baseline survey was administered to the members of irrigation schemes, they could be already older than those who are to have infant children. In fact, the average age of husbands interviewed is 45 years old while that of wives is 40 years old. From these average ages, there may be a possibility for them not to have infant children already.

Table 1.3.2 shows an average number of family members per household, number of children under-15 years, dependent ratio and number of female-headed households interviewed. Number of the family members includes not only the blood related family members but also anybody who eats together in the same house, e.g. relatives, orphans taken care of by the household.

Number of family members per interviewed household ranges from 5.4 (Makashi, Mpika) to 8.9 (Molwani, Kasama) with an average of 7.0 members. Number of children under-15 years per household varies from 2.6 (Makashi, Mpika) to 4.0 (Mumba, Luwingu) giving a dependent ratio from 37% (Molwani, Kasama) to 58% (Mumba, Luwingu). Share for the female-headed households interviewed is from 3% (only one included, Molwani, Saise, Mumba and Mutiti) to as many as 23 % (7 households included) in Saise village of Mbala district.

**Table 1.3.2 Summary of Family Structure**

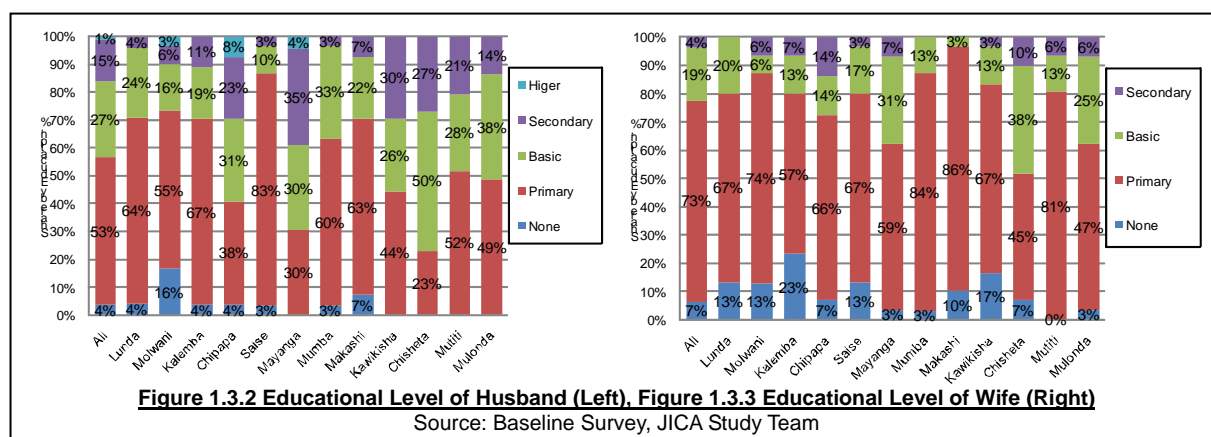
Village / district name	Average family members per H/H	Average family members under age 15	Dependent Ratio (% of U-15 )	No. of F-HHs interviewed
Lunda	7.5	3.8	51.3	5 (16.7)
Molwani	8.9	3.3	36.7	1 (3.2)
Kalembe Chiti	7.5	3.6	48.7	3 (10.0)
Chipapa	7.6	3.1	41.4	3 (10.0)
Saise	6.4	2.7	43.1	1 (3.2)
Mayanga	7.6	3.2	39.9	7 (23.3)
Mumba	6.9	4.0	58.2	1 (3.2)
Makashi	5.4	2.6	48.5	2 (6.7)
Kawikisha	5.7	2.7	46.5	3 (10.0)
Chisheta	6.5	2.7	41.3	4 (13.3)
Mutiti	6.3	2.8	44.5	1 (3.2)
Mulonda	7.1	3.7	51.8	0 (-)
Average	7.0	3.2	46.0	2.6 (8.6)

Source: Baseline Survey, JICA Study Team. Note: Figures in parenthesis are %

### 1.3.3 Education Level

Figures 1.3.2 and 1.3.3 show educational levels of the husband and wife by such categories as primary, basic, secondary and higher<sup>3</sup>. Share of the husbands in all the villages excluding Molwani who have received no education is lower than their spouses. Combined share of non-education and primary level for husbands is also lower than that of wives except for Saise village. This is to say, though it differs by village, educational level for husbands is generally higher than that of the wives.

Higher education level can be found in the husbands of such 3 villages as Molwani (4%), Chipapa of Mungwi district (7%) and Mayanga of Mbala district (4%), but none in wives. Molwani village is located at about 16km away from Kasama center, Chipapa about 15.0 km away from Kasama center and the Mayanga 11.5 km away from Mbala center. In addition, there is a secondary school within Mayanga village and within a walking distance for household of Chisheta of Kawambwa district. These situations seem to have contributed in raising their educational level but not much done same in the both sexes. The first who has received better education can be found in men.



<sup>3</sup> Primary education covers from Grade 1 to Grade 7, Basic from Grade 8 to Grade 9, and Secondly from Grade 10 to Grade 12 in Zambia. After the secondary, higher or called tertiary education starts for collage and university.

### 1.3.4 Property and Assets Holdings

Table 1.3.3 shows the property and asset holdings by village. It is learned that in all the villages more than 70% of the sampled households have radio, of which in 4 villages of Lunda of Kasama district, Molwani, Kalemba Chiti of Mungwi district and Chipapa of Mungwi district, more than 80% of the households owns one. As for the TV, except for 3 villages namely, Kalemba Chiti, Saise, and Makashi, we can find TVs. Kalemba Chiti, Makashi and Saise are located relatively deep in the rural area where they have difficulty in accessing the TV signals, and this is the reason why we could not find any TV set.

Surprisingly, there is a high rate of cell phone possession. Almost all the villages but Saise and Makashi are covered with constant cell phone network in fact. The cell phone has a function to receive text message when the person moves into the network area. By this reason and also thanks to the wide areas of network coverage, cell phone has become very popular even in rural area. The ratio of the sampled households, who have cell phone, ranges from 9.7% (3 out of 31 sampled households in Saise village) to as high as 63% (19 out of 30 sampled households in Chisheta) with an average of 44%. Cell phone is used for communication with CEO and middleman etc. for the information on the fertilizer distribution, price of the agriculture produce etc.

Bicycle is recognized as an important tool for agricultural marketing in those villages and more than half of the households interviewed own bicycle (average is 75%). Households without bicycles have to take their produce either on foot or hiring other farmers' bicycles. In this case, it costs them ZMK 5,000 / trip and not always available at their convenient time. Therefore, villagers tend to own bicycles (bicycle costs ZMK 250,000 to 450,000 according to the interview at Mansa district in July 2010).

Crop knapsack sprayer is also recognized as an important item for those farmers who cultivate vegetables. The ratio ranges about 3 % (only 1 household in Chipapa, Mumba and Chisheta) to 42% (13 out of 31 sampled households in Molwani village) with an average of 16%. Higher possession rate of crop knapsack sprayer corresponds to the higher application of agricultural chemicals in villages such as Molwani and Mulonda (Nchelenge district) where possession rate of crop knapsack sprayer exceeds over 40 % (In fact, concerning tomato, 85% of Molwani and 95 % of farmers applied agricultural chemicals to tomato) as discussed later in details. Nevertheless, the application ratio of agricultural chemical is not still so high in some villages. For example, concerning tomato, only 25% of Chipapa, 33% of Lunda and 42% of Chisheta tomato growers have applied the chemical while the overall average of those who applied the chemicals on tomato was 68%.

Houses with iron sheet roof are not so many except for Mumba where 12 (40%) of the surveyed households owns it. It ranges from 3% (one household in Lunda, Kalemba, Saise and Makashi) to 19% (6 out of 30 sampled households in Chipapa, Mayanga and Chisheta) in the rest of the 11 villages. Houses with iron sheet roof are regarded as one of rich farmers' characteristics according to the interviews as mentioned earlier.

It may seem strange that Mumba has the largest percentage because level of income and consumption level there is estimated as one of the lowest among the 12 villages. Some sampled farmers who own the house with iron sheet roof in Mumba explained that they bought it in Kitwe (in Copperbelt) where iron sheet was sold rather cheaper than Luwingu center when they went there for selling their produce with one of farmer's truck. They further explained that they had been troubled with grass-thatched houses getting soaked by heavy rain or catching bush fire (it even damaged crops stored).



**Table 1.3.3 Asset and Property Holdings**

Village	Radio		TV		Cell Phone		Bicycle		Crop Sprayer		Iron Sheet Roof	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Lunda	24	80.0	6	20.0	12	40.0	25	83.3	7	23.3	1	3.3
Molwani	29	93.5	9	29.0	17	54.8	23	74.2	13	41.9	5	16.1
Kalemba	25	83.3	0	0.0	8	26.7	22	73.3	5	16.7	1	3.3
Chipapa	24	80.0	8	26.7	16	53.3	18	60.0	1	3.3	6	20
Saise	19	61.3	0	0.0	3	9.7	17	54.8	3	9.7	1	3.2
Mayanga	19	63.3	5	16.7	11	36.7	24	80.0	3	10.0	6	20.0
Mumba	20	64.5	2	6.5	19	61.3	25	80.6	1	3.2	12	38.7
Makashi	19	64.3	0	0.0	7	23.3	21	70.0	4	13.3	1	3.3
Kawikisha	18	60.0	9	30.0	15	50.0	26	86.7	2	6.7	2	6.7
Chisheta	20	66.7	11	36.7	19	63.3	22	73.3	1	3.3	6	20.0
Mutiti	22	71.0	10	32.3	16	51.6	26	83.9	6	19.4	4	12.9
Mulonda	28	75.7	4	10.8	23	62.2	30	81.1	15	40.5	4	10.8
Total (Average)	267	72.0	64	17.4	166	43.5	279	75.1	61	15.9	49	13.2

Source: Baseline Survey, JICA Study Team

### 1.3.5 Livestock Holdings

Livestock holdings differ by kind and also among villages as shown in Table 1.3.4. Most of the households in every village own chicken (60 % to 97 %) and its number per owned-household is around 11. Chickens are very often served in special occasions such as Christmas, New Year, wedding ceremony and for special guest visit. In these occasions, a whole chicken is usually served.

As for cattle, such three villages as Lunda, Saise and Mayanga own some but not so many. In Lunda village, 7 households out of the 31 sampled households own cattle for beef purpose, in Saise only one household owns a pair of oxen, that is for droughting purpose, and in Mayanga there are four households owning cattle for beef purpose. As for Makashi case, 6 households out of the 31 sampled household own cattle and they started to raise the cattle under the support of ZAWA (Zambia Wildlife Authority). Oxen are used for taking the produces to the market and for droughting for both of the owners and other farmers in the village.

Goat can be found in all the villages except for Mutiti (Mansa district) with the owner households ranging from as low as only 2 in Chipapa to the maximum of 23 households in Mulonda. Number of goats owned by a typical household is not so many, ranging from only 3 to a maximum 7 heads only. No goat is found in Mutiti and this is because villagers experienced crop damage by goats and stopped raising them.

Pigs are owned to a lesser extent than goats in most villages except for Makashi and Mutiti and number of pigs owned by a typical household is 1 to 7 heads. Fishpond can be found out in five villages of Lunda, Molwani, Kalemba Chiti, Kawikisha (Mporokoso district) and Mutiti. Fish ponds can be a very good venue which provides protein as well as being an income source.

**Table 1.3.4 Livestock Holdings by Kind and by Village**

Village name	Chicken		Cattle		Goat		Pig		Fish pond	
	Nr. (%)	Unit/HH	Nr. (%)	Unit/HH	Nr. (%)	Unit/HH	Nr. (%)	Unit/HH	Nr. (%)	Unit/HH
Lunda	18 (60.0)	10.8	7 (23.3)	2.6	3 (10.0)	4.7	1 (3.3)	1.0	4 (13.3)	3.8
Molwani	27 (87.1)	13.0	0	-	5 (20.0)	4.0	0	-	3 (9.7)	1.7
Kalemba Chiti	29 (96.7)	7.7	0	-	5 (16.7)	2.8	9 (30.0)	2.4	1 (3.3)	2.0
Chipapa	25 (83.3)	9.7	0	-	2 (6.7)	4.0	1 (3.3)	2.0	0	-
Saise	20 (64.5)	7.8	1 (3.2)	2.0	12 (38.7)	5.3	10 (32.3)	1.6	0	-
Mayanga	25 (83.3)	10.1	4 (13.3)	4.3	12 (40.0)	6.3	8 (26.7)	4.1	0	-
Mumba	27 (87.1)	10.8	1(3.2)	2.0-	14(45.2)	3.2	10 (32.3)	4.1	0	-
Makashi	25 (83.3)	13.0	6 (20.0)	5.3-	4 (13.3)	5.5	12 (40.0)	2.5	0	-
Kawikisha	29 (96.7)	7.7	0	-	7 (23.3)	7.0	4 (13.3)	2.8	1 (3.3)	1.0

Chisheta	22 (73.3)	9.7	0	-	15 (50.0)	4.8	1 (3.3)	1.0	0	-
Mutiti	29 (93.5)	9.7	0	-	0	-	10 (32.3)	2.5	1 (3.2)	1.0
Mulonda	30 (81.1)	12.8	0	-	23 (62.2)	5.6	3 (8.1)	7.3	0	-
Total/average	162 (85.7)	10.6	7 (3.7)	3.7	63 (33.3)	5.2	40 (21.1)	3.4	2 (3.2)	1.0

### 1.3.6 Drinking Water

The sources of drinking water and its treatment are summarized in Table 1.3.5 next page. There are mainly two water sources; pond/ stream and dug well and averagely speaking, 65% of surveyed households utilize the pond /stream for drinking water. For water treatment, mainly two measures, e.g., chlorine and boiling are employed. Chlorine is nowadays available even in rural kiosks at a price of ZMK 1,000 per 350 ml bottle. An NGO also provided a sanitation improvement programme to Saise village together with the distribution of chlorine.



*Children come to nearest stream to fetch the water.*

On the other hand, there are still many villagers who do not carry out any treatment. There are five villages which percentage exceeds 70%, namely Lunda (73%), Chipapa (70%), Mayanga (87%), Mumba (94%), and Makashi (70%). These villages can access streams with a sizable flow volume for which they think it is not risky to take as it is. Therefore more than half of the sampled households for these villages do not carry out any treatment on the domestic water.

**Table 1.3.5 Drinking Water Sources and Its Treatment**

Village name	Source of drinking water				Water treatment					
	Pond/ stream		Dug well		Chlorine		Boiling		No treatment	
	Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Lunda	23	76.7	7	23.3	4	13.3	4	13.3	22	73.3
Molwani	10	32.3	21	67.7	18	58.1	4	12.9	9	29.0
Kalembe Chiti	23	76.7	7	23.3	19	63.3	5	16.7	6	20.0
Chipapa	22	73.3	8	26.7	4	13.3	5	16.7	21	70.0
Saise	31	100	0	0	30	96.8	1	3.2	0	0
Mayanga	30	100	0	0	1	3.3	3	10.1	26	86.7
Mumba	29	93.5	2	6.5	2	6.5	0	0	29	93.5
Makashi	27	90	3	10	5	16.7	4	13.3	21	70.0
Kawikisha	23	76.7	7	23.3	11	36.7	2	6.7	17	56.7
Chisheta	16	53.3	14	46.7	9	30	1	2.2	20	66.7
Mutiti	0	0	31	100	12	38.7	5	16.1	14	45.2
Mulonda	1	2.7	36	97.3	36	97.3	0	0	1	2.7
Average	235	64.6	136	35.4	151	39.5	34	9.3	186	51.2

Source: Baseline Survey, JICA Study Team. Note: Because some households utilized multiple water source/ treatment, the total is more than 100 % in some villages.

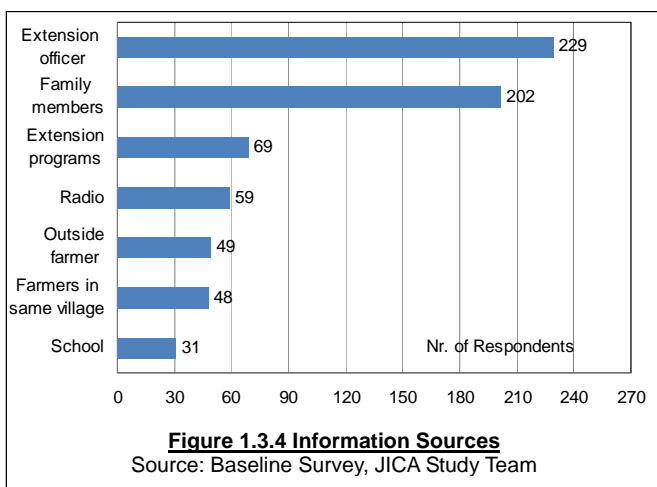
### 1.3.7 Information Source of Agricultural Knowledge

The baseline survey also asked their sources on agricultural knowledge. Results for all the villages are summarized in Figure 1.3.4. Extension officer and family members are the most dominant information sources, followed by extension programme of donors, NGOs and the government, and radio programme. There are farmers who have sourced agricultural information from fellow farmers outside his/her village and also within the village. They were counted at 49 and 48.

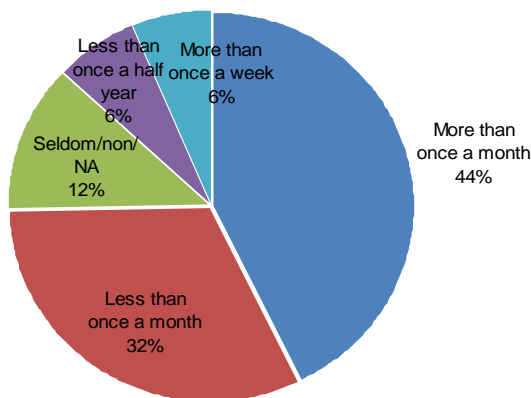
Figure 1.3.5 and Figure 1.3.6 show the frequency of CEO visit and listening to radio extension

programme respectively. Almost half of the respondents (43%) answered that they have chance to see CEO more than once a month, and more than half of the respondents (55%) answered that they listen to the radio extension program almost every week. In fact, it revealed that 70% of respondents listened to the radio extension programme if the responses of “seldom, none and NA” were excluded.

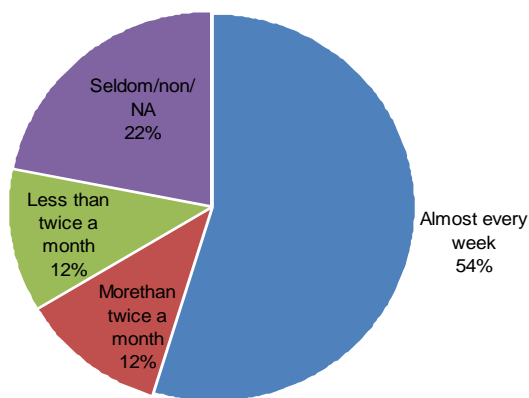
There are several regular radio extension programmes available not only managed by MACO’s NAIS (National Agricultural Information Services) but also Zambian National Farmers’ Union etc. These programs are broadcasted in farmers’ convenient time (early morning or evening when famers are in the house before / after the field work) and some are broadcasted more than once a week. These factors contribute to the high percentage of those listening to the radio programme.



**Figure 1.3.4 Information Sources**  
Source: Baseline Survey, JICA Study Team



**Figure 1.3.5 Frequency of CEO Visit**  
Source: Baseline Survey, JICA Study Team



**Figure 1.3.6 Frequency of Listening to Radio Programmes**

### 1.3.8 Debt

In the latter part of the baseline survey, the situation of borrowing money was asked. Except for Lunda and Mumba, more than 80% of the respondents answered that they do not have any debt as shown in the Figure 1.3.7. Next, Figure 1.3.8 shows the sources of borrowing money. First contact person tends to be relatives and rather rich family in the same village. If fail, they resort to lender outside. Some of respondents borrow the money from cooperative, church and bank too. None of the borrower had to submit any mortgage when they borrowed money, though.

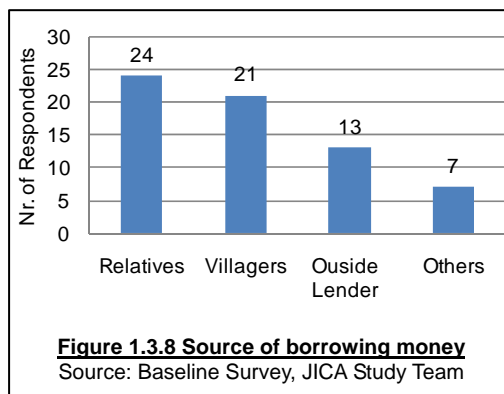
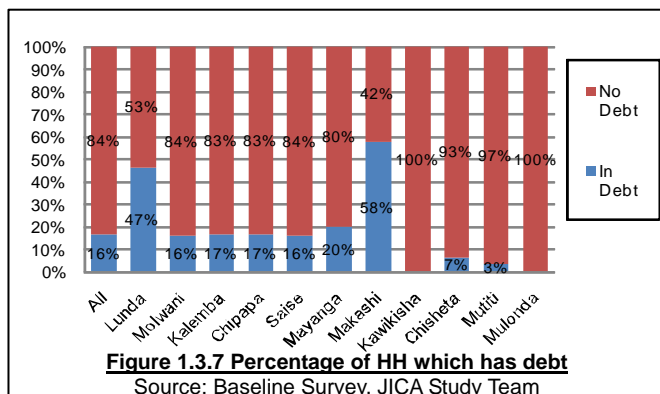
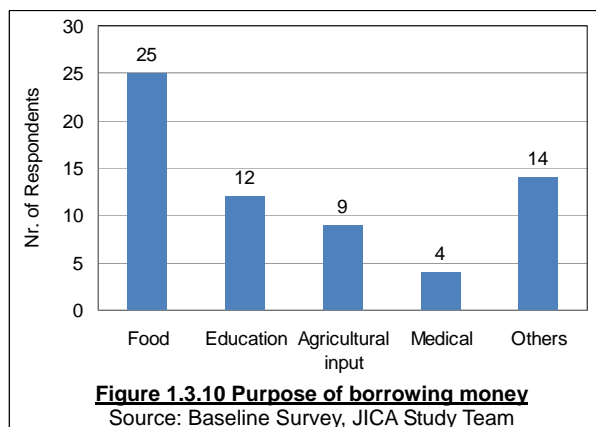
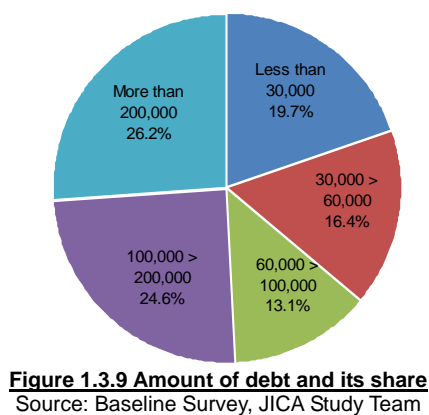


Figure 1.3.9 shows the amount of money they had borrowed. Almost half of the respondents had a debt of more than ZMK 100,000. On the other hand, respondents with debt less than 60,000 were also more than one-third (36%) and many of the respondents (64%) who borrowed the money for food fall in this category. Food is the most dominant reason for borrowing money, followed by for education as shown in Figure 1.3.10. “Others” include house construction / maintenance, repair fee for radio / bicycle and clothing.



## CHAPTER 2 FARMER ORGANIZATIONS / IRRIGATION CLUB IN STUDY AREA

As earlier mentioned, there is “village committee” chaired by village headman in every village and the committee is the supreme decision making body in the village. Villagers proudly introduced their village as disciplined and cooperative during focus group interviews and they also shared that they have been devoting themselves into communal or self-help works under initiative of the village committee etc.

CEOs in charge started COBSI activity by asking farmers to organize the irrigation club. Village chairperson or committee, then, was first entry point for the CEOs to deliver the message. Some of them even became irrigation club committee members who took lead for the activities.

Of course, other farmer group members and advanced farmers were also selected as irrigation club committee members because experience in irrigated agriculture with water furrow was still limited. In this chapter, therefore, groups in the village are firstly reviewed and then activities of the irrigation clubs in the Study areas are summarized to explore further improvement of activities.

### 2.1 Village Committee

Basically, village committee consists of 8 to 10 members such as chairperson (the village headman), vice chairperson, secretary, treasury and members. There are also female members in every committee, and it is learned that the female members are recognized mostly as active farmers in the villages and their opinions are important especially when they have to handle female villager related issues.

The position of village headman is handed over to his son, brother and nephew or villagers select the new village headman by voting based on interviews.

The village committee discusses various issues and topics wherein decision is basically made as the committee’s consensus under the chairpersonship of the village headman. Topics discussed are issues relating to village development such as road & bridge maintenance, construction of school and health post, construction and maintenance of village shelter (a public meeting place), establishment of village community fields, etc.

The committee meeting is usually conducted regularly, e.g. such as once a month. Information dissemination of the decision made in the meeting is done by calling the general meeting (all villager get together) or letting village spokesman go around the village to announce.

Common roles of the village committee observed in the interviewees were 1) settlement of the issues among villagers / keeping the village peaceful, 2) promotion of communal works, such as road clearance, construction of temporal bridge, school, clinic etc., 3) welcoming the guests from outside (village headman decides where guests stay and villager offer the place to stay), 4) encouraging villagers for hard work (agriculture) and 5) taking care of vulnerable.

As for 5), taking care of vulnerable, widows, couples with little money to invest on the farm, those who fail to send children school, the aged are commonly regarded as vulnerable in the interviewed villages. Village committee holds a general meeting and

#### Sanctions for the disobedient villager.

Village committee members shared with the Team how the committee treats the disobedient villagers during the focus group interviews. Case of Molwani village is: First of all, the village committee gives sanction such as road clearance etc. which can be benefit to the village. If the case becomes serious, the village headman takes him/her to the chief and chief will fine them for K40,000 to K50,000 or forms of chicken and these money will be used for the coffin box, tilling communal land and buy the stationary for the village committee. As for case of Kalembe Chiti, they explained that they are not allowed to fine villager by paramount chief and the village committee can only give them tasks of maintenance of village shelter, road, bridge etc. Same as Molwani village, the committee takes him/her to the paramount chief if they fail to the case.

issues for supporting the vulnerable are discussed and decided what to do in the meeting. Some measures shared in the interviews were; 1) forming funeral committee to support those who cannot pay for the funeral, 2) managing the communal field to give them the produce, 3) saving the money for emergency issue for them, 4) lending the irrigated land for free, 5) helping the repairing the house etc.

Disobedient villagers are punished by giving tasks such as maintenance of village shelter, road and bridge or otherwise required fine (in cash and/or kind) in some villages as shown in the box. If the committee fails to handle the cases, they take him/her to the chief, senior chief and finally to the paramount chief as need arises.

## 2.2 Agricultural Cooperative

Agricultural cooperative is also recognized as an important group in the village. One of major advantages for farmers to belong to agricultural cooperative is to access the subsidized fertilizer through FSP / FSIP.

Nevertheless, not all of villages in the Study area have cooperative, therefore, cases were observed that some farmers join a cooperative in neighboring villages if his / her own village does not have cooperative.

Members of the cooperative pay the admission fee and membership fee every year. One of interviewed farmers in Chalwe village of Mpika district shared with the Team that each member pays ZMK 20,000 as membership fee every year and buys 10 share of ZMK 50,000 for 3 years.

### *COBSI has become trigger for setting up cooperative.*

In Chisembe village, Mansa district, temporary weir was constructed in November 2009. Irrigation club members are also members of the cooperative which was established at the same time. Villagers used to face the problem of acquisition of subsidized fertilizer because they did not have their own cooperative in the village. Chairperson explained that COBSI was a trigger to take action for establishment of the cooperative. He further explained that there are programs for supporting the fertilizer such as District Farmers' Association, FSIP (=former FSP), CEEC (Citizen Economic Empowerment Commission) and PLARD, but these organizations can support registered organization, not

for individual. It requires ZMK 300,000 (10,000 is registration fee, but rest of them is used for printing by-laws, regulation etc.) and this made them hesitate to take action until now.



“But we had confidence to make benefit from furrow and decided to form it finally” chairperson concluded. (Based on the interview on 6 July 2010)

In addition, members are required to pay for the registration fee and printing fee of by-laws, regulation etc. and it makes villagers hesitate to take action for establishment of cooperative or become member of cooperative as mentioned in the box on the right.

There are many cases observed during interviews that the cooperative members, especially who are in the major positions such as chairperson, secretary etc. become the key members of the irrigation club committee. They are regarded as rather successful farmers in the village and have some experience in irrigation and other members tend to think their knowledge and experience can be useful to other members too. Further, there are cases the formation of the irrigation club had become a trigger to form agricultural cooperatives during interviews as shown in the box above.

## 2.3 Other Organizations / Groups / Activities

In addition to village committee and agricultural cooperative, following groups / activities were observed in the Study area. Group can be divided into four categories, namely 1) interest group such as vegetable farming and credit group, fish farming group, 2) youth group, 3) women's group and 4) other activities for the vulnerable such as funeral committee. Former two groups tend to target to improve members profit / livelihood and latter group tends to do activities supporting vulnerable such

as household with orphan and the aged.

In Mayanga village, Mbala district, there is a women's club which was established in 2005 with 10 members. Members sew the school uniforms, Chitenge etc. and school uniform were distributed for free to orphans in the area. Another women's club in Chishishi village of Luwingu district, owns club's fields and cultivate them to raise the money and buy domestic necessary such as food, soap and salt etc for the vulnerable. In Chalwe village of Mpika district, there is funeral committee by the initiative of village committee to support the household who cannot afford the funeral or taking sicken family members to the hospital.

## **2.4 Irrigation Club**

### **2.4.1 Irrigation Club Committee and Its Rules and Regulations**

Farmers who showed interest in COBSI were asked to form irrigation club by the BEOs / CEOs in charge according to the interviews. The irrigation club has office bearers in their committee as the village committee does, namely, it has chairperson, vice chairperson, secretary, treasurer and members. Some of village committee members have also become irrigation club committee members as earlier mentioned.

Each irrigation club formulate rules and regulations such as i) maintenance activity, ii) meeting, iii) membership fee and iv) do and don'ts such as "do not wash the dishes and clothing in the furrow", "member should attend the maintenance work", "members should attend meeting every week" etc. The rules and regulations are prepared by the club and then submitted to the village headman /committee for the approval as mentioned further in the next section.

Activities are reported to village committee through the village committee members in the irrigation club committee regularly, but ordinary issues raised in the irrigation club are discussed within irrigation club committee in most cases. Only when the problem becomes too serious, the issue is brought to the village committee to ask for their decisions, such as land allocation issues.

Of course, the availability of the water depends on the site selected and not always opened for every villager in some cases. There were cases that allocation of irrigation land became serious issue among the members or with non-members especially who have the land along the furrow as mentioned in next section..

### **2.4.2 Challenges Observed**

Famers in the Study area had just started their irrigation club activities and it may be too early to evaluate their activities. However, there were some challenges observed during the interviews. Therefore, this sub-section takes up these difficulties and also good practices already taken up in the following sub-section.

Firstly, the Team encountered some cases which members had not started their irrigation activities even though the weir and furrow were constructed. The main reasons observed were either i) they did not believe "temporary" weir could really work, or ii) they thought they needed fertilizer to start with which they could not afford fertilizer.

The chairperson of Mayanga irrigation club in Mbala district told us that only 4 households among 30 households started irrigation in 2009/2010 because the rest of members could not believe temporary weirs fully and some of them could not afford fertilizer to start with. Further, some villagers withdrew when they realized that no financial support would be given from the JICA.

Another chairperson of Chishishi irrigation club in Luwingu district told us that members still do not

believe the benefit from the furrow and are waiting to see others succeed in getting benefit from it. The weir constructed was damaged by the villagers while they were passing over the weir as small bridge and they were afraid that the weir will be damaged again even if they construct it and would not get enough water. In addition, villagers expected that the weir will be a permanent one and they would be paid for labor fee and withdrew when they found out that the weir was temporary and no payment was given to them. (The interview in Chishishi was conducted in November 2010 and the situation might have changed in the following year).

Chairperson of Chikwanda irrigation club in Mpika district shared with the Team that members faced land issue. Members had started utilizing the newly constructed furrow which was constructed in the upper area of the old furrow but land owner started to claim that he did not want the furrow to pass through his field. Because the village committee could not solve the problem, members took this land owner to the chief and problem was solved. Enthusiasm of the farmers disappeared during the settlement of the land issue and they went back to the old furrow in the end.

### **2.4.3 Good Practices Observed**

On the other hand, there are some cases where irrigation club is functioning well by their own trials.

Sokoni irrigation club of Mporokoso district shared with the Team that they started the irrigation activity by establishing 1 lima area of “demo farm“ which was managed by the club members in 2009. ZMK 5,000 was collected from each member and it was used for fertilizer for the demo-farm. ZMK 350,000 realized from rape was shared among members and the remaining ZMK 880,000 realized from green maize was used for purchasing fertilizer and shared among members.

Having learnt from demo-farm in the 2009, each member had been allocated a 0.5 lima plot for their own irrigation activities in 2010. The demo-farm has since been expanded up to 1 ha in 2010 and members also have started to dig fish ponds for the club.

“I thought it would be very good way to start furrow irrigation not individually but start in a group because none of the members had enough knowledge and money to buy the input to start with”, chairperson of the club proudly explained to us.

The village headman of Lumpombwe, Mungwi district shared with the Team that they have just formed monitoring committee to follow up members’ activities for further improvement. He further said, “I even told members that if all assigned fields were not used properly, I will give the land to others who can utilize them properly. I want to make all fields turn to paradise”

Similarly, chairperson of the Mpangankulu irrigation club shared with the Team that the committee members try to monitor the members’ activities by visiting members’ farms regularly and they encourage the members who do not utilize the land fully. He further continued, “we cannot just sit and wait for support for upgrading the weir but we will keep on going with the temporary weir as much as we can because other sites such as Chinenke and Ngulula also started from temporary and then were upgraded to permanent weirs because government recognized their achievement they had done by temporary weir, so we will also try our best”.



## CHAPTER 3 INCOME, EXPENDITURE AND POVERTY IN THE STUDY AREA

Here the villagers' income level as well as the magnitude of the inequality is examined. Based on the results of the baseline survey, this chapter examines the income level of the sampled households and also their distribution by examining Gini index. There should be inequality in villagers' income. The inequality itself may be justified if it is not so big since it may spur people's competition towards economic vigorous activities. However, if the inequality between the rich and poor, or between the Haves and Have-nots, are considerably high, it may not be accepted socially and social security cost may arise.

### 3.1 Estimation of Income

Estimating a villager's income needs a bit of technique. Here in this study, the income is defined as the cash the household has got from any kind of economic activities and plus the monetary value of any kind of production converted with farm gate price less necessary inputs. The former is very simple, e.g. cash from vegetable selling, remittance, wage work, etc. and for the latter, for example, agriculture production is once valued with prevalent farm gate price at the area and its relevant gross income is subtracted by necessary input e.g. chemical fertilizers. Therefore the latter is counted as net agriculture profit, net livestock profit if s/he has sold livestock, etc.

Table 3.1.1 summarize the annual income by village, and in addition the table shows the income only from food crops, which is the majority of all the income sources. Food crop here means any food either it is staple or relish produced. Then, the table further explores how much their disposable incomes are; the disposable income is defined here as the annual income less the monetary value of what the people have self-consumed. From the table and the figure, it is obvious that the income of Mulonda is by far bigger than those of other villages. This is because the sampled village is blessed with market including buyers from DRC and the soil is fertile. Farmers there apply a lot of fertilizer and as such they obtain high yield. With this specific situation, the average, median, and the 1<sup>st</sup> quartile are examined by 2 cases, namely, with Mulonda and without Mulonda. Following are pointed out;

- 1) Annual income, including self-consumed food, ranges ZMK 2.92 million (Mumba) to as much as ZMK 16.32 million (Mulonda). Village showing the least income is Mumba with ZMK 2.92 million, followed by Saise with ZMK 3.43 and Kalemba Chiti with ZMK 4.06 million. Mumba, Saise and Kalemba are located in relatively remote area; 45km from Luwingu center (farthest among the surveyed village), 28 km from Mbala center and 32 km from Kasama center respectively. Mulonda shows the highest income of ZMK 16.32 million, followed by Mayanga with ZMK 6.82 million and Chisheta with ZMK 5.80 million.
- 2) Overall average annual income, including self-consumed food, for the total 12 villages arrives at ZMK 5.82 million while the average without Mulonda is ZMK 4.67 million. Median annual income is ZMK 3.98 million and ZMK 3.69 million respectively. First quartile annual income is ZMK 2.44 million and ZMK 2.27 million for the cases of with Mulonda and without Mulonda respectively.
- 3) As is expected, food crop income shares the majority of the income. The food crop income ranges from ZMK 2.54 million at Saise to ZMK 10.98 million at Mulonda (excluding Mulonda is ZMK 4.22 million at Chisheta), with an overall average of ZMK 4.11 million including Mulonda and ZMK 3.36 million excluding Mulonda. The food crop based income shares 53% at Mayanga to as much as 92 % at Makashi of the total annual income. The overall average share of the food crop income against the total income arrives at 71% including Mulonda and 72 % excluding Mulonda.
- 4) Annual income extracting self-consumed crops, equivalent to disposable income, ranges from

ZMK 2.29 million at Saise to ZMK 14.75 million at Mulonda (2<sup>nd</sup> biggest is ZMK 5.51 million at Mayanga). The overall average is ZMK 4.39 million including Mulonda and ZMK 3.26 million excluding Mulonda. As compared with total annual incomes including self-consumed ones, which are ZMK 5.82 million (with Mulonda) and ZMK 4.67 million (without Mulonda), there found balance of ZMK 1.43 million and ZMK 1.41 million respectively. These balances are the monetary value of what the people self-consumed.

- 5) Disposable food crop income which comes actually from the crops sold shares about 37 % (Chipapa) to 88 % (Makashi) with the average of 61% for with Mulonda and 60% for without Mulonda. This examination suggests to us that approximately half the disposable income comes from the food crops sold while the rest of the disposable income, comes from those other than food crops. The other income sources are carpentry, brick making, making charcoal, selling goods, wage labor, etc.

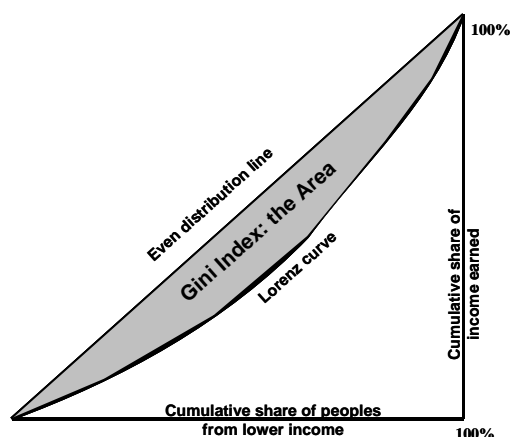
**Table 3.1.1 Annual Total Income and Food Crop Income by Village**

Village	Valid Sample Nr	Annual Total Income million ZMK	Food Crop Income		Annual Total Income (excluding self consumption) Million ZMK	Food Crop Income (excluding self consumption)		Remarks
			M ZMK	%		M ZMK	%	
Lunda	29	<b>4.47</b>	2.61	58%	2.97	1.20	40%	
Molwani	29	<b>5.33</b>	3.92	74%	3.33	1.93	58%	
Kalemba Chiti	30	<b>4.06</b>	3.45	85%	2.60	1.99	77%	
Chipapa	30	<b>5.85</b>	3.22	55%	4.20	1.57	37%	
Saise	31	<b>3.43</b>	2.54	74%	2.29	1.38	60%	
Mayanga	30	<b>6.82</b>	3.64	53%	5.51	2.33	42%	
Mumba	31	<b>2.92</b>	2.58	88%	2.30	1.96	85%	
Makashi	30	<b>4.27</b>	3.91	92%	2.90	2.56	88%	
Kawikisha	30	<b>4.30</b>	3.01	70%	3.11	1.83	59%	
Chisheta	30	<b>5.80</b>	4.22	73%	4.03	2.47	61%	
Mutiti	31	<b>4.56</b>	4.05	89%	2.86	2.35	82%	
Mulonda	36	<b>16.32</b>	10.98	67%	14.75	9.41	64%	
Total w/ Mulonda	367	<b>5.82</b>	4.11	71%	4.39	2.69	61%	
Median		<b>3.98</b>	2.96	74%	2.53	1.54	61%	
1st quartile		<b>2.44</b>	1.71	70%	1.44	0.58	40%	
Total w/o Mulonda	331	<b>4.67</b>	3.36	72%	3.26	1.95	60%	
Median		<b>3.69</b>	2.65	72%	2.26	1.43	63%	
1st quartile		<b>2.27</b>	1.58	70%	1.32	0.46	35%	

Source: Baseline Survey, JICA Study Team.

### 3.2 Measuring of the Inequality

To measure the inequality among the sampled households, Gini index is employed in this Study. Gini index is understood by the geometry definition “area enclosed by the Lorenz curve and the diagonal”. If one takes the horizontal axis as the cumulative share of people from lower income and draw the cumulative share of income earned, then the curve becomes Lorenz curve, and the area between the curve and the straight line (diagonal = even distribution line) becomes Gini index (the triangular area composed of the axis and the diagonal is assumed to be 1.0).



**Figure 3.2.1 Gini Index based on Lorenz Curve**

**Table 3.2.1 Standard Interpretation of Gini Index**

Gini Index	Standard Interpretation of Gini Index
Less than 0.1	There is an artificial background for leveling.
0.1 – 0.2	Though considerably equal, there is an anxiety to obstruct the effort to the improvement.
0.2 – 0.3	Usual distribution type that exists in general in society.
0.3 – 0.4	Though there are some differences, there is also a desirable respect in the improvement through competition.
0.4 – 0.5	The difference is serious.
Over 0.5	The improvement is required except under special circumstances

Source: Wikipedia

Given the magnitude of the Gini index, one can understand the value of the Gini index as the degree of income inequality. The Gini Index is, for example, 0.3 in “the society where one king owns 30 % of the whole income and the other people have the others” and also in “the society where a powerful group consisting of 70% of the whole population gets all income and the rest population of 30% gets nothing”<sup>1</sup>. There is no clear definition of the difference in this case. Table 3.2.1 presents a standard to understand the degree of inequality according to the value of the Gini Index.

### 1) Income and its Distribution

Figure 3.2.2 shows the Lorenz curves for the 12 villages and also the total of them (because income of Mulonda is far larger than others, Lorenz curve for total is calculated both by including / excluding Mulonda), based on which Gini indexes are calculated. Further, Table 3.2.2 summarizes the aforementioned total income, food crops income (both including the self consumption and excluding it, namely cash income only) and corresponding Gini Index by category and village. From the table, it is learned that;

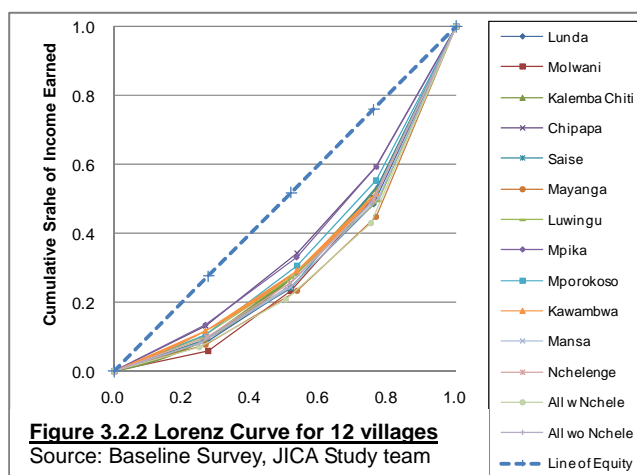
- 1) The Gini index for total income varies from 0.25 in Makashi and Chipapa being the lowest to as much as 0.37 in Molwani villages with an overall average of 0.40 (0.35 excluding Mulonda). Gini index for food crop income also varies from 0.26 in Makashi to 0.45 in Molwani with an overall average of 0.41 including Mulonda and 0.37 without Mulonda. Gini indexes for both the annual and crop incomes for the total 12 villages are bigger than those Gini index excluding Mulonda. This is because the income in Mulonda is by far higher than those of other villages as shown in the Table 3.1.1, raising the inequality of the income with higher Gini index.
- 2) Gini index for food crop income is not much different from those for annual total income, ranging from 0.26 in Makashi to 0.45 in Molwani. The reason why the Gini index for food crop income is not much different from those of annual total income could be derived from the fact that the share of food crop income occupies the most of the total income. In some villages, however, Gini index for food crop income is somewhat higher than that of annual total income, e.g. in Molwani village 0.45 vs. 0.37, in Chipapa 0.30 vs. 0.25, in Saise 0.40 vs. 0.34. In these villages, scale of the agriculture among the sampled farmers may vary to the extent more than their total income varies.
- 3) Gini index for annual total income excluding the self-consumed food crop becomes higher than those Gini indexes including self-consumed food crops. It ranges from 0.29 in Makashi to as high as 0.52 in Lunda. The overall average Gini index arrives at 0.47 with Mulonda and 0.42 without Mulonda. It means the disposable income for the sample households varies more than total income

<sup>1</sup> This Gini Index is decided by the area, and is not related to the shape of the Lorenz curve. Therefore, even if the ratio of a rich layer to the poor layer is different, the Gini Index may become the same in some cases.

including the self-consumed food. This situation becomes severe when looking into the Gini index for the income from food crop excluding self-consumed food crop. It ranges from 0.30 in Makashi to as high as 0.58 in Lunda and Saise with the average of 0.53 with Mulonda and 0.48 without Mulonda.

- 4) In summary, as far as it is concerned the annual total income including self-consumed food crops, the inequality in the income of the sampled households is not quite big. The magnitude of the

Gini index can be considered as only some differences in their total income, for which there is also a desirable respect in the economic improvement through competition. However, when looking into disposable annual income, the difference is already more than 0.4 in about half of the villages, which means the inequality is somewhat already serious. In those villages, there may be different people who have fetched good income opportunities including agriculture while the others may not.



**Table 3.2.2 Annual Income and Its Distribution (Gini Index) Amongst Villagers**

Village	Valid Sample Nr	Average Income / Household, million ZMK					Gini Index				
		Annual Total Income	Food Crop Income	%	Annual Total Income (excluding self consumption)	Food Crop Income (excluding self consumption)	%	Annual Total Income (excluding self consumption)	Food Crop Income (excluding self consumption)	%	
Lunda	29	<b>4.47</b>	2.61	58%	2.97	1.20	40%	<b>0.36</b>	0.38	0.52	0.58
Molwani	29	<b>5.33</b>	3.92	74%	3.33	1.93	58%	<b>0.37</b>	0.45	0.43	0.54
Kalemba Chiti	30	<b>4.06</b>	3.45	85%	2.60	1.99	77%	<b>0.33</b>	0.34	0.40	0.47
Chipapa	30	<b>5.85</b>	3.22	55%	4.20	1.57	37%	<b>0.25</b>	0.30	0.31	0.47
Saise	31	<b>3.43</b>	2.54	74%	2.29	1.38	60%	<b>0.34</b>	0.40	0.44	0.58
Mayanga	30	<b>6.82</b>	3.64	53%	5.51	2.33	42%	<b>0.36</b>	0.38	0.49	0.55
Mumba	31	<b>2.92</b>	2.58	88%	2.30	1.96	85%	<b>0.35</b>	0.37	0.40	0.44
Makashi	30	<b>4.27</b>	3.91	92%	2.90	2.56	88%	<b>0.25</b>	0.26	0.29	0.30
Kawikisha	30	<b>4.30</b>	3.01	70%	3.11	1.83	59%	<b>0.30</b>	0.29	0.39	0.42
Chisheta	30	<b>5.80</b>	4.22	73%	4.03	2.47	61%	<b>0.32</b>	0.33	0.40	0.47
Mutiti	31	<b>4.56</b>	4.05	89%	2.86	2.35	82%	<b>0.36</b>	0.32	0.39	0.40
Mulonda	36	<b>16.32</b>	10.98	67%	14.75	9.41	64%	<b>0.34</b>	0.37	0.36	0.40
Total w/ Mulonda	367	<b>5.82</b>	4.11	71%	4.39	2.69	61%	<b>0.40</b>	0.41	0.48	0.53
Median		<b>3.98</b>	2.96	74%	2.53	1.54	61%	-	-	-	-
1st quartile		<b>2.44</b>	1.71	70%	1.44	0.58	40%	-	-	-	-
Total w/o Mulonda	331	<b>4.67</b>	3.36	72%	3.26	1.95	60%	<b>0.35</b>	0.37	0.42	0.48
Median		<b>3.69</b>	2.65	72%	2.26	1.43	63%	-	-	-	-
1st quartile		<b>2.27</b>	1.58	70%	1.32	0.46	35%	-	-	-	-

Source: Baseline Survey, JICA Study Team.

### 3.3 Expenditure and Poverty Line

This session explores the expenditure pattern for the sampled households in the baseline survey. The reason of examining the people's expenditure pattern is to know the poverty line based on Cost of Basic Needs method, and also to know the poverty ratio, how much percentage of people fall under the poverty line and how far they are from the line, whereby how much is needed to uplift them to the

poverty line. This exercise provides us of how much smallholder irrigation can contribute to raising the poor people towards the poverty line. Quantitative indications are thus provided, which can refer to the impact of smallholder irrigation development in relation to poverty line.

### 3.3.1 Estimation of Poverty Line

Under Cost of Basic Needs method, there are conventionally 3 poverty lines; 1) Food Poverty Line, 2) Non-food Poverty Line and 3) the Poverty Line. Food Poverty Line is the minimum food expenditure in monetary term necessary to pay for a consumption basket that will satisfy caloric requirements of a representative household's members. Poverty Line is defined as the sum of Food Poverty Line and reasonable non-food expenditure to meet basic human needs, which is the non-food poverty line. The non-food line is usually calculated as the non-food expenditure for those whose total food expenditures are at around the food poverty line.

#### 1) Food Poverty Line

To estimate the Food Poverty Line, we need to calculate the caloric requirement for an adult equivalent person for a representative household. This Study employs 2,750 kcal per adult equivalent per day as the basis of the requirement according to Living Conditions Monitoring Survey Report 2004, CSO, and also conversion factors on calorie requirement for child are those proposed by the Survey Report as: 0.36, 0.62, 0.78, 0.76 and 1.0 for 0-3 years, 4-6 years, 7-9 years, 10-12 years and over 12 years and adults.

Next step is to establish a food basket, based upon what the population actually consumes, in order to know how much food and also converted monetary value they need to meet the basic caloric requirement of 2,750 kcal per day per adult equivalent. To establish the food basket, this Study refers to the actual food composition for the sampled households of the baseline survey. Tables 3.3.1 and 3.3.2 show representative food items which are actually consumed by the sampled households, necessary food consumption scaled up to meet the basic requirement of 2,750 kcal per adult equivalent, calories contained in each food items<sup>2</sup>, calorie contribution by food item, cost contribution by food item, etc. From the 2 tables, following are found:

- 1) Upon converting the food they consume into relevant calories, the sum of consumed calories arrives at 2,411 kcal per day per adult equivalent, which is 88% of the requirement of 2,750 kcal. It means a typical adult consumes food less 339 kcal per day than why he/she needs in order to maintain his/her physical body. In order for them to meet the requirement of 2,750 kcal per day per adult equivalent, the contents in their food basket should be increased by 1.14 times ( $2,750/2,411$ ).
- 2) Most of the calorie comes from cereals and starch as they are called the energy source for human body. They consume about 203 kg of cereals per year per adult equivalent, composed of maize, cassava and millet. In addition, they consume sweet potatoes of 39 kg per day per adult equivalent which can also be a staple food. In Zambia, it is generally said that a typical adult needs about 200 kg of cereals per year. From this fact, one may say their staple food eaten almost meets what they have to consume from the calorie point of view and thereby food other than staples may not be enough to consummate the requirement of 2,750 kcal or otherwise the level of 2,750 kcal itself might be a concern<sup>3</sup>. In this sense, their diet may tend to be too much carbohydrate-oriented.

<sup>2</sup> Calorie values came from FAO calorie conversion table of 1985, and calorie recommendations by the Ministry of Agriculture of Japan, etc.

<sup>3</sup> The required calorie of 2,750 kcal per day per adult equivalent is presented by the Ministry of Health, Zambia. When farmers are engaged in farm work and other laborious work, they need such calorie or even more. However, during off-agricultural season, they may need calorie less than that, whereby the 2,750 kcal itself may

- 3) The food poverty line now arrives at 'ZMK 1,192,226 per year per adult equivalent (US\$ 228.6 at the rate of ZMK 5,215 as of July 2010)'. When we look at the composition to the calorie requirement of 2,750 kcal, what contributes the most is of course cereals such as maize, cassava and millet by 35%, 27%, and 7% respectively totaling as much as 69% of the requirement. By adding the sweet potato contribution of 5% in calorie, which can also work as a part of staple food, the total calorie comes to as much as 74% of the requirement. In terms of cost contribution, those staples altogether share 35 % of the total food expenditure, which is the food poverty line.

**Table 3.3.1 Estimation of Food Basket and Food Poverty Line per Adult Equivalent per Year (as of July 2010), No.1**

Consumption Item	Consumption per year/A.person , kg (Actual)	Consumption per year/A.person , kg (Ad'd)	Consumption per day/A.person, gram (actual)	Calorie per 100g	Received Calorie , Kc (Actual)	Adjusted Received Calorie	Calorie Contribution, %
Maize	85.5	97.5	234.2	360	843	962	35.0
Cassava	69.6	79.4	190.6	342	652	744	27.0
Millet	17.7	20.2	48.5	348	169	193	7.0
<b>Total of above</b>	<b>202.9</b>				<b>1,664</b>	<b>1,898</b>	<b>69.0</b>
Sweet Potato	38.7	44.1	106.0	114	121	138	5.0
Ground Nuts	21.1	24.0	57.7	332	192	218	7.9
Meat, Fish/Kapenta	22.0	25.1	60.2	175	105	120.	4.4
Other Food crops	4.1	4.7	11.3	201	23	26	0.9
Vegetables, Fruits	69.4	79.2	190.3	37	70.4	80	2.9
Sugar, salt, cooking oil	13.8	15.8	37.9	475	180.1	205	7.5
Beverage	18.2	20.7	49.8	32	15.9	18	0.7
Others	4.4	5.0	12.0	331	39.7	45	1.6
<b>Total</b>	<b>364.5</b>	<b>415.8</b>			<b>2,411 Kcal</b>	<b>2,750 Kcal</b>	<b>100.0</b>

Source: Baseline Survey, JICA Study Team.

**Table 3.3.2 Estimation of Food Basket and Food Poverty Line per Adult Equivalent per Year (as of July 2010), No.2**

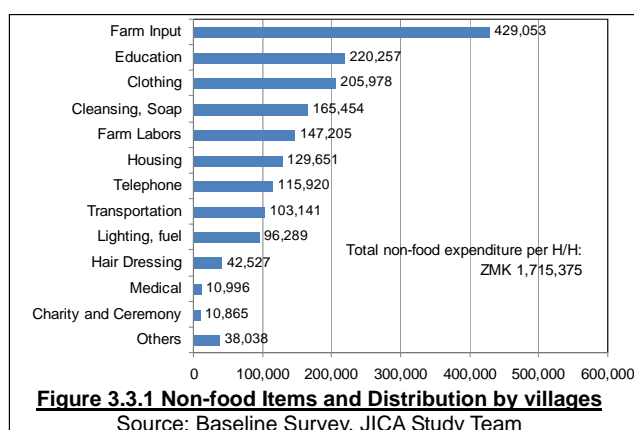
Consumption Item	Received Calorie, Kc (Actual)	Adjusted Received Calorie	Calorie Contribution, %	Unit price/kg	Cost, ZMK/Year (Actual)	Cost, ZMK/Year (Adjusted)	Cost Contribution, %
Maize	843	962	35.0	2,400	205,176	234,051	19.6
Cassava	652	744	27.0	1,600	111,329	126,997	10.7
Millet	169	193	7.0	2,600	46,071	52,555	4.4
<b>Total of Above</b>	<b>1,664</b>	<b>1,898</b>	<b>69.0</b>			<b>413,602</b>	<b>34.7</b>
Sweet Potato	121	138	5.0	500	19,345	22,068	1.9
Ground Nuts	192	218	7.9	3,250	68,432	78,063	6.5
Meat, Fish/Kapenta	105	120.	4.4	13,556	297,780	339,687	28.5
Other Food crops	23	26	0.9	2,625	10,852	12,379	1.0
Vegetables, Fruits	70.4	80	2.9	2,100	145,840	166,364	14.0
Sugar, salt, cooking oil	180.1	205	7.5	6,600	91,358	104,215	8.7
Beverage	15.9	18	0.7	1,200	21,798	24,865	2.6
Others	39.7	45	1.6	6,200	27,160	30,982	1.7
<b>Total</b>	<b>2,411 Kcal</b>	<b>2,750 Kcal</b>	<b>100.0</b>	-	<b>1,045,143</b>	<b>1,192,226 US\$ 228.6</b>	<b>100.0</b>

Source: Baseline Survey, JICA Study Team

be counted at safer side.

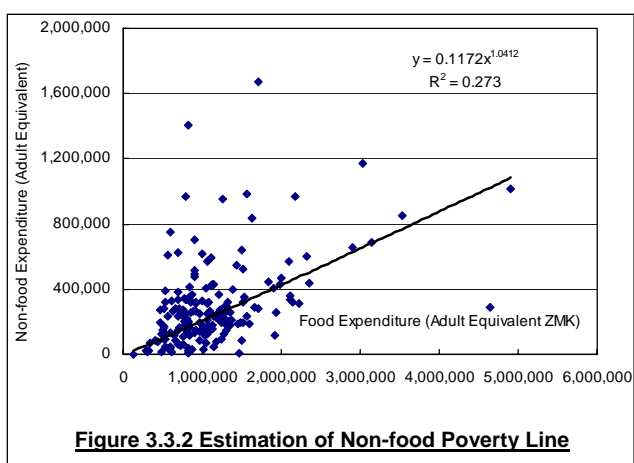
## 2) Non-Food Poverty Line

To estimate non-food poverty line, we should look into the people's non-food expenditures. Figure 3.3.3 shows the contents of the non-food items that the people actually consume or spend on. As we can notice, what comes first is the farm input especially chemical fertilizer, followed by education, clothing, cleansing (e.g. soap), payment to farm labors, housing, telephone, transportations, lighting, etc. The total spending, as average of the sampled households in the baseline survey, arrives at ZMK 1,715,375 per household, of which farm input shares as much as 25%, say about one-quarter, education does 13%, clothing shares 12%, etc.



**Figure 3.3.1 Non-food Items and Distribution by villages**  
Source: Baseline Survey, JICA Study Team

Figure 3.3.4 illustrates the relationship between food expenditure per adult equivalent on its horizontal axis and non-food expenditure per adult equivalent on the vertical axis. Non-food poverty line per adult equivalent per annum is estimated as the non-food expenditure that the people on the food poverty line spend for non-food items. Based on this assumption, the non-food expenditure on the food poverty line of ZMK 1,192,226 (US\$ 228.6) arrives at ZMK 244,818 (US\$ 46.9) per adult equivalent per year, which is the non-food poverty line undertaken under the Cost of Basic Needs method.



**Figure 3.3.2 Estimation of Non-food Poverty Line**

## 3) Poverty Line

The Poverty Line as aforementioned is the sum of Food Poverty Line and Non-food Poverty Line. The lines are summarized in Table 3.3.3, e.g.;

- 1) The poverty line per adult equivalent arrives at ZMK 1,437,044 (US\$275.6) composed of ZMK 1,192,226 for food poverty line and ZMK 244,818 for non-food poverty line. The former shares as much as 83 % while the latter does 17 % only. The 83% corresponds to so-called Angel's coefficient, whereby we can see a very high share in food expenditure. In general, as a society moves to a developed one, the share of food expenditure, or the Angel's coefficient, becomes smaller and vice versa. From this point of view, one may say the rural population's life is still primary sector dominated.
- 2) To establish the poverty lines for a typical household, we should take into account the average adult equivalent members per household. According to the baseline survey, the average adult equivalent member arrives at 5.7 per family. Multiplying this 5.7 into above poverty lines established as per adult equivalent give us the poverty lines per household. The poverty line is now ZMK 8,191,150 (US\$ 1,570) composed of ZMK 6,795,688 (US\$ 1,303) for food poverty line and ZMK 1,395,462 (US\$ 267) for non-food poverty line.
- 3) Table 3.3.3 shows poverty lines presented by LCMS 2006 as well, which was inflated to the value

as of May 2009 value according to the prevalent inflation ratios during those times. The lines presented by the LCMS 2006 are much bigger than what are presented by this Study based on the baseline survey. The reasons could be;

- 3.1) The LCMS poverty lines are all based on those ones established back in 1991, 18 years ago already, whereby those for latter years have been inflated according to the consumer price indexes presented by the CSO. This long period, during which no poverty related household survey has been done, may have caused some difference from the current prevalent poverty line.
- 3.2) The LCMS poverty line has not made any difference between the line in urban area and the one in rural area. In fact, it is a general consensus that urban residents require more money to make living, e.g. foods are relatively expensive as compared to their rural counterparts, some of them may need to pay house rental, etc. For example, an example in Kenya presents such poverty line for urban residents higher by about 30% of that for rural population. Therefore, the poverty line presented by LCMS may stand more for urban dwellers but might not be for rural population.

**Table 3.3.3 Poverty Lines per Adult Equivalent and per Typical Household**

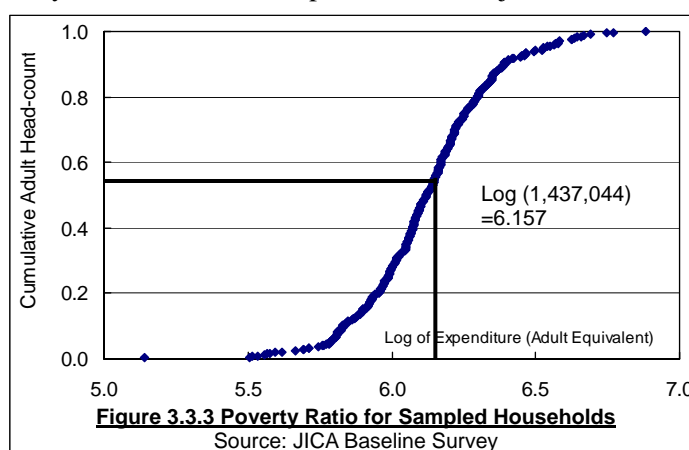
Poverty Line	Lines, ZMK	Rate in July 2010	Lines, US\$	Share, %	Remarks
<b>Per adult equivalent</b>					
Food Poverty Line	1,192,226	ZMK 5,215	228.6	83	
Non-food Poverty Line	244,818		46.9	17	
Poverty Line	1,437,044		275.6	100	
<b>Per typical Household</b>					
Food Poverty Line	6,795,688	ZMK 5,215	1,303	83	5.7 adults
Non-food Poverty Line	1,395,462		268	17	
Poverty Line	8,191,150		1,571	100	
<b>Based on LCMS 2006, CSO, as of 2009</b>					
Food Poverty Line	8,580,712	ZMK 5,269	1,629	70	5.7 adults ZMK value in May 2009
Non-food Poverty Line	3,741,206		710	30	
Poverty Line	12,321,918		2,339	100	

Source: JICA Study Team, based on baseline survey carried out 2009.

In countries that poverty lines have not yet been established by carrying out household baseline survey, a simple methodology is often applied. The simple method estimates poverty line to be just US\$ 1 per day per person. This gives us US\$ 365 per person per annum. Given a typical number of adult equivalent family members of 5.7, the simple poverty line for a typical household comes to US\$ 2,081. The poverty line per typical household shown above, US\$ 1,571, is found to be about 75% of the simple poverty line of US\$ 2,081. This fact may attribute to the low prices of the major commodities, especially staple foods in the rural area.

### 3.3.2 Estimation of Poverty Ratio

Given the Poverty Lines in Table 3.3.3, poverty ratios are estimated by all the sample households and also by village. Figure 3.3.5 shows the cumulative adult equivalent headcount by all the sample households versus log of the annual expenditure per adult equivalent. The poverty line of ZMK 1,437,044 per adult equivalent per year is at the scale '6.157'





in log. With the log scale, poverty ratio is calculated as summarized in Table 3.3.4, and pointed out are:

- 1) Poverty ratio by all the sampled households is 56.2%, and the ratio varies by village from 29% in Mulonda to 76% in Mumba. The annual income in Mulonda is by far the highest among the surveyed 12 villages as ZMK 16.3 million against the average of ZMK 5.8 million only. This low poverty ration in Mulonda is correlated with the high income. On the other hand, Mumba is located in the remote area (farthest from district center amongst 12 villages) and also their average household annual income level of ZMK 2.8 million is much lower as compared to the whole samples' average of ZMK 4.7 million excluding Mulonda. Also the villagers depend on cassava and finger much more than maize for their staple foods. Therefore it may be reasonable for Mumba to show the highest poverty ratio among the 12 villages.
- 2) Chipapa and Lunda also show very high poverty ratios, 72.6% and 72.3 %. Lunda's annual total income is ZMK 4.4 million which is lower than the average and less than most of others. Therefore, the high poverty ration in Lunda village can be exploratory. However, annual income of Chipapa (ZMK 5.6 million) shows more or less same as the total average and even 4<sup>th</sup> amongst 12 villages. Food crop income of Chipapa shares only 59% of total income while the average of the 12 villages is 71%. It means they produce less food than others and thus they may have to spend more on food to be purchased. This possibility may have raised their poverty ratio despite the high annual income.
- 3) There are three villages which show poverty ratio under 50%; Mulonda (29%), Mayanga (49%) and Kawikisha (49%). The average household annual income of Mulonda is ZMK 16.3 million, which is the highest among the 12 villages whereby the least poverty ratio shown. Mayanga's annual income is ZMK 6.9 million, which is the second highest among the 12 villages. Therefore, the low poverty ratio for Mayanga village can be explanatory. As for Kawikisha, the average household annual income (ZMK 4.3 million) is lower than average. However, Gini index is the 3<sup>rd</sup> lowest and poverty gap also shows third lowest. This implies income gap is smaller in Kawikisha and poorer people below the poverty line are relatively close to the poverty line. These results may have contributed to the 3<sup>rd</sup> lowest lower poverty ratio despite the low annual income.
- 4) Table 3.3.4 shows poverty gap ratio as well, indicating the depth of the poverty; corresponding to the distance between the poverty line and the average of expenditures for those who fall below the poverty line. In other words, adding the monetary value calculated by multiplying the poverty gap ratio into the poverty line, the person can be lifted up to the poverty line. The overall poverty gap ratio is 18.4%, and it ranges by village from 7.2% in Mulonda to as high as 28.1% in Mumba. We can see almost 4 times difference in the depth of the poor people between the richest and poorest villages. It means the poverty in Mumba is about 4 times deeper than that of Mulonda.

**Table 3.3.4 Poverty Ratios by All Sample Households and by Village**

Particular	Valid Sample No.	Poverty Ratio, %	Poverty Gap Ratio (%)	Poverty Square Gap Ratio (%)	Annual Income, M ZMK
<b>Whole of 12 Villages</b>	<b>370</b>	<b>56.2</b>	<b>18.4</b>	<b>8.1</b>	<b>5.8 (4.7*)</b>
Lunda	30	72.3	22.8	10.3	4.4
Molwani	31	59.9	16.5	6.9	5.3
Kalembe Chiti	30	58.4	23.6	11.4	3.9
Chipapa	30	72.6	19.5	7.2	5.6
Saise	31	50.2	17.3	8.8	3.3
Mayanga	30	48.7	14.9	5.8	6.9
Mumba	31	76.3	28.1	13.7	2.8
Makashi	30	52.0	16.6	7.0	4.3
Kawikisha	30	48.8	16.2	6.0	4.3
Chisheta	30	55.2	18.2	8.3	5.8
Mutiti	31	59.9	20.9	9.4	4.6
Mulonda	36	29.4	7.2	2.0	16.3

Source: JICA Study Team, based on baseline survey, Note; \* average excluding Mulonda

### 3.3.3 Estimation of Necessary Sum of Uplifting the Averaged Poor to the Poverty Line

The poverty gap ratio is used to provide an estimate of the sums required to raise the consumption level of all poor families up to the poverty line. For example, at the average level for all the villages, the poverty gap ratio stands at 18.4% which means that the additional expenditure to raise the poor up to the poverty line equals to 18.4% of the poverty line as average. Poverty line already estimated for a typical household is ZMK 8,191,150. Therefore, if a project can produce an additional value of ZMK 1,507,172 ( $=0.184 \times 8,191,150$ ) per household, an average poor household who is below the poverty line can now be lifted to the poverty line.

Then, by multiplying the target households (or target population) with the additional expenditure, we can know how much total sum is required to raise all the poor people up to the poverty line. Table 3.3.5 calculates the necessary sum to raise all the poor in a typical village. To raise a typical poor household, there should be an additional expenditure of ZMK 1,507,172 as aforementioned.

**Table 3.3.5 Estimation of Necessary Sum of Raising the Poor Household to the Poverty Line**

Particular	Estimation, ZMK	US\$ (ZMK5,215/1US\$)	Remarks
Poverty Line for household, ZMK	8,191,150	1,571	
Poverty Ratio, %	56.2		
Poverty Gap Ratio, %	18.4		
Required Amount per Poor Household, ZMK & US\$	<b>1,507,172</b>	<b>289.1</b>	

Source: JICA Study Team

According to the result of series of harvest surveys, the amount which a typical household can benefit from COBSI was estimated as a ZMK 1,554,994 (net income). This implies that COBSI will have impact to lift up the averaged poor even beyond the beyond the poverty line.

## CHAPTER 4 CHANGES AFTER COBSI INTRODUCTION

The Team conducted first series of field interviews from late October to mid November 2010 to collect information on 1) outcome after introducing the irrigation by putting the emphasis on what kinds of “changes” they realized, 2) meaning of irrigation income to their household economy (compared with other income sources in the dry season), 3) group organization and marketing, 4) the village headman/ committee’s role in the irrigation facility development / promotion of irrigation, especially in the involvement of the vulnerable, 5) change of income / expenditure balance trend of the year.

The list of the interviewed districts / sites is shown in Table 4.1.1.

The team encountered situation that some of selected farmers had just started irrigation or had just started selling the produce and could not get appropriate information on the above.

The Team also realized that some farmers have difficulty in calculating the “balance” of income and expenditure of each month.

Therefore, the Team conducted another set of interviews in March 2011 to get more complete information for “before-after” especially on income-expenditure trend by asking an income and expenditure separately.

This chapter summarized the positive changes observed during interviews, then explorers some case studies of income-expenditure trend change.

**Table 4.1.1 List of interviewed sites**

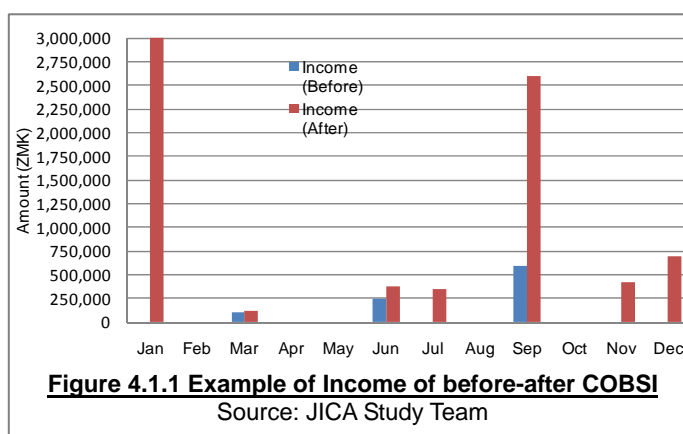
Date	District	Camp	Site
2010/10/22	Kasama	Chitambi	Molwani
2010/10/26	Mbala	Nondo	Mpangankulu
2010/10/27, 11/10	Mungwi	Ngulula	Chabukila
2010/10/28, 11/12	Mungwi	Nseluka	Kalungu
2010/10/29	Mungwi	Mungwi Central	Kabula
2010/11/01	Mungwi	Malore South	Mutamba (A)
2010/11/02, 11/05	Mpika	Chalwe	Chalwe
2010/11/03	Luwingu	Chishishi	Chishishi
2010/11/09	Mpika	Chintu	Malisawa
2011/03/04, 18, 04/08	Mungwi	Ngulula	Chabukila
2011/03/07	Mungwi	Misamfu	Kalupa
2011/03/09	Mungwi	Nseluka	Chipamano
2011/03/10	Mpika	Chalwe	Chikwanda
2011/03/11	Mpika	Katongo Kapala	Kabale
2011/03/14	Mporokoso	Chishamwamba	Chilala
2011/03/15	Mporokoso	Mutotoshi	Sokoni
2011/03/16	Mbala	Lucheche	Mayanga
2011/03/21	Mungwi	Nseluka	Kalungu
2011/03/22	Mbala	Nondo	Mpangankulu
2011/03/23	Mbala	Nondo	Kambafwile
2011/03/24	Mpika	Chilonga	Itongo upper and Minamba

### 4.1 Positive Changes Observed

#### 4.1.1 Diversification of income sources

Although some farmers have irrigation experience even before starting COBSI using community / individual furrows or bucket, the amount of cash income was rather small and they still used to rely on rainfed income, from rainfed maize for their livelihood.

Others used to depend on rain-fed crops fully or used to engage in non-agricultural activities such as charcoal burning, brick laying, broom making, trading etc. as a main or supplemental income. Farmers under this circumstance used to face difficulties when the harvest was



**Figure 4.1.1 Example of Income of before-after COBSI**

Source: JICA Study Team

quite poor or family members become sick / injured or die in worst cases.

After introducing COBSI, the number of month household get cash income has increased, except for some farmers who used to heavily rely on non-agriculture activities. Farmers who used to rely on non-agriculture activities tried to get constant income from these income sources since they could not get enough income from agriculture.

Similarly, not only they would get new income sources from irrigated crops /vegetables, but also they would sell what they used to consume at home or use as payment for labors after starting COBSI.

Figure 4.1.1 shows the income trend of one of sampled households. This family used to fetch cash income three times in a year, namely in March, June and September, from Sweet potato, groundnuts and rain-fed maize respectively.

But, after COBSI intervention, this family can get income from the sales of green maize, cabbage (both in January), tomato (in June), rape (in July) from irrigated field in addition to the original income sources (sweet potato, rain-fed maize and groundnuts).

In addition, this family has started to sell cassava which used to only be consumed at home before.

*COBSI can stabilize the impact of unexpected event*

Farmer of irrigation club member of Chabukila, Mungwi district mentioned that their family faced most severe hunger in 1996. “We could not harvest maize because of policy change on fertilizer subsidization” Since then, he put emphasis on the diversification of the crops for the realization of food security. He said, “we can teach our children not to steal others by assuring sufficient food at home”. Nevertheless, he used to manage Nshima once a day during January and February until 2010. But, in 2011, he could manage full time meal finally after COBSI. Further, he feels happy that he can serve food whenever guest comes to his home. He explained that he failed to serve food for some guests when he did not have enough food before COBSI and he felt sorry, but now he can serve the guest without any hesitation. (Based on interview on 27 October 2010 and 4 March 2011).

Farmer of irrigation club member of Chilala in Mporosoko faced her daughter’s health problem and her family could not cultivate much than previous year in 2010.

The team asked whether her family faced any difficulty by her daughter’s health problem. She replied, “Of course, it was difficult, but our family could survive thanks to what we had harvested last year” referring to the profit which she gained from green maize, tomato and cabbage grown by the furrow which was improved in 2009. (Based on interview on 14 March 2011)

Diversification of income sources could be “buffer” when farmers faced unexpected event such as family members’ sick / injured or death as shown in the Box above. Further, the team captured the story that some farmers completely stopped “Chitemene” system after introduction of COBSI. They explained that they can get crops which they used to grow in the Chitemene plot in exchange with vegetables which they are growing now. They further mentioned that they can get them more than before and they also can keep them to wait for the highest prices to sell.

#### **4.1.2 Increase the area, especially for rain-fed crops**

The most prominent change farmers realized is, of course, increase in area and production under irrigation. In fact, many interviewees had experience in irrigation by bucket fetching the water from shallow well in the nearby dambo / stream. Works were very tedious and they also faced water problem during dry season and extension of the size of cultivated area was very difficult. Therefore, many of the interviewees showed appreciation for the increase of area even though the increase of the size differs among the interviewees.

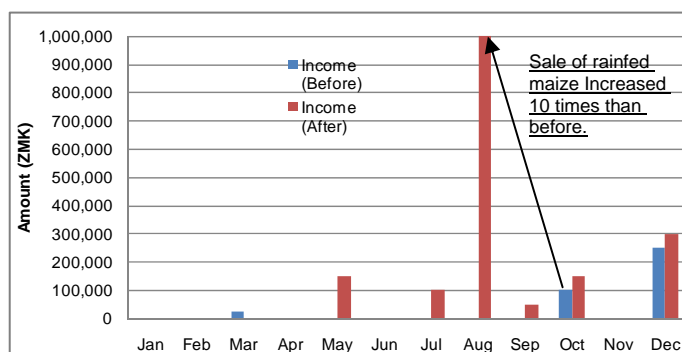
Farmers firstly re-invest the profit from the irrigation plot in their rain-fed crops (especially for maize) which is still their important income sources, namely, purchase of the fertilizer and labour. Then, the profit from rain-fed is invested in the irrigation plots, resulting in creating “positive cycle” for some successful farmers.

Some farmers who have never sold maize or never grown maize because of lack of capital for fertilizer have started to expand the area or established the field for rain-fed maize after getting profit from irrigated vegetables / crops.

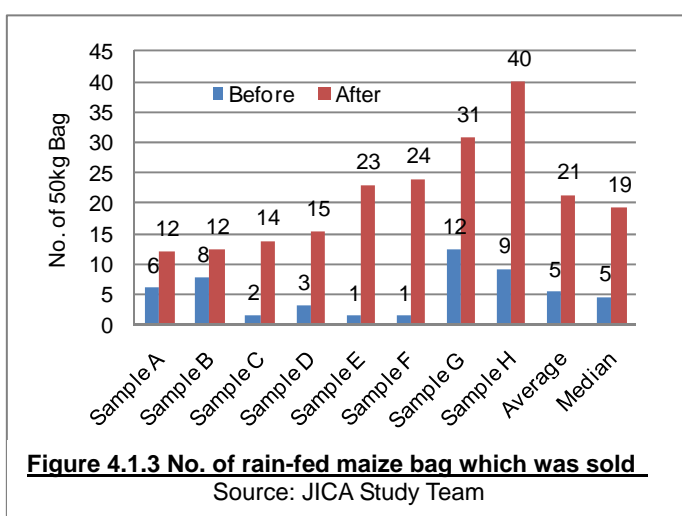
Of course, some farmers still had to stick to the original size of the land even after getting some profit from irrigated field mainly because they could not afford the fertilizer and / or farm labour. Case studies of families who faced this problem are shown in the Chapter 4.2 Case Studies of Income –Expenditure Patten Change for details.

Figure 4.1.2 is sampled household's income-expenditure pattern. This family used to fetch cash income from rain-fed maize about ZMK 100,000 before starting COBSI but the amount has increased up to ZMK 1,000,000, which is about 10 times compared with before.

Futher, Figure 4.1.3 shows number of bag for rain-fed maize sold by famers who had experience in selling rain-fed maize even before COBSI introduction. We can see that the number of bags has increase almot 4 times than before in average.



**Figure 4.1.2 Example of Income of before-after COBSI**  
Source: JICA Study Team



**Figure 4.1.3 No. of rain-fed maize bag which was sold**  
Source: JICA Study Team

#### 4.1.3 Starting to rear/sell livestock

There are farmers who have started to rear the livestock or construct / revitalize the fish ponds. They used to think about difficulty in feeding and could not start with or water shortage in the dry season for the latter case. Livestock used to be kept for emergencies before COBSI. Now that they had confidence in getting constant income and food for the family, they are selling them to get additional income or even slaughter them for the family which they feel contributes to the improvement of nutrition status of the family.

#### 4.1.4 Diversification of marketing channel

There has been also the change of the movement of the agricultural produce. Famers used to go to the market either by bicycle or on foot putting the produce on their head or back; it means famers “took” the produce to the market before COBSI introduction. Now, buyers have started to “come” buy their produce in their field. Famers expressed the happiness not to transport the produce all the way to the market by bicycle spending couple of hours.

On the other hand, a farmer in Kalung of Mungwi district shared with the Team that even if they have regular buyers they still want to go and sell their produce to the market because they feel that price of buyers could be lower than that which they can get if they go themselves to the market.

Followings are some examples which interviewed household showed the Team to attract buyers.

- Advertisement: A farmer in Mpangankulu of Mbala district that members went to the market before starting the harvest to announce they will increase their production by furrow irrigation and asked them to come to buy the produce.
- Contact with association to find new buyers: Farmers in Malisawa of Mpika district mentioned that they contacted with “business association” based on the recommendation of their CEO in charge to introduce them to larger markets. Buyers started to come to their place even from other districts. According to the interviewees, they received 6 buyers from Kitwe and 4 came from Lusaka in 2009. The number has doubled, 12 and 8 respectively. Buyers came to buy onion and tomato in this village. Buyers specialized in either onions or tomato, and last year’s case, 6 buyers came for onions and the rest for tomatoes.
- Respond by buyers’ voice: farmers started with small kinds of crops in the first year and increased the kinds of crops in the following year. A farmer in Kalung of Mungwi district shared with us that he started growing many kinds of vegetables which buyers asked to grow. Buyers liked his agriculture produce when they saw them in the market and request him to grow other kinds of crops too.
- Setting up market day: A farmer in Molwani of Kasama district mentioned that the number of the buyers increased after they started irrigation with constructed weir/furrow. He invented “market day” for their buyers to decide the date to come to the plot in order to supply the buyers with ready vegetables.
- Barter exchange: A farmer in Kalung of Mungwi district mentioned that they practice the “Barter” exchange. His family they stopped “Chitemene” because they can get crops those they used to plant in Chitemene in exchange with vegetables / crops and can get even more than they used to produce.

#### 4.1.5 Increase of assets / livelihood improvement

Farmers spend the money not only for re-investing the profit from irrigated field in the rain-fed crops, starting livestock / fish rearing but also spent the money for getting assets such as TV, radio, solar panel, battery, bicycle. Further, farmers also constructed new houses with brick and iron sheet, bought mattress, set of chairs, plates etc. which enabled them to live a life easier than before and opened the new world for their children.

#### 4.1.6 Improvement of food security

Farmers mentioned that they used to face food shortages in some months of the year. In those periods, they used to go to other farmers’ farms to feed their family. One farmer told the Team that they used to go and work for 3 months at maximum and they used to face this problem just before starting the COBSI. In those days, some farmers could not work on their own farms and it caused another food shortage, resulting in the vicious cycle. Most of farmers could manage only one time Nshima a day during those periods even after they went for work.

In fact, all of interviewees who used to work for others’ farms shared with the Team that situation had



*Famer stands in between old thatched house (left) and newly constructed house with iron sheets after COBSI introduction.*

improved and they had stopped or reduced to work at others farms after COBSI introduction.

A widowed (photo in right) farmer in Kalungu of Mungwi district joined the club in August 2009 and started irrigation from October 2009. She planted groundnuts and some Okra in a plot of 25m x 50m in 2009. She extended the irrigable area up to 50m x 50m and planted groundnuts, green maize, cabbage, rape and pumpkin leaves for the extended area in 2010.



*Farmer in Kalungu of Mungwi district looks back on dates before and says, “We had to resort to cassava leaves when we faced the food shortage. We even had to eat caterpillar not chicken before”. (Based on interview on Nov. 2010)*

“I had to eat cassava leaves when I did not have any relish before, but I can eat cabbage, rape, pumpkin leaves etc. now. In February, the most difficult month, we could manage only two times meals (lunch and dinner) and the size of the Nsima was so small even. I even had to beg salt from the neighbors”, she added.

She further shared with us that she could not afford a chicken at X’mas and had to eat caterpillar which she collected before. “X’mas is very important for us. I am very happy that we can afford chicken at X’mas now”, she said.

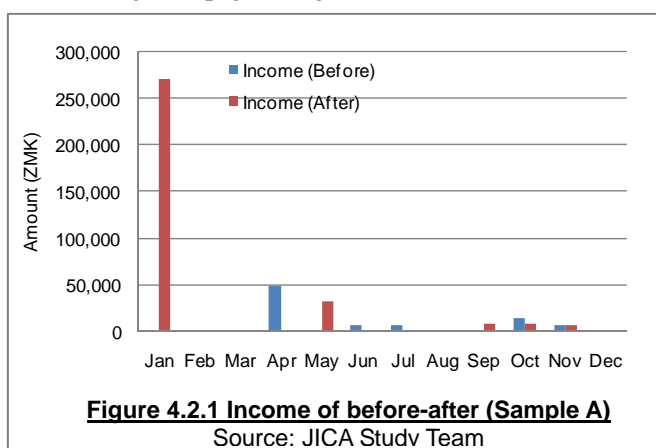
## 4.2 Case Studies of Income-Expenditure Patten Change

Since pre-condition of each potential COBSI farmer differs individually, the strategy of how farmer start COBSI needs to be examined carefully according to his /her family’s situation. This sub-chapter, therefore, explores the income-expenditure patterns of four types of sampled households to present clear images from where potential COBSI farmer can start and what kind of change of income-expenditure pattern can be realized by taking these strategies.

### 4.2.1 Farmer who started with groundnuts

The first case study is the farmer who is widowed and regarded as vulnerable in the village. Because her family could not afford fertilizer for maize and vegetables they started to cultivate groundnuts which require less fertilizer than other crops /vegetables. Since many farmers face the problem of lack of capital for buying fertilizer and some farmers even give up growing rain-fed maize as mentioned earlier, starting with groundnuts may be the clue to start off for those who face the problem of acquisition of fertilizer.

An irrigation club member of Chabukila, Mungwi district practices farming with support from 4 children after her husband passed away. Her family started furrow irrigation by planting groundnuts in a plot of 22m x 30m and pumpkin leaves along the edge of groundnuts in 2009 under COBSI. They could not afford fertilizer for vegetable cultivation, thus she started with



groundnuts.

Her family could not expand the plots as others did because of limited manpower and had to plant groundnuts again in 2010. However, she could get ZMK 270,000 from groundnuts in January, 2011. The income last year was only ZMK 144,000, meaning this year's harvest almost doubled.

In addition to the groundnuts, her family also fetched ZMK 15,000 from pumpkin leaves and another ZMK 6,000 from Okra. As for the rain-fed crops, they earned ZMK 32,000 from sweet potato in 2010.

**Table 4.2.1 Main income sources of each month of BEFORE-AFTER of Sample (A)**

	Jan	Feb	Mar	Apr	May	June
Income (Before)	1,667	1,667	1,667	43,667	1,667	1,667
Main sources	Broom	Broom	Broom	Broom, sweet potato	Broom	Broom
Income (After)	270,000	0	0	0	32,000	0
Main sources	-	Tomato	-	-	-	-
	July	Aug	Sep	Oct	Nov	Dec
Income (Before)	1,667	1,667	1,667	9,167	1,667	1,667
Main sources	-	Rain-fed maize	-	-	Brick laying	-
Income (After)	0	0	7,500	7,500	6,000	0
Main sources	-	-	Pumpkin leave	Pumpkin leave	Okra	-

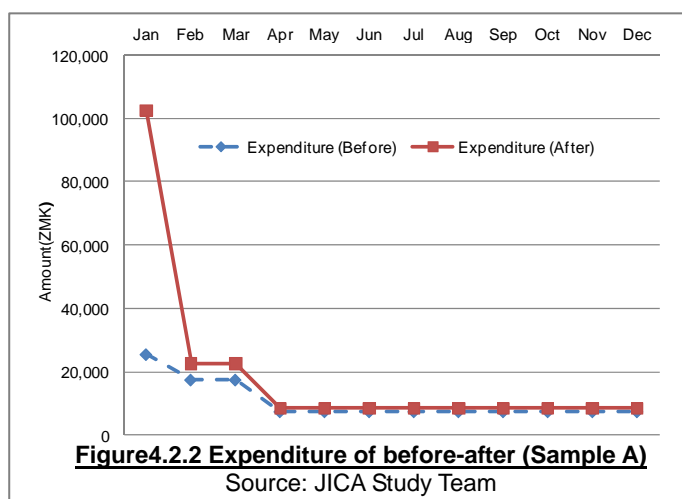
Source: JICA Study Team

Figure 4.2.1 and Table 4.2.1 show income trend of the year for before and after COBSI. Her family used to fetch cash income from sweet sales of sweet potato (in April) and irrigated pumpkin leave (in October) which used to grow by bucket irrigation. In addition, she used to make broom and sell them (ZMK 20,000 in total).

Figure 4.2.2 and Table 4.2.2 show her family's expenditure trend of the year. She could afford new shoes for her school going children for the first time in these years. They were very happy and said "I cannot wait for next morning. I want to show these new shoes to my friends!"

Furthermore, she bought reed mat for sleeping and 4 "nice" plates (in January after getting income from groundnuts) in addition to the regular expenses such as food, domestic.

She even came up with an idea of re-selling cassava chips in 2011. She bought 6 gallons of cassava with the income from the sales of groundnuts. These new trials came true with COBSI irrigation.



**Figure 4.2.2 Expenditure of before-after (Sample A)**

Source: JICA Study Team

**Table 4.2.2 Main expenditure of each month of BEFORE-AFTER of Sample (A)**

	Jan	Feb	Mar	Apr	May	June
Expense(Before)	25,500	17,500	17,500	7,500	7,500	7,500
Main usage	School, food and domestic	Food and domestic	Food and domestic	domestic	domestic	domestic
Expense(After)	102,500	22,500	22,500	8,500	8,500	8,500
Main sources	School, food and domestic, reed mat, plates	Food and domestic	Food and domestic	Domestic	Domestic	Domestic
	July	Aug	Sep	Oct	Nov	Dec
Expense(Before)	7,500	7,500	7,500	7,500	7,500	7,500
Main usage	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic
Expense(After)	8,500	8,500	8,500	8,500	8,500	8,500
Main sources	Domestic	Domestic	Domestic	Domestic	Domestic	Domestic



#### 4.2.2 Farmer who started with groundnuts, then moved to vegetables and maize

Next case is the farmer who started COBSI by growing groundnuts in 2009 and then extended the field and started growing tomato and green maize by investing the profit from the sales of groundnuts in 2010.

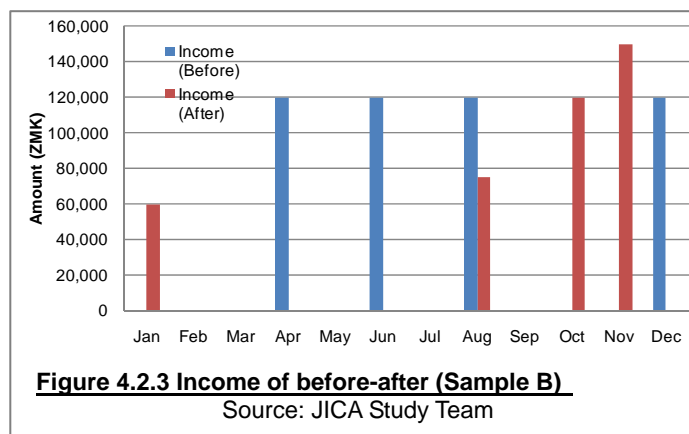
An irrigation club member of Chabukila, Mungwi district who is also widowed shared with the Team that her family started to grow groundnuts in 2009 because they could not afford fertilizer.

Her family extended the field from 20m x 20m to 40m x 40m and they started to grow tomato and green maize in 2010.

Figure 4.2.3 and Table 4.2.3 show the income of her family before-after COBSI. She used to go and work at others' fields in April, June, August and December and this is her family's all income before starting the COBSI because she even could not grow any rain-fed crops.

Her family used to face hunger throughout the year (only one time Nshima was available and they relied on cassava leaves as a main relish.). She could not send her children to school, and she could not buy new clothing for their children before starting the COBSI.

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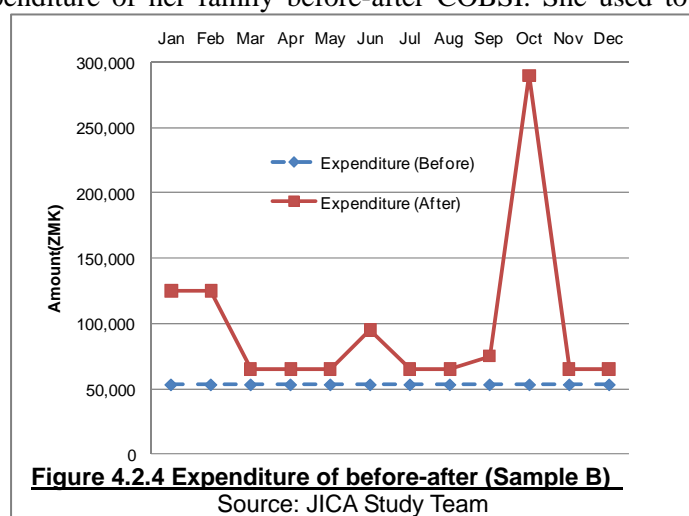


**Table 4.2.3 Main income sources of each month of BEFORE-AFTER of Sample (B)**

	Jan	Feb	Mar	Apr	May	June
Income (Before)	0	0	0	120,000	0	120,000
Main sources	-	-	-	Piece work	-	Piece work
Income (After)	60,000	0	0	0	0	0
Main sources	Groundnuts	-	-	-	-	-
	July	Aug	Sep	Oct	Nov	Dec
Income (Before)	0	120,000	0	0	0	120,000
Main sources	-	Piece work	-	-	-	Piece work
Income (After)	0	75,000	0	120,000	150,000	0
Main sources	-	Sweet potato	-	Tomato	Green maize and caterpillar	-

Figure 4.2.4 and Table 4.2.4 show the expenditure of her family before-after COBSI. She used to spend about ZMK 53,000 per month and about half of that was spent for maize meal before COBSI. Her family's basic expense such as food and domestic has increased than before, and component has been changed. This is because her family no longer has to buy maize meal and relish such as beans and vegetables after introducing COBSI. The amount for soap, salt, cooking oil, lotion and Vaseline has become almost double instead.

Further, she could manage to buy what she could not buy before COBSI such as new clothing, blanket for children and "Chitenge" (traditional cloth) for herself.



Her family started to grow rainfed crops such as cassava, sweet potato, groundnuts and beans in 2010, and rain-fed maize in 2011. She could manage 2 times Nshima throughout the year even though she did not go to work on other farmers' fields in 2010.

She said, "Total cash income appeared to be lower than that of before, but still I am very proud of myself because I am now independent. I used to feel like I was a slave when I was working for others. But now, we have reliable income sources and we are also planning to increase area by reinvesting the profit from irrigation. I even have a dream of buying bicycle and iron sheet now"

**Table 4.2.4 Main expenditure of each month of BEFORE-AFTER (Sample B)**

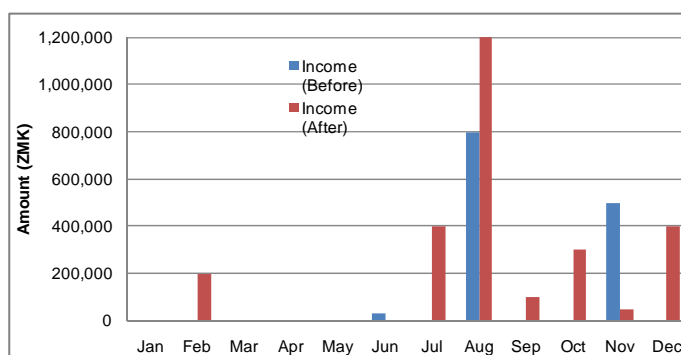
	Jan	Feb	Mar	Apr	May	June
Expense(Before)	53,000	53,000	53,000	53,000	53,000	53,000
Main usage	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic
Expense(After)	125,000	125,000	65,000	65,000	65,000	95,000
Main sources	School, food and domestic	Food, domestic and clothing	Food and domestic	Food and domestic	Food and domestic	Food, domestic and blankets
	July	Aug	Sep	Oct	Nov	Dec
Expense(Before)	53,000	53,000	53,000	53,000	53,000	53,000
Main usage	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic
Expense(After)	65,000	65,000	75,000	290,000	65,000	65,000
Main sources	Food and domestic	Food and domestic	Food, domestic and clothing	Food, domestic and fertilizer	Food and domestic	Food and domestic

#### 4.2.3 Farmer who used to get income from non-agriculture activity, rainfed maize and some vegetables by bucket irrigation

Next case study is the farmer who used to grow rain-fed maize and sell them even before starting COBSI and also used to have small income from vegetables by bucket irrigation. He also used to work as a brick layer for supplemental income for the family.

As mentioned later, he completely stopped to work as brick layer because he thought it would be more profitable to work in the field after experiencing furrow irrigation.

This will be an example for the farmers who used to rely on rainfed maize income or non-agricultural income become to get additional income sources especially in months when they did not get any income before.



**Figure 4.2.5 Income of before-after (Sample C)**

Source: JICA Study Team

A member of Kalungu irrigation club in Mungwi district, started furrow irrigation and his earning from furrow irrigation totaled about ZMK1.2 million from the sales of tomato (in February and September), onion (in July), cabbage (in October) and green maize (in December) as shown in the figure right.

He used to practice irrigation by bucket but earned only about ZMK 30,000 from tomato before (in June). In addition, he used to have rain-fed maize income (ZMK 800,000) and income from bricklaying about ZMK 500,000.

**Table 4.2.5 Main income sources of each month of BEFORE-AFTER of Sample (C)**

	Jan	Feb	Mar	Apr	May	June
Income (Before)	0	0	0	0	0	30,000
Main sources	-	-	-	-	-	Tomato
Income (After)	0	200,000	0	0	0	0
Main sources	-	Tomato	-	-	-	-
	July	Aug	Sep	Oct	Nov	Dec
Income (Before)	0	800,000	0	0	500,000	0
Main sources	-	Rain-fed maize	-	-	Bricklaying	-
Income (After)	400,000	1,200,000	100,000	300,000	50,000	400,000
Main sources	Onion	Rain-fed maize	Tomato	Cabbage	Caterpillar	Green maize

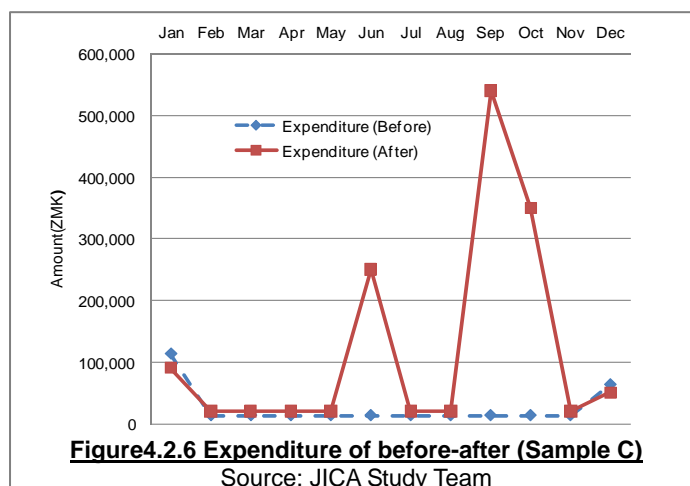
Because he has 11 family members including himself and it was still difficult for him to afford this large family especially in January and February. He and his family members used to go for piece works together about 4 times a month and they were given 50kg bag of cassava. His family does not have to go for piece work anymore because with the irrigation they can have 2 times Nshima now by selling vegetables and crops in the garden whenever they needed money.

He has even stopped working as a brick layer because he feels that he can get much money from irrigation. He said, "I purchased a plot in Nseluka last year (June 2010), so I will work as a brick layer on my own home but not for others this year".

Figure 4.2.6 and Table 4.2.6 show his family's expenditure pattern of before-after COBSI.

His family used to afford only ZMK 50,000 for fertilizer (in December) before, but his family could afford ZMK 480,000 for fertilizer in 2010 for further expansion of the field of maize and vegetables.

Level of expenditure for clothing and food (relish) has become 3 times more than that of the "before". As for clothing, he could not afford all family members at once but he bought clothing for all of them in October 2010.

**Table 4.2.6 Main expenditure of each month of BEFORE-AFTER (Sample C)**

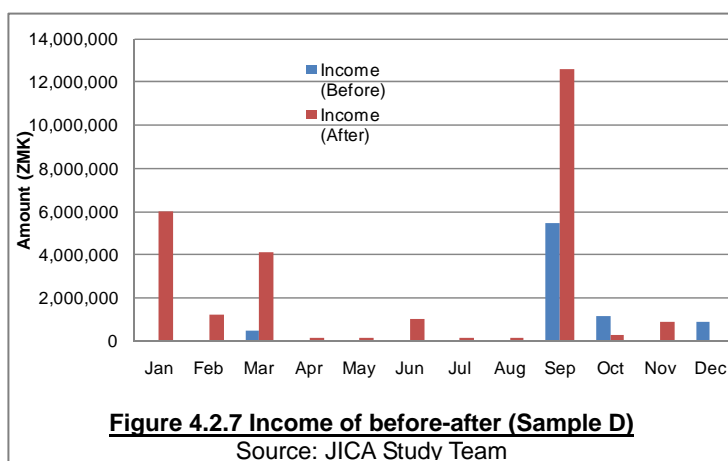
	Jan	Feb	Mar	Apr	May	June
Expense(Before)	113,333	13,333	13,333	13,333	13,333	13,333
Main usage	School, food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing
Expense(After)	90,833	20,833	20,833	20,833	20,833	250,833
Main sources	School, food, domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food, domestic and plot
	July	Aug	Sep	Oct	Nov	Dec
Expense(Before)	13,333	13,333	13,333	13,333	13,333	63,333
Main usage	Food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing	Food, domestic and clothing	Food, domestic, clothing and fertilizer
Expense(After)	20,833	20,833	540,833	350,833	20,833	50,833
Main sources	Food and domestic	Food and domestic	Food, domestic and fertilizer	Food, domestic and labor	Food and domestic	Food, domestic and labor

### 4.2.4 Advanced farmer

Last case is an advanced type of farmer who used to have more than ZMK 8 million from agriculture income even before COBSI introduction.

This case study can give us the clear image of what would happen if the profit from the garden was re-invested in the rainfed crops, especially for maize.

Chairperson of Mpangankulu irrigation club in Mbala district started COBSI in October 2009.



**Figure 4.2.7 Income of before-after (Sample D)**  
Source: JICA Study Team

Before starting furrow irrigation, his family used to practice bucket irrigation and earned about 4.9 million from sales of cabbage and green maize, and also earned ZMK3.2 million (about 3 million was from maize) from rain-fed crops as shown in Figure 4.2.7 and Table 4.2.7.

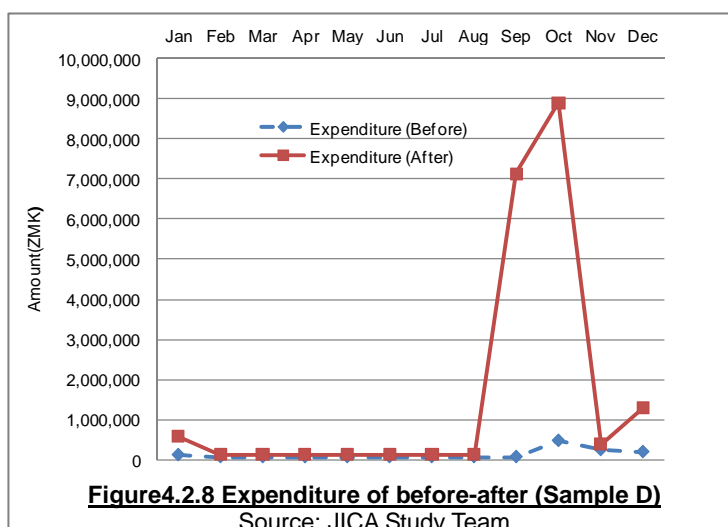
Even though the amount of his total cash income seems large they used to get those incomes in only 4 months (in March, September, October and December) and they did not get any income in other months.

**Table 4.2.7 Main income sources of each month of BEFORE-AFTER (Sample D)**

	Jan	Feb	Mar	Apr	May	June
Income (Before)	0	0	500,000	0	0	0
Main sources	-	-	Cabbage	-	-	-
Income (After)	6,000,000	1,200,000	4,100,000	125,000	125,000	1,000,000
Main sources	Tomato	Cabbage	Green maize, onion and pumpkin	Chicken	Chicken	Chicken and sweet potato
	July	Aug	Sep	Oct	Nov	Dec
Income (Before)	0	0	5,500,000	1,150,000	0	880,000
Main sources	-	-	Rain-fed maize	Groundnuts and onion	-	Green maize
Income (After)	125,000	125,000	12,580,000	300,000	900,000	0
Main sources	Chicken	Chicken	Rain-fed maize	Cassava	Groundnuts	-

As for “after”, he could get cash income almost every month except for December as shown in table and figure above. Rain-fed maize area was expanded from 1 ha to 3 ha after getting profit from irrigated crops and he earned a total of ZMK 14 million (about ZMK 13 million was from maize) from rain-fed crops. He also started selling pumpkin, sweet potato, cassava and chicken which used to cultivate / rear for home-consumption before.

Figure 4.2.8 and Table 4.2.8 show the expenditure pattern. Most distinguished change observed is the amount of fertilizer, seed and labor.



**Figure 4.2.8 Expenditure of before-after (Sample D)**  
Source: JICA Study Team

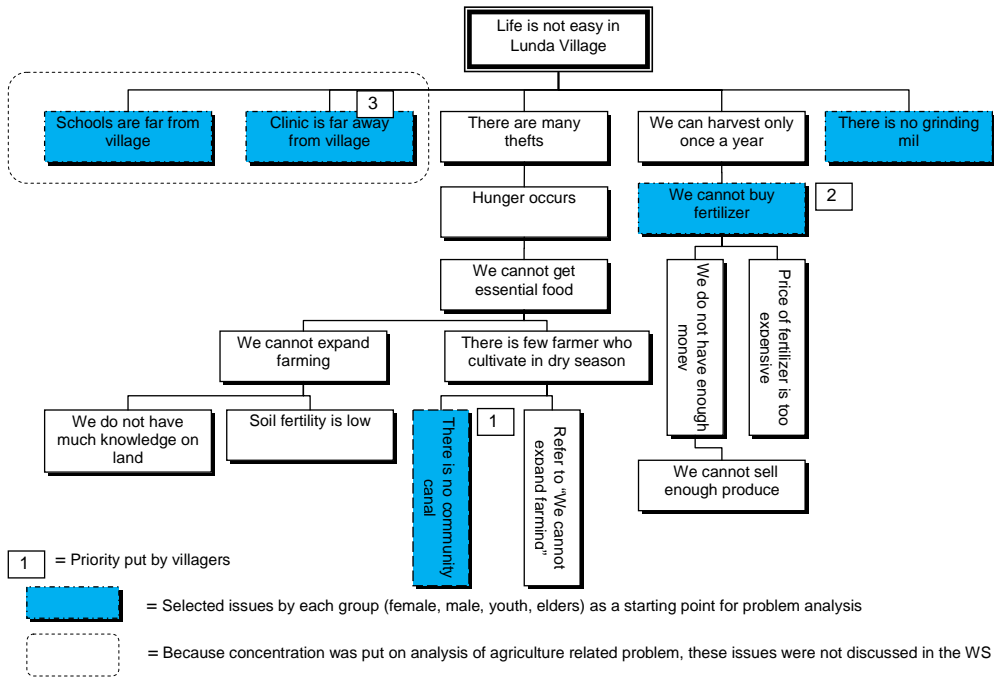
The amount of fertilizer and seed spent for maize was ZMK4 million (in October) and the amount spent for labor was ZMK 1 million (in October to January), which are more than 10 times and 5times of those of “before” respectively. He also spent money for building new house with iron sheets in September which showed 2<sup>nd</sup> highest peak of the year apart from having bought assets such as TV, speakers, adapter, battery, inverter, DVD etc. in October 2010 after he had a big harvest from rain-fed maize.

**Table 4.2.8 Main expenditure of each month of BEFORE-AFTER (Sample D)**

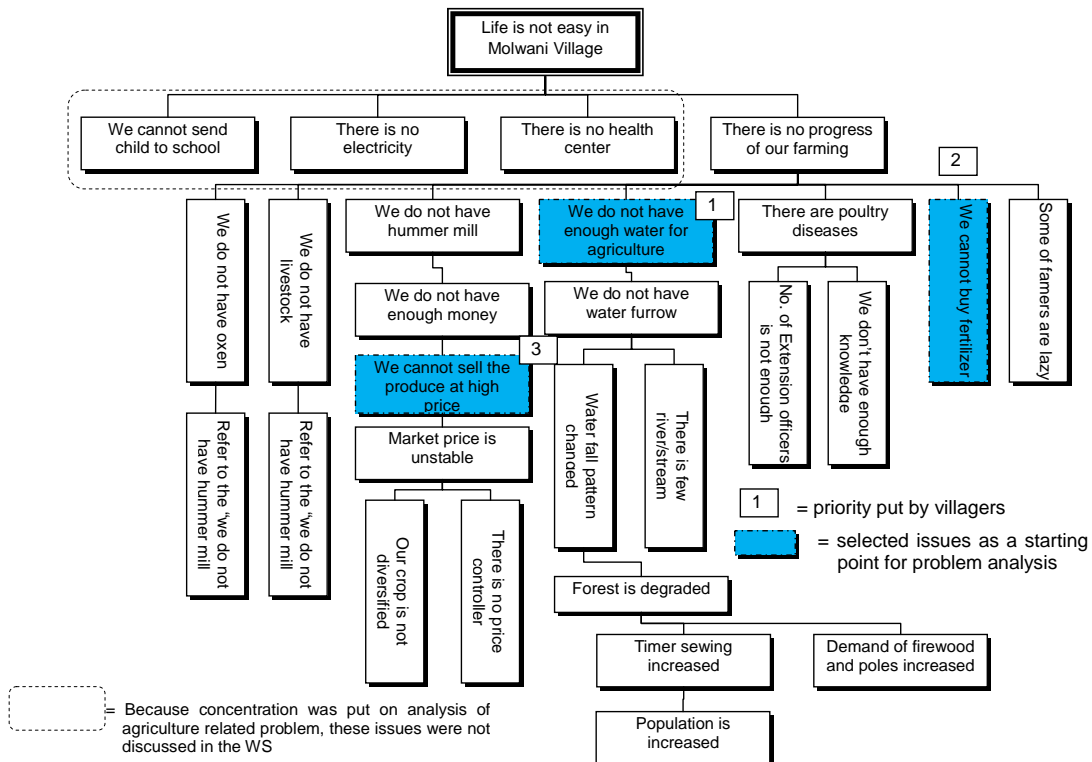
	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>June</b>
Expense(Before)	116,667	66,667	66,667	66,667	66,667	66,667
Main usage	Food and domestic and labor	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic
Expense(After)	575,076	132,576	132,576	132,576	132,576	132,576
Main sources	School, food, domestic and labor	Food and domestic	Food and domestic	Food and domestic	Food and domestic	Food and domestic
	<b>July</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
Expense(Before)	66,667	66,667	66,667	466,667	241,667	191,667
Main usage	Food and domestic	Food and domestic	Food and domestic	Food, domestic, labor, fertilizer and seed	Food, domestic and labor	Food, domestic and labor
Expense(After)	132,576	132,576	7,132,576	8,907,576	382,576	1,291,667
Main sources	Food and domestic	Food and domestic	Food and domestic and building house	Food and domestic, fertilizer, seed, TV, speaker, adapter, battery, inverter and DVD	Food and domestic, labor	Food and domestic, labor

**A-1 Record of Village Analytical Workshop-1: Problem Analysis**

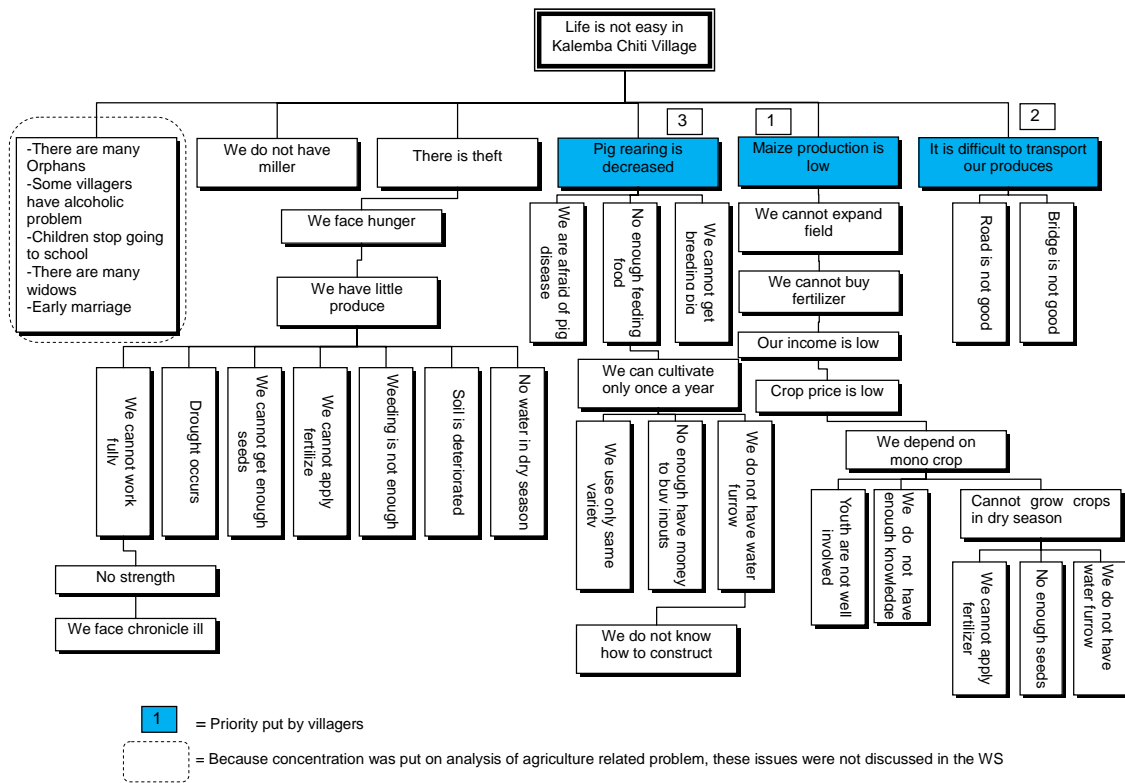
1) Lunda Village, Kasama district



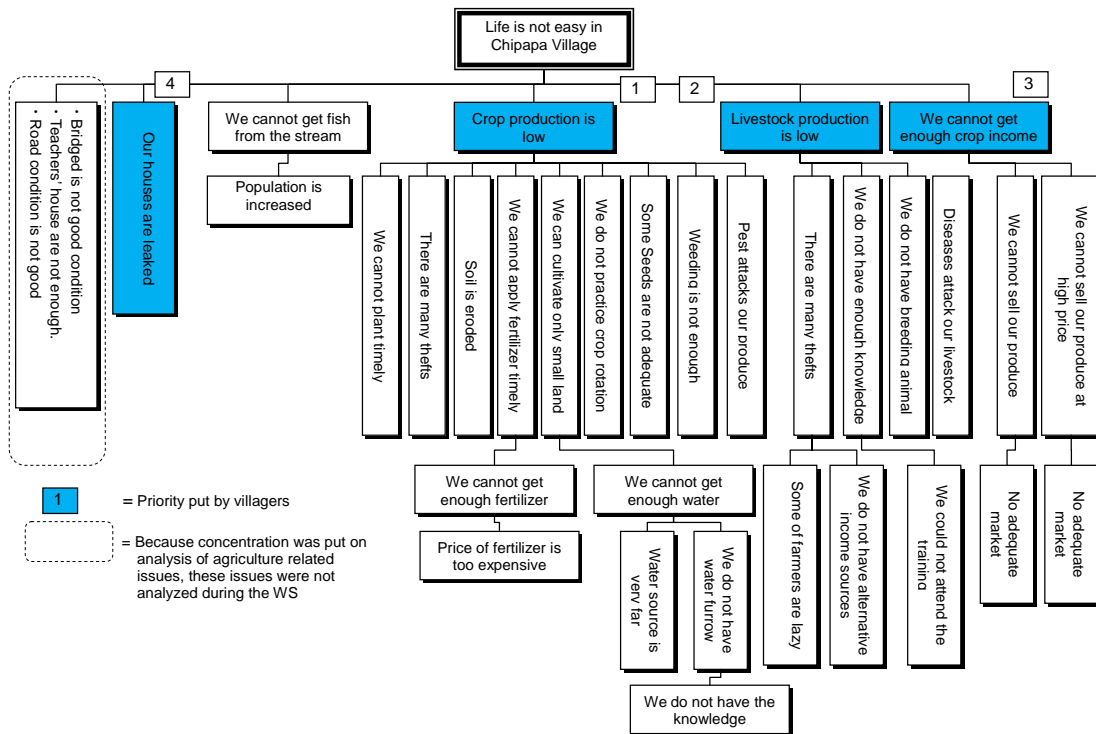
2) Molwani Village, Kasama district



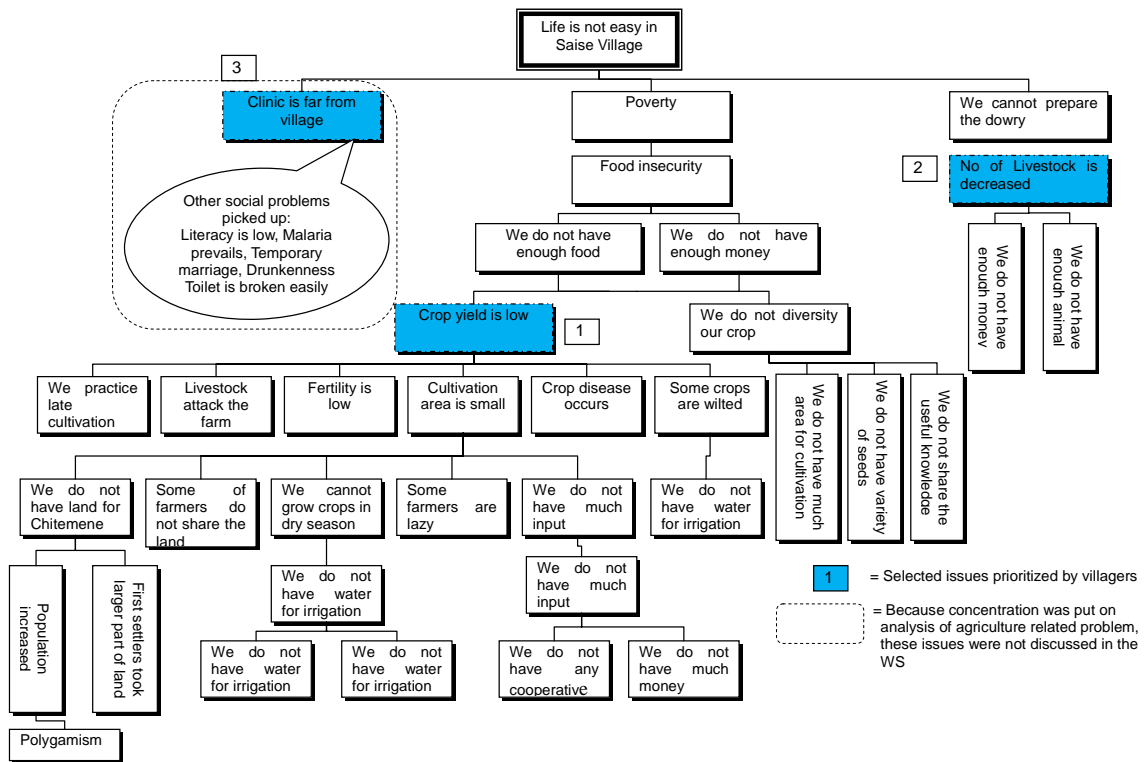
3) Kalembe Chiti Village, Mungwi district



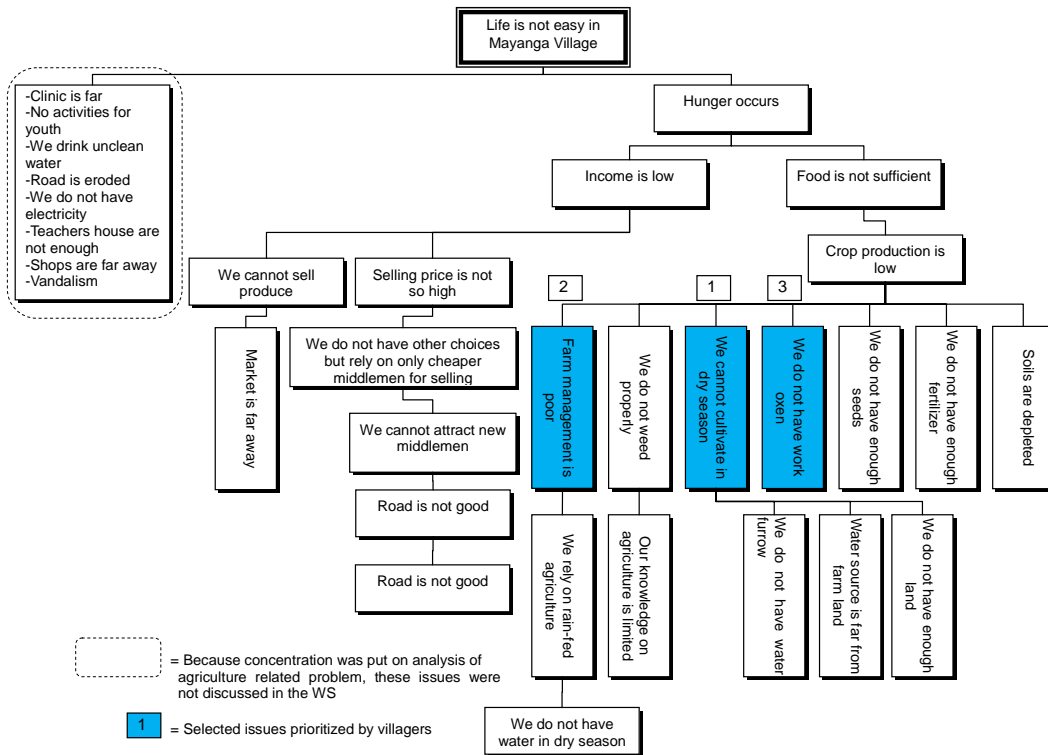
4) Chipapa Village, Mungwi district



5) Saise Village, Mbala district



6) Mayanga Village, Mbala district





**A-2 Record of Village Analytical Workshop -2: Trend Analysis**

## 1) Lunda Village, Kasama district

Topics/ Periods	Agricultural production (Maize)		Agricultural production (Finger Millet)		Agricultural production (Cassava)		Agricultural production (Beans)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80s	○○ ○○	Production was favorable because of 1) timely delivery of fertilizer through co-operatives, 2) good soils condition.	○○ ○ ○○	Production was high because of 1) Abundant forest for Chitemene, 2) high soil fertility and finger millet was grown only for home consumption during this period.	○○ ○ ○○	Production was high because of 1) high soil fertility, 2) favorable climate including rainfall 3) Abundance of forest for Chitemene	○○ ○ ○○	Production was high because of 1) high soil fertility, 2) rainfall was favorably high, but sales of the crop were bad.
'90s	○○	Maize production started reducing because of 1) reduction in the amount of fertilizer distribution to cooperative and 2) no good market.	○○ ○	Production dwindled as farmers because many farmers preferred producing maize.	○○ ○ ○○	Production level still remained high but there is no market so only produced for locally consumed.	○○ ○○	Production level still remained high because of good weather including enough rainfall, but market was still not so good.
'00s	○○ ○	Maize production improved slightly because government resumed fertilizer delivery through cooperative and there was good market.	○○ ○○	Production increased because of 1) favorable market, 2) more farmers started cultivating on the ground with a hoe than Chitemene, 3) use of improved seed.	○○ ○ ○○	Production level still remained high and sales of the produce become grown. Soil fertility level is still high.	○○ ○	Production level became decrease because soil fertility decreased. Market demand increase high and remained still.

Topics/ Periods	Vegetables		Livestock (Cattle)		Livestock (Goats)		Livestock (Chicken)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80s	○	Vegetable production was not common and very few farmers were involved in the production because of lack of knowledge on the technology, no water furrow diversion and also market was not so good.	-	There were no cattle because farmers have no money to buy them there was good market, though.	○	The number of goats was small, there was good market, though.	○○ ○ ○○	The number of chickens was large because there was no theft and market demand was also high.
'90s	○○	Technology improved and spread more farmers but market was still problem.	○	Only one farmer had cattle. Market was still favorable, though.	○○ ○○	The number of goats increased because of high demand of the market and good price.	○○ ○○	The number of chickens started to reduce. Price was good and they sold them off.
'00s	○○ ○	Vegetable production increased slowly. Still few farmers practicing. Lack of communal water furrow is problem.	○○	Two farmers had cattle. Market was still favorable, though.	○○	The number of goats reduced. Price was good and they sold them off.	○○ ○	The number of chickens reduced more because the high market price of chicken and disease outbreak.

Topics/ Periods	Water levels of Chilemba stream		Diseases (Diarrhea cases)		Diseases (Malaria cases)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80s	○○ ○ ○○	Water volume was high because of high rainfall, no disturbance of water source and no. of canal diverted from the stream was less (two)	○○ ○○	Diarrhea cases were common because many villagers were drinking untreated water (chlorine was not available).	○○ ○○	Malaria cases were common. Very few household had mosquito nets, there were tall grasses where mosquito harbored, and no rubbish pits. Mosquitoes were breeding anywhere, and also no awareness raising activity on health issues.
'90s	○○ ○○	The water level slightly reduced because of erratic rainfall, cutting down tree and poles and no. of water canals increased to five.	○○ ○	Diarrhea cases still prevailed because HIV/AIDS was discovered, no. of villagers increased and hospital/clinic was far away.	○○	Malaria cases started reducing because of introduction of mosquito nets and increase of awareness raising activity.
'00s	○○ ○	Water levels continued declining by rainfall pattern change characterized by dry spells, and no of villagers who kept on cutting down trees for housing increased.	○	Diarrhea cases reduced drastically because of increased awareness creation activity / sanitation improvement, growing of ARVs to HIV/AIDS patients and much chlorine were given by government to households and sold in shops too.	○	Malaria cases drastically reduced because of more awareness raising activity on malaria preventive measures, and increased distribution of insecticide treated mosquito nets to household.

## 2) Molwani Village, Kasama district

Topics/ Periods	Agricultural production (Maize)		Agricultural production (Cassava)		Agricultural production (Ground nuts)		Agricultural production (Vegetables; rape)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○○ ○ ○○ (B= 1980)	Production was quite high because of 1) fertilizer is not so expensive 2) can get fertilizer on credit, 3) fertilizers were given to the needy, 4) rainfall was favourable.	○○ ○ ○○ (B= 1982)	Production was quite high because of 1) Abundant forest for Chitemene, 2) favorable rainfall, 3) There were abundant maize stocks and farmers took the time to wait cassava matured.	○○ ○ ○○ (B= 1983)	Production was quite high because of 1) favorable rainfall, 2) high soil fertility.	○○ ○ ○○ (B= 1989)	Production was quite high because of 1) high availability of fertilizer, 2) diseases were not so many, 3) fertilizer and pesticide were available on credit.
'90s	○○ ○	Maize production started reducing because of 1) shortage of fertilizer 2) timing of the fertilizer deliver was not so appropriate.	○○	Maize production started reducing because of 1) infection of cassava mealy bug and termites, 2) consumption of immature cassava due to enough maize stocks.	○○ ○○	Production decreased slightly because rainfall has been decreased.	○○ ○	(not in particular)
'00s	○ (L= 2008)	Maize production is reduced because of 1) high cost of fertilizer 2) small rainfall, 3) poor germination of the seeds, 4) shortage of money getting fertilizer, 5) demand-supply of the fertilizer is not well balanced.	○○ ○○ (L= 2008)	Maize production is reduced because of 1) erratic rainfall, 2) high infection of termites on the cassava.	○ (L= 2006)	Ground nuts production is reduced because of 1) dried soil because of drought, 2) soils degradation by the fertilizer, 3) termites build up due to drought.	○ (L= 2007)	Vegetable production is reduced because of 1) pests and diseases of vegetables increased, 2) not enough water in the shallow well, 3) high cost of fertilizer, 4) high cost of pesticide.

Topics/ Periods	Livestock (Goat and chicken)		Water volume of Luauo stream		Diseases (Malaria and Diarrhea)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○○ ○ ○○ (B= 1987)	Livestock were plenty because of 1) abundant food, 2) no theft, 3) not so many diseases.	○○ ○ ○○ (H= 1987)	There was plenty water because of 1) high rainfall, 2) no canal diverted from the stream.	○○ ○ ○○ (H= 1990)	We suffered from diseases because 1) we did not know much about diseases 2) hospital was very far from the village, 3) there was no support from the government, 4) we did not have clean water for drinking
'90s	○○ ○	Livestock numbers decreased but we constructed poultry house by the support from the government.	○○ ○○	Stream water volume is not so much change because there is still favorable rainfall.	○○ ○	Diseases started to decrease because we started to get knowledge on the health and to take preventive action.
'00s	○ (L= 2004)	Livestock numbers are quite limited because of 1) animal diseases 2) shortage of food, 3) many theft cases, 4) selling off livestock because of poverty.	○ (L= 2004)	The water volume is so much decreased because of drought.	○ (L= 2006)	Diseases reduced much because 1) we received mosquito net from the government, 2) availability of the medicine become high, 3) we have enough knowledge on the health, 4) we established home based care group.

B: Bumper harvest / production year selected by the participants, L: Lowest harvest year, H: Highest volume / incidence year

## 3) Kalembe Chiti Village, Mungwi district

Topics/ Periods	Agricultural production (Maize)		Agricultural production (Finger Millet)		Agricultural production (Beans)		Agricultural production (Cassava)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○○ ○ ○○ (B= 1983)	Production was quite high because 1) fertilizer was delivered in good timing, 2) favourable rainfall, 3) soils were fertile, 4) government gave fertilizer and seed on loan.	○ (L= 1990)	Production was small because of 1) soil erosion by heavy rain, 2) poor germination by the burning finger millet seed too much.	○ (L= 1983)	Production was small because of 1) low price, 2) erratic rainfall, 3) pest damage	○ (L= 1983)	Production was small because of 1) cassava mealy bug infestation, 2) insufficient knowledge on benefit of cassava production, 3) selling price of cassava was too low and to attractive farmers.
'90s	○○	Maize production started reducing because 1) infection of termites started, 2) government stopped giving farming inputs on loan. Rainfall was still favorable, tough.	○○ ○	Production started increased because 1) market became available 2) favorable rainfall	○○ ○	Production increased slightly because 1) rainfall has become stabilized, 2) minimal infestation of pest, 3) selling price become favourable.	○○ ○○	Production increased because 1) selling price has become increased, 2) benefit of cassava production was well known
'00s	○ (L= 2009)	Maize production became small because 1) we could not buy fertilizer fully, 2) soil became highly acidic, 3) continuous high rainfall damaged matured maize, 4) high infestation of termites in most maize field, 5) cultivation area has been decreased because of high cost of fertilizer.	○○ ○○ (B= 2008)	Maize production became high because of 1) favorable selling price, 2) Abundant forest for chitemene, 3) favorable rainfall	○○ ○ ○○ (B= 2008)	Production because high because of 1) attractive selling price, 2) favorable rainfall, 3) soil fertility was high.	○○ ○○ (B= 2008)	Production has become quite high because 1) fertilizer price is high and farmers cannot apply, so most farmer resort to cassava instead of maize, 2) not so many cassava mealy bug, 3) soils were fertile, 4) selling price stayed high.

(Continued)

Topics/ Periods	Livestock (pig)		Livestock (Chicken)		Water volume of Chibile	
	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○ (L=1983)	Pig production was not so high because we did not know much about pig rearing and also there were few people eat the pork	○○ ○○ ○ (B=1982)	There was plenty chicken because of 1) no diseases, 2) no theft	○○ ○ ○○ (H=1982)	We had plenty water of chibile ricer because of 1) heavy rainfall, 2) many streams joining the main river.
'90s	○○ ○ ○○ (B=1997)	Pig production increased because 1) there was no jiggers disease, 2) there was no worm infestation, and farmers who rear the pig started increased.	○○ ○	Chicken production started to decrease because there was theft.	○ (L=1994)	Water volume reduced a lot because of so many droughts
'00s	○ ○○	The importance of pig rearing was known to the village and we started to eat pork so we normally sold them.	○ (L=2008)	Chicken productions become small because of 1) outbreak of diseases and 2) increase of theft.	○ ○○	Water volume recovered to some level because of 1) favorable rainfall, 2) no drought

## 4) Chipapa Village, Mungwi district

Topics/ Periods	Agricultural production (Cassava)		Agricultural production (Beans)		Agricultural production (Maize)		Agricultural production (Finger millet)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○ (L=1982)	Production was quite small because 1) our attention was paid for maize, 2) there was no market for cassava	○ (L=1980)	Production was quite small because 1) there was no market for beans, 2) our concern was put on maize	○○ ○ ○○ (B=1984)	Production was quite high because 1) favorable rain, 2) we could apply fertilizer at proper timing, 3) fertilizer and seeds were available on credit	○ (L=1983)	Production was quite small because 1) our concern was put on maize more, 2) we used millet only for brewing beer and we did not know we can get profit from millet.
'90s	○○ ○ ○○ (B=1993)	Production increased a lot because 1) we could not get enough fertilizer for maize and started to grow more cassava, 2) favorable rain, 3) there was cassava mealy bug infestation, 4) soils were fertile.	○○ ○ ○○ (B=1993)	Production increased a lot because 1) we got knowledge on profit from beans, 2) more villagers practice intercropping beans with maize, 3) favorable rain, 4) there were so many fields for maize where maize was abandoned, 5) we harvested twice a year.	○ (L=1991)	Production decreased because 1) government stopped giving fertilizer and seeds on credit and price became expensive, 2) soils became not so fertile.	○○ ○ ○○ (B=1992)	Production increased a lot because 1) we got knowledge on profit from millet, 2) there were a lot of trees for chitemene, 3) favorable rain.
'00s	○○ ○ (L=2008)	Production becomes decrease because there was high market and we harvested immature tubas.	○○	Production decreased because 1) soils were degraded, 2) pest attacked, 3) rain was not so favorable	○○ ○	Production increased because 1) we established cooperative and started to buy fertilizer at cheaper price and proper timing through cooperative, 2)	○○ ○	Production decreased slightly because we started to introduce winter ploughing using manure/compost which we were not so familiar. There were high demand and favorable rainfall.

Topics/ Periods	Livestock (Goat and chicken)		Water volume of Kan Sala stream		Diseases (Malaria and Diarrhea)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○○ ○ ○○ (B=1987)	There were so many livestock because 1) there were no thefts, 2) there was no diseases, 3) we did not sell the livestock because we did not have knowledge on marketing	○○ ○ ○○ (H=1987)	Water volume was quite high because 1) there was enough rainfall, 2) we did not cut the trees near the stream, 3) no one diverted the stream, so stream was not dried up.	○○ ○	Diseases were many because 1) there were no rubbish pits and toilets, 2) we did not have knowledge on hygiene, 3) male were not fully involved with some activities such as toilet construction, rubbish pit etc.4) there were few closer clinic.
'90s	○○ ○	Production decreased because 1) thefts started to occur, 2) outbreak of diseases, 3) we learned and started to sell the produce.	○ (L=2000)	The water volume become low because there was not so much rainfall.	○○ ○ ○○ (H=1994)	Diseases increased a lot because 1) we still did not know about hygiene, 2) still there were no close clinic, 3) the water was contaminated and most of us still did not have toilet, 4) we did not properly slashing rubbish pit, 5) we did not have mosquito net, 5) chlorine was not so common for water treatment.
'00s	○ (L=2008)	Production become low because 1) high cases of the theft, 2) price become high and we also have school fee problem, so we sold many of them.	○○ ○	The water volume become increased because 1) normal rainfall, 2) there were plenty of trees near the stream	○ (L=2008)	Diseases decreased because 1) we started to learn on hygiene, 2) government distributed mosquito net and chlorine for treatment of water

## 5) Saise Village, Mbala district

Topics/ Periods	Agricultural production (Maize)		Agricultural production (Finger Millet)		Agricultural production (Cassava)		Agricultural production (Beans)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○○ ○ ○○ (B=1980)	Maize production was high because 1) loans for fertilizer and seeds were available, 2) favorable rain and 3) soils were fertile.	○○ ○ ○○ (B=1986)	Finger millet production was high because 1) there was abundant forestry for chitemene, 2) we also practice (winter ploughing) and 3) soils were also fertile.	○ (L=1983)	Cassava production was small because 1) concentration was put on the production of maize and finger millet, 2) we did not realize the benefits of grow the cassava, 3) we did not get so many cassava cutting (stem as a seed) from government because there were very few farmers who grow cassava.	○○ ○ ○○ (B=1980)	Beans production was high because of 1) favorable climate and normal rainfall, 2) no pest infestation and 3) soils were very fertile
'90s	○ (L=1990)	Maize production decreased because 1) farmers failed to return loans so government stopped giving out loans, 2) heavy rainfall destroyed maize and 3) there was flood and fertilizer was washed off.	○ (L=2000)	Finger millet production decreased because 1) high rainfall affected the growth of the finger millet and also eroded the soils.	○○ ○ ○○ (B=1994)	Cassava production was high because 1) we realized the importance of cassava production after experience hunger, 2) soils were fertile and 3) there was favorable rainfall	○ (L=2000)	Beans production decreased because 1) depleted soils due to lack of crop rotation, 2) high infestation of pest and 3) high rainfalls destroyed beans.
'00s	○○ ○	Maize production recovered because 1) government started selling fertilizer for cheap price through cooperatives, 2) favorable rain, and 3) quality seeds were available through government.	○○	Finger millet production recovered because 1) rainfall was moderate and 2) price for the commodity was attractive.	○○ ○○	Normal rainfall continued to support cassava production. Further, abundant cassava cutting was available and the price was also attractive	○○	Beans production recovered small because 1) low infestation of pest, 2) farmers tried to cultivation in the dambo areas where the soils were fertile. The beans cultivated in the dambo areas was not infested by pest

Topics/ Periods	Livestock (Goat and chicken)		Water volume of Lualuo stream		Diseases (Malaria and Diarrhea)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○○ ○ ○○ (B=1987)	A lot of people kept livestock. No crops to sale for, buying livestock. Selling and buying prices were not good.	○ (L=1989)	Water volume was not high because 1) there was not enough rainfall, 2) The rivers dried up because of small furrow	○○ ○ ○○ (H=1990)	People took good care of themselves. Not many mosquitoes. There were not many people.
'90s	○○ ○	The selling and buying prices were good. A lot people started keeping livestock. World Vision organization started helping a lot of people. Rapid started helping the people	○○ ○○	(no specific comments)	○○ ○	Number of started to increase. HIV/AIDS disease known. Hygiene levels fall down
'00s	○ (L=2004)	World vision gave us livestock. A lot of people started selling the livestock. Selling and buying prices were good	○○ ○ ○○ (H=2008)	The water volume was high because there was much rain.	○ (L=2006)	Large population. Low standard of hygiene heavy rainfall and so many mosquitoes. Change of weather pattern. HIV/AIDS spreads

## 6) Mayanga Village, Mbala district

Topics/ Periods	Agricultural production (Maize)		Agricultural production (Beans)		Agricultural production (Finger Millet)		Agricultural production (Cassava)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○ (L=1989)	Maize production was quite small because of 1) small rainfall 2) high interest for getting loan of fertilizer made us fail to buy them.	○○ ○	Beans production was normal because of 1) favorable rainfall, 2) no pests, 3) fertile soils	○ (L=1987)	Production of finger millet was quite small because 1) farm land for finger millet was not so large, 2) we did not get much rainfall, 3) market for finger millet was not yet established.	○○ ○ ○○ (B=1988)	Production of cassava was quite high because of 1) favorable rainfall 2) crop rotation made the soil fertile 3) early mature variety (it took 6 months at most)
'90s	○○ ○ ○○ (B=1998)	Maize production increased a lot because 1) favorable rainfall, 2) fertilizers became available through cooperatives and we could apply fertilizer at proper timing, 4) many farmers started to grow maize and 5) soils were fertile.	○○ ○ ○○ (B=1982)	Beans production was quite high because of 1) favorable rainfall (we grew beans 3 times a year), 2) no pests, 3) fertile soil and 4) not many weeds in the fields	○○ ○	Production increased because 1) good market price, 2) weeds were not so many in the field, 3) favourable rainfall.	○○	Production decreased because 1) pests started destroying cassava 2) much attention was paid in growing maize.
'00s	○○ ○	Production decreased because even if government gave out fertilizer on a cheap price, the amount was limited and we could not get enough. Market price was attractive, though.	○ (L=2009)	Beans production was quite small because 1) we experienced hail, 2) rain season finished very early and 3) so many pests	○○ ○ ○○ (B=2008)	Production increased a lot because 1) the area for cultivation increased because we started "fundikila" (winter ploughing) we tried to make soils fertile and 2) favorable rainfall.	○ (L=2007)	Production was very small because 1) pests destroyed leaves of cassava, 2) moles also attacked cassava tubas and 3) early mature variety decreased.

Topics/ Periods	Livestock (Goat and chicken)		Water volume of Lualaba stream		Diseases (Malaria and Diarrhea)	
	Scale	Remarks	Scale	Remarks	Scale	Remarks
'80's	○ (L=1980)	There was few livestock because 1) many animal diseases, 2) many have not been taught on rearing of livestock, 3) prices was not so attractive, 4) we did not have chance to get training on livestock rearing	○○ ○	The water volume was normal because of normal rainfall and lot of trees near the river	○○ ○ ○○ (H=1990)	There were plenty of diseases because 1) many grasses and mosquitoes were hiding there, 2) low standard of hygiene, 3) many rotten mango attracted flies
'90s	○○	Livestock increased slightly because 1) training on livestock rearing started, 2) prices improved, 3) animal diseases reduced	○○ ○ ○○ (H=1998)	The water volume was quite high because 1) heavy rainfall, 2) cutting of trees in the river was prohibited by village headman, 3) there was no water furrow.	○ (L=2000)	Diseases drastically decreased because 1) we learnt about hygiene 2) grass was cut reducing mosquitoes 3) we started making traditional toilets and rubbish pits, 4) mango production was decreased.
'00s	○○ ○ ○○ (B=2008)	Livestock production was quite high because 1) many have the knowledge of livestock rearing, 2) crop production also increased and we could afford for livestock feeding, 3) prices became much better, 4) we started to utilize manure for our farm land and demand became high.	○ (L=2005)	The water volume was quite small because 1) there was drought, 2) we started to cut trees near rivers.	○○ ○	Diseases increased because 1) HIV/AIDS were known, 2) climate changed, 3) we had to drink contaminated water.

### A-3 Record of Village Analytical Workshop-3: Village History

#### 1) Lunda Village, Kasama district

##### Establishment of Village:

Lunda village started in 1947. It had 4 households. The first village headman was Mr. John Alubanshi. Since the village was small, they named the village Lunda meaning “extending”. Mr. John Alubanshi reigned from 1947 to 1978 when he handed to his nephew Mr. Pehol Kobwe. The first head man died in 1979. The second head man reigned from 1978 to 1998 when he handed to his nephew Mr. Piace Ngosa. The second headman died in 2002.



##### Vegetation:

When the village started it was just a jungle and full of monkeys, lions and bush pigs, but all these could not be seen (lost) during 1970's.

##### Agriculture & Natural disaster:

We rely on Chitemene system and we grow cassava, beans and groundnuts and these are not for business but for mainly home consumption. In 1962 and 1963, we experienced hunger due to rainfall which destroyed the crops (floods) and in 1972, we experienced the same situation (floods and hunger) again. In 1960, 3 households started farming of tomato (we had not have any new activities after colonized by the British, colonizers only encouraged the villagers on cleanliness). By that time, people were just carrying Chikanda and small amount of cassava meal on their heads to go and sell in Kasama where the market was. From 1954 to 1970, people also were carrying millet to go and basket of sell in small amount to the same market.

##### Education:

During the period of 1954 to 1960, the village had only two literate villagers. After then, more villagers have become literate.

##### Culture:

From 1947 to 1970 whenever the funeral happen in this village, young ones were used to be locked in houses until body is buried and the fire in every household put off. As for wedding, men tended to marry age of 30 women were at 22 to 25 for women, but since 1970' trend has been changed and age of marriage become late.

##### Water furrow (canal):

In 1962, the first water furrow was dug by Mr. Bosniface Chishimba for personal use. It is still existing and only being used by the farming. In 1978, Mr. Chanda bought water furrow which somebody dug. In 1979, Mr. Fredrick Chanda also dug his own water fullow and 1984, Mr. Masabo Chanda dug his own water furrow. There is no water furrow for the village (communal) since the village was established.

## 2) Molwani Village, Kasama district

- 1970 Village formation. The village started with 25 houses. The name of the village 'MOLWANI' came from the first village headman (King) Mr. Molwani.
- 1978 There was poverty in the village because of poor harvest.
- 1980 Construction of the roads and getting fertilizer on credit from Lima Bank.
- 1982 Getting coupons when buying mealie meal from Government assistance.
- 1984 Formation of "Chawamina Avaice clubs" (Good for Youth club) and crop production
- 1986 A lot of people started making gardens for crop productions
- 1988 "Chawamina Avaice clubs" scattered because leaders went away but only the name remained existing
- 1996 Mr. Molwani gave leadership to Mr. Peter Mutale because he was of age.
- 1997 The rebirth of the Good for Youth Club and there was heavy rain such that maize, cassava and finger millet were destroyed.
- 1998 We got a lot of fertilizer from Omnia (fertilizer Supply Company) on loan and we returned the loan on 25 hectare farm.
- 1999 There was a bumper harvest and high market demand, we sold to Kasembo Farm In the same year we built the poultry shed with money given by RIF (Rural Investment Fund) Kambulu club,
- 2002 We bought chickens with the remaining money and we used to look for food to feed the chickens





## 3) Kalembe Chiti Village, Mungwi district

- 1840 Formation of the Village
- 1842 Kangala was the Headman of the Village. Poverty stroke the village.
- 1944 There were wild life game animals.
- 1957 There was drought because of lack of rains and diseases broke out in the village.
- 1958 Measles and chicken pox attacked us. The Government sent the authority to kill the animals that were threatening peoples' lives.
- 1959 There was fighting for independence so there was no farming activities were taking place.
- 1964 We were given fertilizer by cheaper price to start farming.
- 1965 We cleared the roads for easy movements.
- 1974 We built a school near Ngulula for the children.
- 1975 Chilufya, the Headman dies.
- 1976 Mr. Findeli took over Headship of the village.
- 1982 Government stopped giving Fertilizer
- 1983 There was poverty in the village.
- 1990 We stated clearing the land for framing and built a community school called Katrik community school.
- 1993 Government took charge of the school, Ministry of health brought us knowledge about health.
- 2000 We had a lot of caterpillars for sell.
- 2001 Dug wells were dry (up to date).
- 2009 Mr. Chiti Mukulu (paramount chief) visited.
- 2009 Government gave free mosquito nets.



## 4) Chipapa Village, Mungwi district

1920	This village was established and the village was known as Itinti (pulling each other) because the Paramount chief, Chiti Mukulu and senior chief Mwamba were disputing the boundaries in this area.	
1935	The village was divided into two; one was remained as Itinti, and another was called Chipapa. Mr. Michael Kampyongo was given the Chipapa village from the Chief. Chipapa means “carrying on the back” and Mr. Kampyongo experienced that crocodile jumped on his back and survived on the way back from the Chambeshi river when he was sent by Chief Chiti Mukulu. For an appreciation from the chief, he was called Chipapa later on.	
1961	There was an outbreak of measles. We treated them by sleeping on the sand naked and rolling until sound covered wound.	
1967	There was an outbreak of scabies and we used to go to the clinic which is 6km from our village.	
1974	Mr. Michael Kampyongo died and he was succeeded by his brother, Mr. Michael Mukuka Kampyongo in 1975.	
1983	Michael Mukuka died and Leo Chileshe succeeded him up to 1990.	
1985-	We experienced hunger because cassava mealie bug destroyed our crop.	
1990-	Current village headman, Mr. John mulenga was chosen as village headman as his family.	
1991	We were assisted with fertilizer from CUSA and we could manage hunger.	
1992/1993	Although we prepared our field, the rains stopped in February 1993 and our crops withered and our harvest was poor. By the time even soils became unfertile and we have to rely on fertilizer.	
1994	We were given free maize (50kg bag) from the Government as a relief food for each H/H.	
1997	The Government also distributed rice to the sick and vulnerable (1 gallon).	
2000	Theft started stealing other people’s properties such as goats, chickens, even breaking into houses and even now we are experiencing. We formed CCPU (community Crime PreventionUnit)	
2007	The Ministry of Health brought under-five clinic to our village	
2008	The Ministry of Health gave 3 mosquito nets to the household who are living more than 2 per household.	
2009-	We dug the water furrow in May, 2009 with the help from JICA.	



## 5) Saise Village, Mbala district

1. Saise village was formed in 1979 and Mr. Pilula Simutowe was the first headman.
2. In 1980 the production of maize started.
3. 1987 production was low because government told that each farmer should look for own market.
4. 1986 we had a spread of the measles.
5. 1988 the village was made as a farm by Mr. Kalusa Siame.
6. 1995 We were given relief food from the government.
7. 1999 Mr. Kalusa Siame left the farm and Mr. Siame has become village headman and we elected a committee. We started to grow beans, cassava, soya beans, groundnuts, sweet potatoes and banana.
8. 2000 we started growing vegetables by bucket irrigation and furrow. Same year, the theft had increased up to now and monkeys and wild pig also damaged our crops and vegetables.
9. 2004 we had drought and faced hunger. We relied on wild mushrooms and bananas for food. World Vision taught us midwifery.
10. 2007 the Village Headman's house caught fire and his child died inside the fire.
11. 2008 High theft cases especially livestock like goats.
12. 2007 we received mosquito nets and chlorine from World Vision through the care givers and we also received bicycles from RAPID

## 6) Mayanga Village, Mbala district

1. The village was established in 1902 by Mr. John Mayanga.
2. In 1962 John Mayanga died and he was succeeded by Mr. Robert Ntinda Sikazwe. In the same year Robert Ntinda Sikazwe left the village and started to work for Mr. Abel Mwanakatwe in Mbala. Mr. Peter Sinyangwe succeeded the village headman. In the same year we experienced heavy rainfall which destroyed the crops and lead to poverty. Also wild pigs and monkeys attacked the fields and destroyed the remains. Elephants were also a threat.
3. From 1963 to 1964 there was fighting for independence, people did not want to be ruled by the White (British) as a result they formed a political party called UNIP. Because of this the Whites killed the big snake which was staying at the Chila Bridge which people believed to be a spirit, then immediately the water dried up in the river. One of teacher reported the case to the District Commissioner (DC) so that they can organize for prayers and for sure preachers prayed and the spirits and water came back.
4. In 1964 we got independence.
5. In 1974 we started facing problems where to find soap, sugar, cooking oil etc. Also cassava was dried up by cassava mealie bug.
6. In 1976 we were carrying paraffin and sugar to go and sell in Tanzania and exchange with food.
7. In 1977 heavy rains continued and one day, the lightening killed one woman and many more were burnt.
8. In 1994 Johnston Chipungu killed 4 peoples by axe in their house those who came to cultivate in our village. One was killed others were left with injuries.
9. 1969 two men crashed with bicycle at the bridge and one died and another run mad.
10. In 1982 got the coupons for mealie meal from the government.
11. In 1996 there was hunger and World Vision started giving relief food.
12. 1997 we had heavy rains and crops were damaged and experienced hunger.
13. 2007 world vision gave out 5 pigs per household.
14. 2008 because of heavy rains many houses and crops were destroyed.
15. 3rd June 2009 we constructed weir using locally available materials and we started to dig the furrow which will benefit us all farmers



#### A-4 Record of Village Analytical Workshop -4: Success Story and Happiest Moment

##### 1) Lunda Village, Kasama district

###### <Youth Group>

We have been contributing ourselves to road maintenance, working on communal land, construction of communal village shelter. We want to contribute ourselves to our village development by vegetable production, starting business, grow rain-fed maize during rainy season, and continue our education. For this, we need more water & land, fund raising by doing community piece work, take our time before marriage.



The happiest moments in our life was; when I passed the school examination, when I had wedding, when I visited town in the first time, when I had rode in the boat, when I joined church activity such as cleaning surroundings, when I had first born child. The saddest moment in my life was; when my parents died, when my parents failed to source my school fee, when I went to the hospital for operation, when my child deadly sickened.

###### <Female Group>

-We have been contributing agricultural production by growing maize, beans, groundnuts, cassava, practicing slash and burn, grow finger millet. It enables us to have enough food at our homes, to buy clothes for our children, to build improve houses, to buy bicycles which helps us to take patients to hospitals and take our produce for sell

-We worked together with men for road maintenance. We crushed the stones to pave way for the road and to remove the stumps and shrubs. Our cash helps to raise money to pay for our children's school fees and hospital

-We mobilized ourselves for the construction of the wooden bridge by carrying the log on our shoulder to the sites. The bridge helps us to get our produce across the river for selling. We also can go to the hospital/ clinic. Further, children who go to school also use this bridge.

-We have been contributing to fetching the domestic water by walking long distance.

-We assisted men to gather the grass and clay soil for communal village shelter.

-We have been contributing to village communal field cultivation. This cassava field helps to feed the orphan, old aged, others who cannot work by their own and to feed visitors who come to see village headman. Further, in case of funerals, it feeds the mourners.



The happiest moment was; Road construction, Communal land cultivation, Construction of communal village shelter, and good harvest.

###### <Male Group>

We have been contributing ourselves into crop production such as cassava, finger millet, groundnuts, beans, Mbambara nuts, church construction which brings us together, road maintenance which enables us to have access to other villages, those who have access to irrigation land can succeed into grow vegetables, keeping village clean to protect from diseases, conserve tree, construction of communal village shelter for meeting. Further, we are looking after orphans and committee is helping them to pay school fees. We also constructed bridge to make us to access to other villages.



2) Molwani Village, Kasama district  
<Youth Group>

1. Construction of communal poultry houses: We contributed ourselves into 1) making bricks, 2) drawing water , 3) chopping wood to bake the bricks, 4) uprooting the trees in the area construction of the poultry shed, 5) digging foundation, 6) collecting sand soil and 7) handing over iron sheets to the ones on top of the roof. This poultry house became source of income from the chickens, and we used to get manure from the poultry house for the farms and the fish ponds.
2. Construction of roads: We contributed ourselves into 1) uprooting trees in the area of construction, 2) weeding , that is to remove unwanted grass in the area of construction, 3) filling up the potholes in the roads. This road makes us easy transportation of our products to the markets.
3. Formation of the Youth club: We formed youth group under Kambulu cooperative to move forward without depending on others. Since we have just started our activity, there are not so many impacts /changes observed, but we gained enough knowledge on cooking.



Happiest moments were: when we built the poultry shed, when the cooperative groups and clubs were formed, when I finished school, when I got married, when harvesting.

<Female Group>

1. Construction of a school: We contributed ourselves into c drawing water for making the bricks, collecting building stones and sand soil. Now our children can go learn there.
2. Construction of a bridge: We contributed ourselves into collecting wood (timber) and weeding off grass. Now this bridge is used for passing when going to the hospital, market, school. Further, it is useful when fertilizer is delivered. (We are still working on the bridge)
3. Growing crops: This helps us with buying of fertilizer, when there are visitors at home. Further, Farming really helps us in our livelihood such as sending children to school, building houses, buying goods needed at home, and resulting in alleviation of poverty.
4. Clearing the road: We contributed ourselves into weeding the grass, it makes us easy movements and development. Roads makes the visitors to visit, children going to school, going to the hospital, and the market places.
5. Construction of hospital: We contributed ourselves into drawing water, collecting sand soil and gathered grass to thatch the roof. Further, we made the bricks for the construction of the hospital that we can get clinical services nearby place
6. Construction of Poultry shed: We contributed ourselves into drawing water for making bricks and collecting sand soil.



Happiest moments were: when we have a bumper harvest and when there is high demand of our products.

<Male Group>

1. Construction of the poultry house in 2000: We contributed ourselves into molding bricks, collecting sands and burnt bricks. Government supported us for cement and iron roof sheet. Money gained from poultry was used for purchasing fertilizer and it also helped our villager from hunger.
2. Growing vegetables and sweet potatoes in the communal field: Money gained from the gardens was used for inputs and it helps elders in the village, reserves the money for chief, and helps the village headman for receiving the visitors.
3. Road maintenance: It contributed to villagers easy movements
4. Construction of Church: we constructed 5 churches
5. Molwani cooperative communal farm: we harvested 74 gallons beans from Iha's field and money are used for



Our happiest moment (as a villager): When government brought cooperative for fertilizer distribution, when night water storage reservoir were constructed, when government gave us the food such as rice, maize etc when drought happened when we were shortage of fertilizer in 2004, when we succeeded in growing vegetable in dambo using shallow well in 1974.

My happiest moment (personal): When I succeed to extending the vegetables gardens, when I survived sickness, when I got children/ I got twins, when I got good harvest after from hard working, when I found that I can get my own farm land (I had not hope to get farm land after independence from parents, but I could get it), when my friend helped me purchasing the fertilizer, when I became to read, when my parents take me to the school because I did not expected they can afford me.

## 3) Kalembe Chiti Village, Mungwi district

## &lt;Youth Group&gt;

1. **FARMING:** we are doing farming in rainy season and chitemene too for eradication of poverty and also peoples are now giving us the respect. Our life also has been changed.
2. **BUILDING A SCHOOL:** we think that education for our children is important, so we contributed ourselves by drawing the water, making bricks, collecting the sand, and crushing the stones etc. Now our children can learn how to read, playing the game etc. there.
3. **CONSTRUCTION OF BRIDGES:** we collected logs and soils for the construction. Now, our school children can go to school easily, and we can carry our agricultural produces and government support (COBSI's water furrow construction) has been reached our place.
4. **ROAD UPGRADING:** We thought road is a sign of new development and we wanted development in our area, so we cleared area, stamping the trees, leveling the road. Our life has been changed through buying and selling the goods and buyers now come from different places.



Our happiest moments were: When God has given a hardworking child, when I knew that I can learn how to write, when I harvested 20 bags of sweet potatoes, when God has given me the knowledge of how to beat the drums, when my rabbit increased up to 24, when Government workers reach to our place.

## &lt;Female Group&gt;

We contribute ourselves into building school, road maintenance, bridges and clinic construction, and farming. For road, we wanted easy transportation of goods and new development by this. As for clinic, we constructed a shelter for under-five clinic. We cleared the land, drew the water, cutting grass and making brick. We wanted this because we can receive treatment at a nearby place, can know the growth of our children. For farming, we were involved in weeding, planting and harvesting and for marketing. We can send our children to school, buy things for the homes and can reduce our poverty through the farming.



Our happiest moments were: when we had bumper harvest and new year day.

## &lt;Male Group&gt;

In 1991 we built a school we are happy now it is near our village. Now we can take our children's to school (it was very far). Also built a health post patients receiving medications from here in 1994. We also contributed ourselves for road maintenance. We can easily bring our goods to town and buyers just come here to buy our goods compared to previous. We also growing vegetables using our small tines. Futher, thourh growing crops lik maize, we can earn money for school fees. Through agriculture officers instruction on seed renewal we can not get higher yield than before.



Our happiest moment (as a villager) was: when Government distributed fertilizer due to drought in 2005 which made us overcome our poverty, when we constructed school in 1991, when we constructed clinic. Now patients can receive medications from here, when had many bole holes in 2008, we had new village headman in 2006.

My happiest moment: when I had 1st born child, when I had this furrow (personal furrow) which I dug in 2000. I can grow vegetables, green maize, and it gave our family good earning, when I got bicycle this year which helps me to transport goods to town, when I planted 1 gallon of beans and harvested 20 gallons in 2003, when I lost bicycle in 2007 but I could get new one in 2008, when I bought sewing machine by selling plunks in 2001 which now are main income sources for our household, when I was given a reward for looking after the pigs given by NGO, and now I have 6 pigs, when I planted a hector of cabbages sold them and bought iron sheets for my house.

## 4) Chipapa Village, Mungwi district

## &lt;Female Group&gt;

1. Agriculture: we are proud of our agricultural activity at fertile land. We are growing groundnuts, beans, maize, cassava, soya beans, finger millet and we also growing vegetables. We, women are contributing ourselves for land preparation for chitemene, planting, weeding and harvesting because we want to overcome poverty. Because of our hard work, we can send our children to school, buy necessary goods at home, and can build house etc.
2. Water furrow construction: We are also proud of our stream which never dries up. Because we want to grow more vegetables such as cabbage, rape, Chinese cabbage, tomato, onion, Irish potato, sweet potato, and we also want to construct fish pond, we constructed weir and started to dig furrow with the support from JICA.
3. Construction of the school: Before construction of the school, we did not have close school and we had problem for sending the school. Therefore, we decided to construct the school and started molding the bricks. The profits were used not only for construction of the school, but also for paying for school fees and our necessity goods for home. Now, our children can go to nearby school.
4. Construction of the road and bridge: We contributed road and bridge also, we weeded, and filling up the potholes and slashing the grass and these improved our smooth movement.
5. Construction of Under-5 clinic: We used to walk long distance to take our children to the hospital and many parents failed to take them there. To overcome this, we molded bricks, drew the water, cutting grass and men helped us with the construction and roofing. We are now managing taking care of our children whenever they are sick.



The happiest moments were: when season for caterpillars' collection comes, when we got bumper harvest, when X'mas and New Year come, when we are praying for God, when we had church, when we constructed weir.

## &lt;Male Group&gt;

1. Construction school: We built school in 1960. We mad bricks, cut the grass and poles. Now our children can go to nearer school. The school was from grade 1 to grade 3. We also built 2 houses for the teachers and 2 toilets using poles.
2. Upgrading of school: We upgraded our school up to grade 9 in 2009. Because PTA could not pay for electricity fee, so now only teachers' houses have electricity. There is bore hole with motor pump but PTA cannot afford the electricity, so it is not used now.
3. Construction of furnace: in 1932 to 1935 we constructed furnace for heating and melting stones where processed into iron for making hoes, axes, and spears, arrow, hammers which were used to sharpens the iron. These tools now are used for maize, cassava, ground nuts and ginger mille ploughing. Further, these tools were used for protecting ourselves from wild animals, hoes are used for digging trenches and construction of protective fence with wooden poles from animals.
4. Utilization of fiber for Chitenge (traditional clothing): we found fiber in the bush and introduced them as a material for making clothes.



The happiest moments were: when I found the medicines for my children, when I could send my children to school, when I have learned how to play the football, when I was passed grade 8.

## 5) Saise Village, Mungwi district

## &lt;Female Group&gt;

We contributed ourselves into clearing the road, construction of the weir/ digging furrow, growing crops etc. For clearing road, weeding the grass, removing the trees and filling in the potholes. This makes even children can move easily especially for going to school. Further, it helps our marketing activity not only villagers but also ox-cart can pass the road. For construction of furrow, we collected grass, wooden poles, clay soils and digging furrow. We are now expecting to utilize the water in dry season. For growing crops, we are growing maize, beans, finger millet, cassava, tomato, rape, cabbage, Irish potato etc. We are getting money from these crops when we sold them. We use those money for buying fertilizer, clothing, hire the farm labor, and solve the malnutrition of children.



Our happiest moment was: when we constructed furrow on 19<sup>th</sup> May 2009, we knew our village well by today's WS on 28<sup>th</sup> May 2009 as a villager. As for when I felt happiest personally; when I got married, got first born child, I got good harvest, I could send my children to school, I bought clothing, I got money by selling the produce, I bought bicycle, I bought equipment of houses, I bought livestock/ breeding.

## &lt;Male Group&gt;

We have good soils and we grow vegetables like rape and cabbage. We also grow beans, cassava, sweet potatoes and finger millet there. After harvesting we sell our produce then we buy clothes, pay school fees and so many things. We also constructed schools and teachers houses too. Now our children have started learning and teachers are already in.

Further, we cleared our road by crushing the stone and collecting sand soil.

Our children are using the same road to the school. We also built a clinic and houses for our medical staff. We also help orphans to draw water, collect firewood and, as well as widows.

Happiest moments as villagers; when we saw furrow, on 19th May 2009 we constructed weir. In 1985 the government gave us free fertilizer and grew maize and the harvest was good.

Happiest moments (personal); when I felt happiest personally; I had money and bought clothes in 2008, we are living happily with my family compared to the past, I married in 2005, we had a clinic near our village, my harvest was good and I sold my tomatoes and bought Morris chairs, able to feed my family, we are healthy, I have my parents, mother sold vegetable at K 200,000 and paid my school fee.



## 6) Mayanga Village, Mbala district

## &lt;Female Group&gt;

1. Construction of school: We wanted school so that our children get educated and take care of us when we grow up and they can be literate. We collected sand soil, drew water, building stone, and collected fire wood. Distance to the working place was far and we had difficulties, but now we can see our children are learning and make us happy and proud.
2. Establishment of club (Women club and SWAZI):
  - 1) WOMENS CLUB: the reasons we formed this Women club is to make money by making uniforms for our children and ourselves. Further, we are making scones and fritter so that we have money to help the orphans. We went to school to learn how to use sawing machine after that we were given machines and materials to start with by World Vision. schooling was hard for us because we had to travel every day to Mbala for learning
  - 2) SWAZI: the activity for the group is to help the orphans, widows and the aged by growing beans, draw the water and collect firewood and wash clothes for them.
3. Construction of the house for hammer mill: We wanted a hammer mill for grinding our maize at a near place and we thought it is also helping the needy. We drew the water for making bricks, collecting bricks. Today, we are grinding our maize at a nearby hammer mill. Hammer mill was given by World Vision. We help orphans such as buying books, soap, clothing etc.



The happiest moments were: When there was bumper harvest and sold them and raised money, when we had children.

## &lt;Male Group&gt;

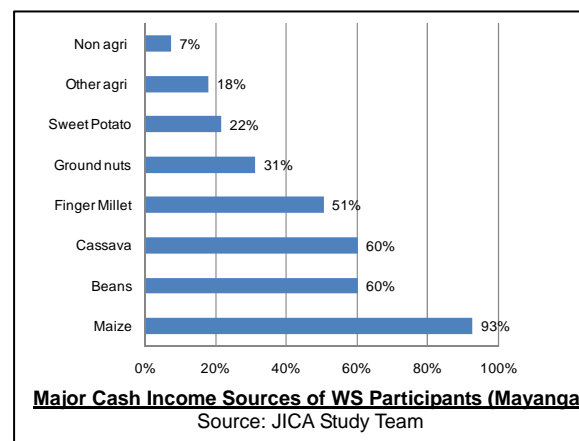
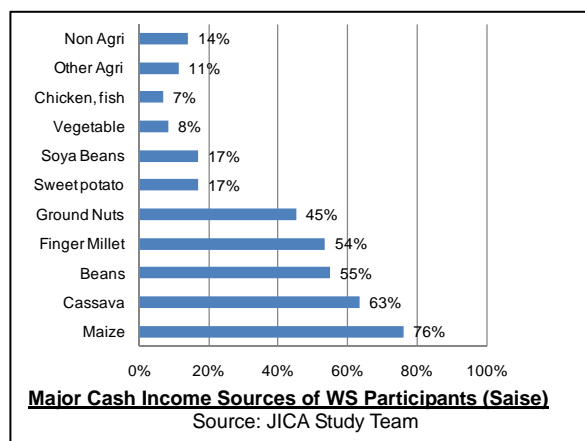
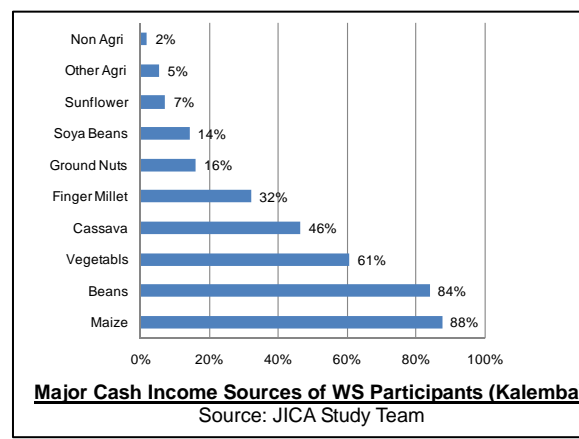
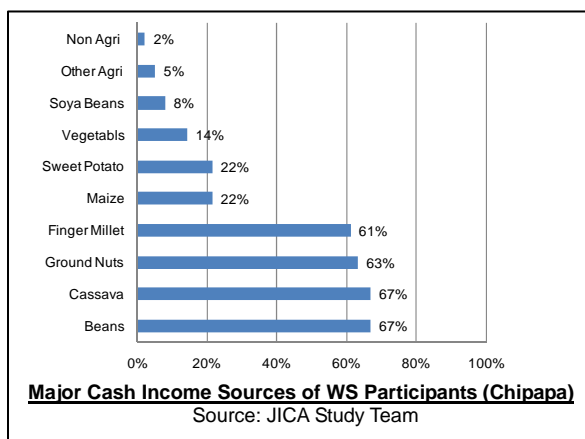
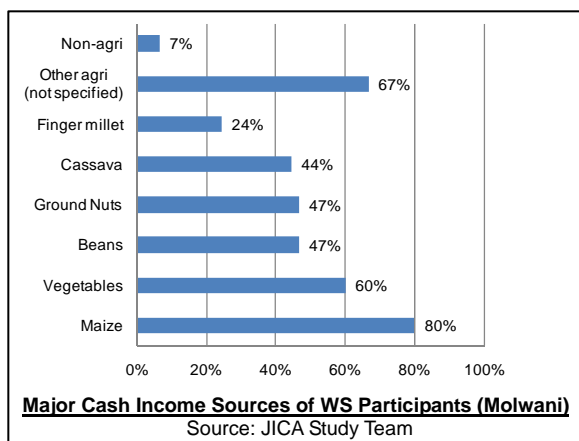
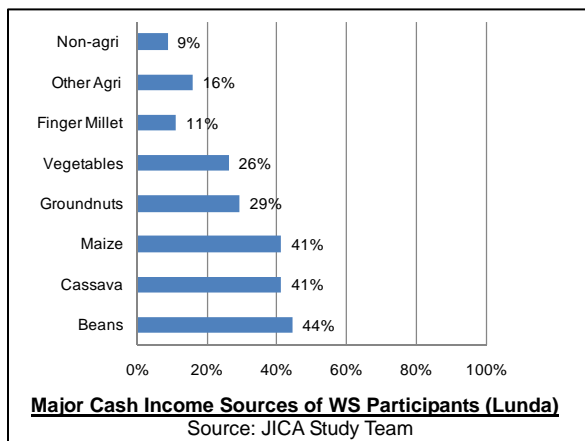
1. Construction of school: Our children are now able to learn up to grade 9 within village. We made bricks, crushed stones, collected sands etc. After that, PTA decided to build teachers' houses and we also built 3 houses for the teachers. They used to live in the village.
2. Construction of fish pond: We constructed 3 fish ponds. Unfortunately, all fish was stolen and ponds were dried up, but we want to revitalize utilizing the water from our constructing furrow.
3. Pig rearing: World Vision gave out pigs for us to solve the problems such as paying school fees, improving the diet etc. in 2007. We are successfully rearing the pigs and they are really helping our livelihood improvement. We even use the profit from the pigs for purchasing fertilizer.
4. Tree planting: We received also 130 trees from World Vision in Feb 2009 and we have already planted them, one day we will sell the poles (for houses) and earn money.
5. Road maintenance: We also repaired center road with many potholes which is used for villager's many movement.
6. Communal land management: We work together for the aged to cultivate communal land. After selling the produce, profit has been used for the aged.



The happiest moments were: when I found my alternative livelihood after quitting working in the commercial farm and started career as a technician for repairing TV sets, radio etc., when I sold my produce and can look after my family and my mother, when I got married and I had children, when I completed my school by the farm income which I worked hard, when I got knowledge on the water furrow construction, when I opened a pre-school and my 47 pupils started reading, writing and counting.

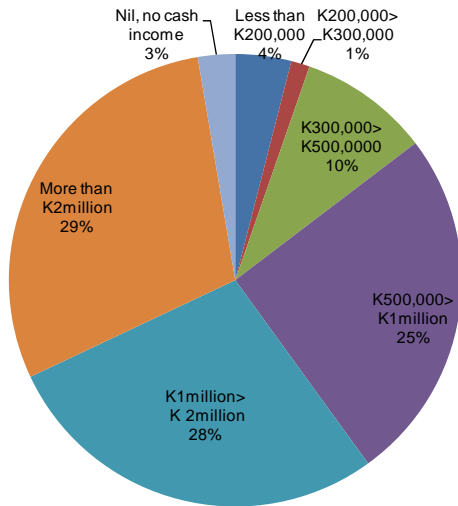
**A-5 Record of Village Analytical Workshop -5: Participants Analysis**

1) Major cash income sources of village analytical workshop participants

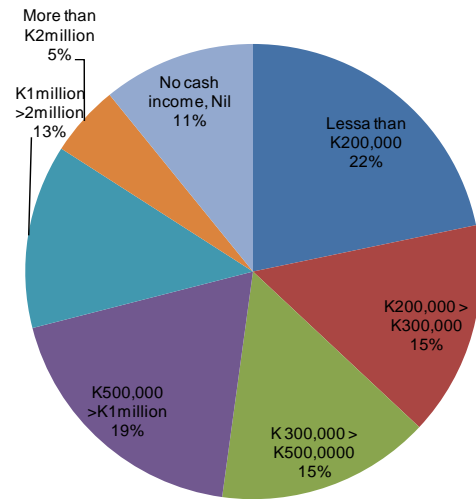




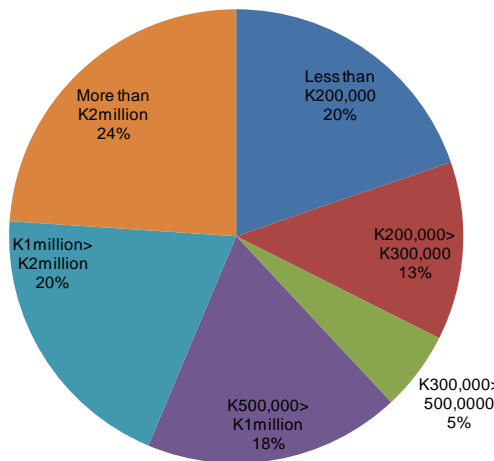
2) Annual cash income level of village analytical workshop participants<sup>1</sup>



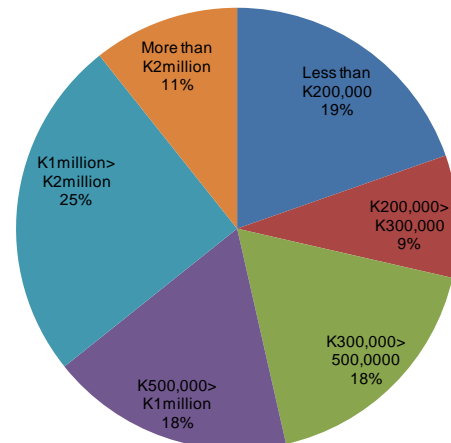
**Annual Cash Income Level of WS Participants (Molwani)**  
Source: JICA Study Team



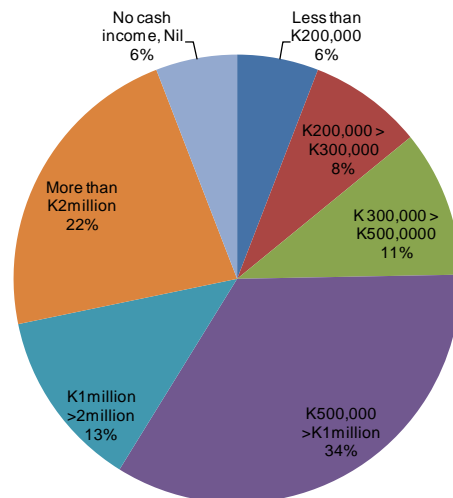
**Annual Cash Income Level of WS Participants (Kalemba)**  
Source: JICA Study Team



**Annual Cash Income Level of WS Participants (Chipapa)**  
Source: JICA Study Team



**Annual Cash Income Level of WS Participants (Saise)**  
Source: JICA Study Team



**Annual Cash Income Level of WS Participants (Mayanga)**  
Source: JICA Study Team

<sup>1</sup> Since the Team started to ask this question from workshop at moiwani village, there is no data for Lunda village.