THE REPUBLIC OF ZAMBIA
MINISTRY OF AGRICULTURE AND COOPERATIVES (MACO)

# THE MASTER PLAN FOR PROMOTION OF IRRIGATED AGRICULTURE FOR SMALLHOLDERS IN THE PERI-URBAN AREA IN THE REPUBLIC OF ZAMBIA

## FINAL REPORT
## MAIN REPORT

**March 2011**


JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)
NTC INTERNATIONAL CO., LTD.
SANYU CONSULTANTS INC.


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## Composition of Final Report

## MAIN REPORT

## ANNEX

# PREFACE

In response to a request from the Government of the Republic of Zambia, the Government of Japan decided to conduct The Study on the Master Plan for Promotion of Irrigated Agriculture for Smallholders in the Peri-Urban Area and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA dispatched a study team, headed by Mr. Akira Yamamoto of NTC International Co., Ltd., to the Republic of Zambia from November 2009 to March 2011.

The team held discussions with the officials concerned of the Government of Zambia and conducted a series of field surveys in the studied area. Upon returning to Japan, the team conducted further studies and prepared this final report; entitled as “The Master Plan for Promotion of Irrigated Agriculture for Smallholders in the Peri-Urban Area”.

I hope that this report, namely inscribed as Master Plan, will contribute to the sustainable agricultural development in the Republic of Zambia and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials of Government and those concerned in the Republic of Zambia for the close cooperation they had to the study.

March 2011

Izumi Takashima
Vice-president
Japan International Cooperation Agency

March 2011

Mr. Izumi Takashima
Vice-president
Japan International Cooperation Agency

Letter of Transmittal

Dear Sir,

We are pleased to submit to you the final report entitled as “The Master Plan for Promotion of Irrigated Agriculture for Smallholders in the Peri-Urban Area”. This report presents the outcome of the Study which was conducted both in Zambia and Japan during a total period of 17 months from November 2009 to March 2011.

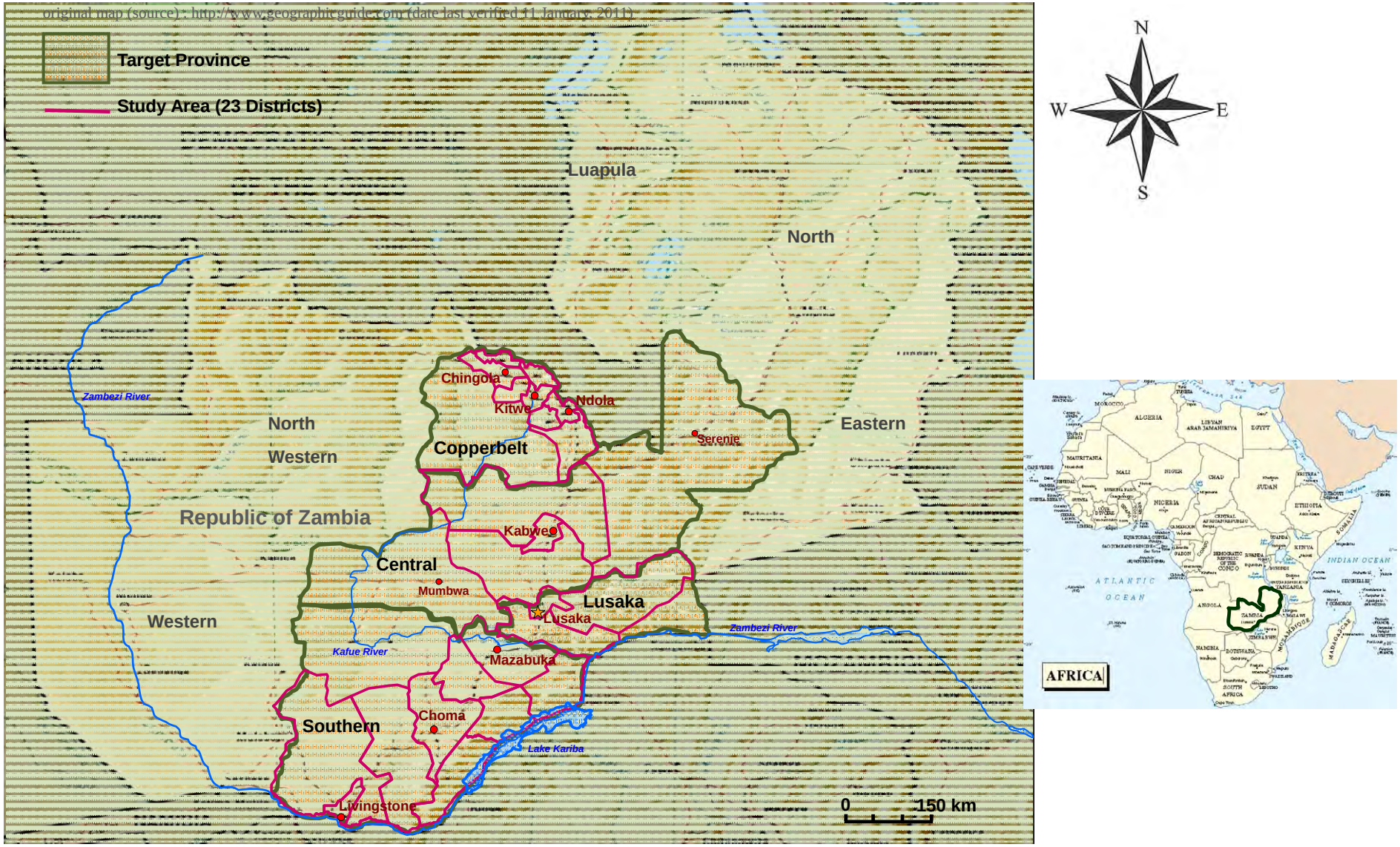
The Study was conducted to put together several countermeasures for improving income of smallholder farmers in the peri-urban area via promotion of commercial irrigated agriculture; while, it aims at re-strengthening field extension system throughout capacity development of Zambian counterpart and farmers / farmers’ organizations. The study results showed that smallholders in the peri-urban area remains deficient situation for taking up its advantageous market-accessibility and irrigation condition to generate or sustain agricultural profit. In this regard, the Study Team carried out “case-study analysis on the best-practice farmers’ groups” and “preliminary survey for feasibility of the partnership between marketers and farmers / farmers’ groups” as a part of main study activities. Results from these investigations revealed competitive circumstance of crop produce marketing under dynamic market mechanism of the pri-urban. It is therefore significant to emphasize on capacity development of farmers / farmers’ groups towards improvement of crop productivity and effective utilization of irrigation facilities. Presenting Master Plan was formulated with taking account of above point.

We, the Study Team, expect utilization of the Master Plan and Action Plan by Zambian government for promotion of commercial irrigated agriculture by smallholders and hence positive impacts on smallholders’ income. Moreover, we would sincerely like to request continuous assistance by Japanese government and follow-up in the Study Area. By doing so, we are sure that the friendly relationship between Japan and Zambia will be further reinforced.

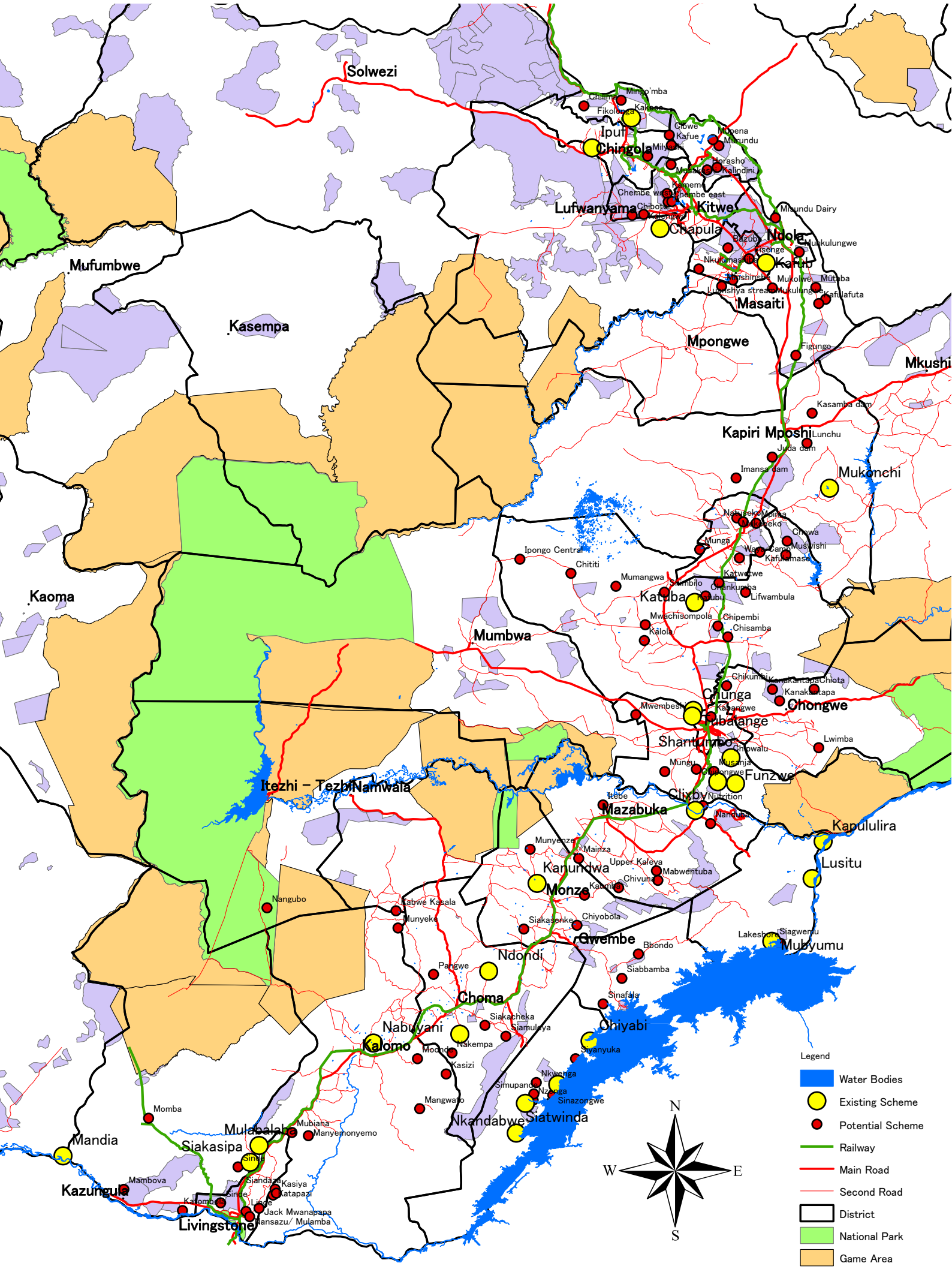
In submitting this report, we would like to express our heartiest appreciation for substantial cooperation and advice provided during the Study period by officials of the Japan International Cooperation Agency (JICA), Embassy of Japan in Zambia, JICA Zambia Office, dispatched JICA Experts, the Ministry of Agriculture and Cooperatives and related ministries of the Government of Zambia. Members of the advisory-committee of JICA are greatly acknowledged for valuable comments for the study.

Very truly yours,

Akira Yamamoto
Team Leader
The Study on the Master Plan for Promotion of Irrigated Agriculture
For Smallholders in the Peri-Urban Area
the Republic of Zambia




**Location Map of the Study Area**




**Location of Existing and Potential Irrigation Schemes**

## Workshop

The workshop held at Kalulushi DACO office in Kalulushi city.

The workshop held at Kabwe DACO office in Kabwe city.

The workshop held at the conference room of House of Excellence Guest House in Kafue city.

The workshop held at the conference room of Livingstone Lodge in Livingstone city.

## Farm Management

Intercropping maize and pumpkin in the Chunga Irrigation Scheme in Lusaka district

Upland field on bank area of dambo. Ridges are arranged as perpendicular to the direction of slope (Kabwe District, Central Province).

Small scale gardens are utilized upon soil water regime over transient topo-sequences of dambos (Kabwe District, Central Province).

Smallholders manage their small gardens (nursery) for different crops using microirrigation-measures (Kalomo District, Southern Province).

Kraal for cattle (top-left) and on-ground livestock manure under decomposition process (left). Composted manures are applied to garden soil by surface broadcasting method (top). All photos were taken in Southern Province.

Gardens cropped with greenbeans in Chipapa irrigation scheme (Kafue District). Earthen open channels (L=250m approx., 25 lines) are used for gravitation irrigation over the gardens.

# Marketing



Chisokone Green Market (Kitwe, Copperbelt Province): One of the biggest and the most commercialized market (wholesale/ retail mixed type) for fruit and vegetables in Zambia. Majority of the commodities sold here are imported from other provinces or countries, reflecting deficiency in production in Copperbelt province.

Roadside Market (Chibombo, Central Province):
Main market in Chibombo area. Relatively well organized roadside market. Very little variation in commodities and prices.

"Tuesday Market" (Lusaka):
Open every Tuesday under shed. Sellers are mostly traders who procure commodities for sale from farmers, other markets, etc.

Marketeer's Cold Storage (Livingstone, Southern Province): Owned by one (1) marketeer who makes a linkage with farmers' groups.

Local township market (Chibombo District, Central Province): Facility is simply constructed with RC for floor and display tables; corrugated metal sheet for the roof. Typical produce such as tomatoes, impwa, onions, rape and cabbage are sold.

## Irrigation / Water Management

Chipapa Irrigation System (Kafue District)
Reservoir and dam body

Irrigation canal and division pit
Water is diverted by closing with earth materials.

Dambo area in the Chibombo District
Dambo area is covered with grass. The area is suitable for farming

Treadle pump (1)
Not suitable for women

Treadle pump (2)
Improved on operatability

Movable engine pump
A few farmers use engine pump

Waya Irrigation Scheme (Kabwe District)
Vegetables are planted in the spot holes. This method is identified as a water harvest method.

Bwafwano Irrigation Scheme (Kalulushi District)
Earth canal was well maintained by the farmers Group.

Waya Irrigation Scheme (Kabwe District)
Vegetables are planted in the farm bed to minimize irrigation water.

Waya Irrigation Scheme (Kabwe District)
Farm bed method is recommended where farm area has certain slope to mitigate surface erosion by rain.

# Farmers' Organization

Explaining SWOT (Strength/Weekness/Opportunity/Threat) analysis on cooperative management to the staff of DACO & PACO in Lusaka Province (Work shop in PACO office in Lusaka).

PRA (Participatory Rural Appraisal) workshop at Nkandabwe irrigation scheme of Sinazongwe District (left) and Chunga irrigation scheme of Lusaka District. Participants are discussing the definition of Rich and Poor in their communities.





Matching Meetings were conducted between farmers' groups and marketers in 4 candidate districts for implementation of the Action Plan (A; Kalulushi, B: Kabwe, C: Lusaka and D: Kazungula/Livingstone). Farmers' groups and marketers joined the meetings for exchanging opinions among the stakeholders.

# Executive Summary

## 1. Rationale:

Recently, urbanization is advancing in Zambia, and the large scale farmers and enterprises cultivate horticultural crops and industrial crops such as sugarcane in the peri-urban area of big cities, and sell them to the city zone areas. Even in the areas where irrigation facilities are available, the agricultural productivity of smallholders is low, since stable water usage is difficult due to inadequate operation and maintenance of these facilities. Most of the smallholders are often restricted to low selling price of products due to individual and small dealings of farm products, although they are located in areas which have a good accessibility to the peri-urban market.

Recognition of agriculture as business is indispensable for farmers and farmers' groups to promote small scale irrigated agriculture towards commercialized farming. To realize the above point, it would be important to; 1) set market oriented approach in the base and 2) formulate program and participatory planning based upon the needs by farmers. Throughout the process, a keynote of the proposed projects is to shift farmers' behavior from "sell after production" to "production for sell".

The proposed Master Plan will establish and expand the model areas for commercial small-scale irrigated agriculture by smallholders in the different marketing zones along the line of rail from Copperbelt in the North to Livingstone in the South.

## 2. Concept of the Master Plan

### 2.1 Vision

The vision of the Master Plan is to enable smallholders in the peri-urban area to conduct sustainable and commercial irrigated agriculture and thus increase their productivity by making full use of advanced accessibility to markets etc. For this vision to realize it is invaluable to introduce practicably an irrigated agriculture based on market needs and therefore necessary to shift from "grow then sell" to "grow to sell" as a market oriented approach.

### 2.2 Objective and Target Area

The objective of the Master Plan is to contribute to poverty reduction of smallholders in the peri-urban area as well as to increase their productivity through promotion of irrigated agriculture.

The Master Plan targets the peri-urban area along the line of rail where the potential for marketing and irrigation are high. Both existing small-scale irrigation schemes and other potential sites are included.

### 2.3 Planning Period and Component of the Master Plan

The Master Plan, to be entitled, "Master Plan 2012-2020" provides a road map for development over a 9-year period and an "Action Plan 2012-2015" with 4 years implementation period in early stage.

The early stage of the Master Plan, the 4-year period (2012-2015), aims to establish models

of commercial small-scale irrigated agriculture upon implementation of pilot projects. Experiences and lessons learnt from the pilot projects shall be fed back to be summarized as a technical package to be utilized for the implementation of the following Master Plan. Termination of the Action Plan is scheduled for 2015 to coincide with the ending year of the SNDP.

## 2.4 Strategy for Development of Small-Scale Irrigated Agriculture

### (1) Phased Development Process

The Master Plan involves a stepwise process as indicated by the Irrigation Policy and Strategy 2004 (MACO) and it includes; 1) preparing the environment, in the early stages, for empowering farmers' group, participatory planning by beneficiaries, improving market access including information service, information transmission and reception, and setup of extension unit, 2) implementation of upgrading measures for existing irrigation schemes and informal irrigation areas upon progress of the environment preparation in 1), 3) monitoring and evaluation of activities in the existing schemes followed by dissemination and scale-up in similar areas based on the lessons, and 4) formulation and implementation plan of project based on experiences for the potential areas newly identified.

### (2) Formation of Leading Models: Selection & Intensification of Area for Irrigated Agriculture Development

The pilot projects emphasize formulation of leading models by selecting target areas and related development approaches from the view of sustainability and intensifying investments to those areas. Moreover the projects prioritize approaches which only require simple maintenance of irrigation facilities etc and less cost on it to ensure that sustainable irrigated agriculture is possible. High potential areas qualified for efficient small scale investment and demonstration shall be selected as the sites for the pilot projects.

### (3) Capacity Building of Farmers

Recognition of agriculture as business is indispensable for farmers to promote small scale irrigated agriculture towards commercial farming. To realize this , it is important to; 1) include a market oriented approach in the base and 2) formulate program and participatory planning based on farmers' needs. Herein the capacity building that meets with the above two points are significant.

## 3. Study Area

The study area is located in the line of rail from Copperbelt in the North to Livingstone in the South. The type of farming varies along this North to South line. It can be found that the marketing destination area of vegetables by smallholders follows several tendencies. These tendencies make the study area divided into 5 zones. The current situation and the direction promotion of small-scale irrigated agriculture by zone are summarized as follows.

### (1) Zone 1 : Cooperbelt Zone

- Zone has abundant water resource as contributions from affluent basins draining into Kafue River
- Zone holds vast consumers within Ndola and Kitwe areas etc., and huge demands arising from the new mine industrial area, North Western Province as well as DR. Congo.
- More than 80 % of the total population of the province settles in urban area whereas potentials

for farm land, water resource and marketing are not fully utilized.

- Promotion of local production upon reduction of import is expected by utilizing lowland areas or perennial streams, and constructing simple diversion weirs and hence formation of irrigation areas.
- Establishment and expansion of a model for small-scale irrigated agriculture; a model applicable to the zone and targeting "quality improvement and production increase" to compete with imported products.

### (2) Zone 2 : Kabwe Zone

- Zone covers wide range of wetlands with shallow groundwater depth in the dry season period over the skirts of Kabwe township area. Many small-scale dams exist around its suburb region.
- Zone is characterized by its high self-sufficiency rate of agro-product. Huge amount of products are gathered into three major markets in Kabwe town while surplus of products distributed over the district are redistributed to other provinces via those markets.
- Smallholders yet suffer from poor market development in the suburb of Kabwe. Improvement based on marketing initiatives such as collective assembly of product for persistent marketing channels as well as partnership between farmers and marketers, and production for small amounts and multi-products is necessary.
- Establishment of the model in local city market area will be emphasized.

### (3) Zone 3 : Lusak Zone

- Zone covers the largest marketing center in Zambia. In addition, huge potential exist for various players; super markets, processers, numerous marketers for the smallholders as producers.
- In this zone, existing small-scale dams and their stored water are efficiently utilized contrary to other zones. There is, however, unsteady rainfall condition, requiring use of stored water to be more effective.
- Smallholders can appreciate many marketing opportunities from several channels with demand while facing competitive situations among farm enterprises, large-scale farmers and emerging farmers. Most of these smallholders fail to utilize their favorable environment and remain as individual minute sellers and confine themselves to production targeting only typical highly demanded crops.
- Empowerment of famers' organization, efficient uses of existing small-scale dams promoting highly competitive brand products are necessary for the zone to fully take advantage of its high market potential.

### (4) Zone 4 : Choma Zone

- Zone is characterized with topographical location of production area and market areas scattered over Lusaka, Livingstone and other local markets.
- Smallholders cultivate their small-sized field with fresh vegetables using water source from small-scale dams and lowland swamps outside the town suburbs, whereas large-scale famers irrigate their farms vastly using pumped-up groundwater along the railway area.
- Potential of water resource is similar to Zone 5.
- Marketing strategy employs the partnership between farmers and marketers to obtain stable marketing channels as similar to the case in Zone 2. Irrigation strategy uses the model of

small-scale dam utilization that is applicable to Zone 5.

### (5) Zone 5: Livingstone-Kazungula Zone

- Annual average precipitation is less than 800mm in the zone. Many small-scale dams have been constructed in the past; however, most of these dams are not fully utilized as water intake systems are not maintained.
- Zone is located on high potential area for marketing with demands for large consumption area of Livingstone with its tourist hotels or lodges and cross boarder trading.
- Smallholders, as individual sell base, try out cropping highly demanded vegetables; however, appear not to fully utilize the market potential. Quality controls, strategic production for niches in tourist facilities and cross boarder trading are keys for Zone 5.
- Rehabilitation of existing small-scale dams for water-intake facilities and irrigation canals is necessary to use full beneficial areas.

## 4. Master Plan

### 4.1 Components

The components implemented in the Master Plan (M/P) which are set up based on the analysis of present conditions, are as follows;

Component 1: Farm management/Cropping

a) Introduction of appropriate cropping system
b) Implementation of strategic cropping
c) Improvement of cultivation technology

Component 2: Distribution and Marketing

a) Promotion of collective marketing by use of multi-purpose shed
b) OJT for strengthening of practical marketing skill smallholders
c) Technology transfer to district officers through OJT
d) Trail of road side market

Component 3: Irrigation and water management

a) Lining of the irrigation canal with concrete
b) Effective use of impounding water (existing dam) for irrigation
c) Dambo and swamp area development with groundwater use
d) Expansion of an irrigable area with efficient irrigation water supply

Component 4: Farmers Organization

a) Strengthening of marketing ability
b) Enhancement of support system for farmers' organization
c) Formulation of Registered Cooperative
d) Strengthening of Water Users Associations

Component 5: Capacity Development

a) Technical transfer to Government technical officers
b) Capacity development of farmer's leaders, staff of cooperatives

### 4.2 Model Programs

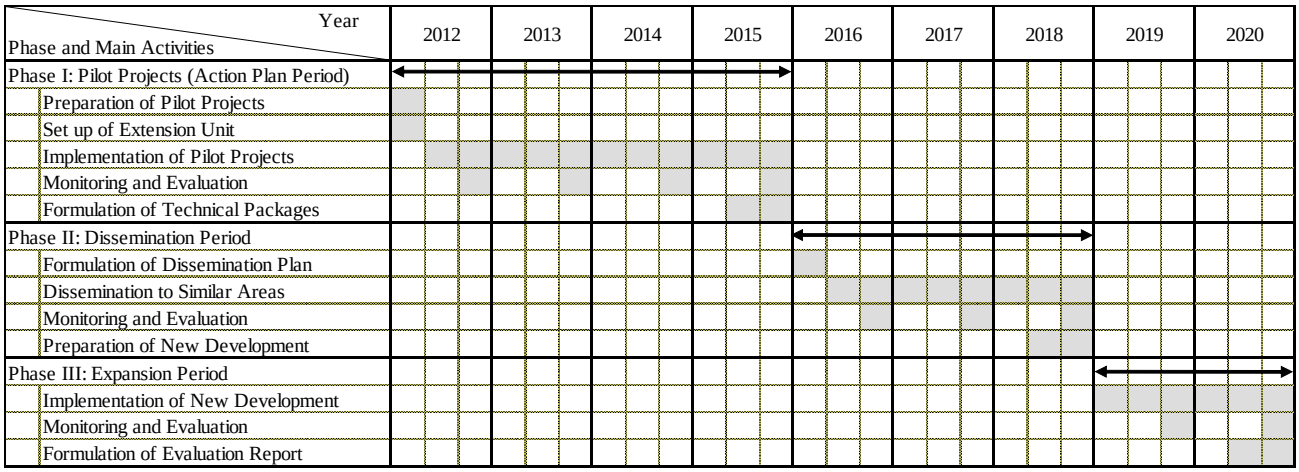
The M/P proposes three model programs that implement small scale development and are integrated with the components mentioned above, namely farm management/cropping, distribution and marketing, irrigation and water management, farmers' organization, and capacity development. Three model programs proposed in the M/P are one of the models which indicate the directionality of small scale irrigated agriculture on the targeted areas.

| Program | Target area and objectives of model projects |
|---|---|
| 1. Small scale irrigated agricultural model project in the surroundings of Lusaka city | ＜Target Area＞: Zone 3<br>＜Objectives＞<br>The suburb of Lusaka has a high potential on marketing while there is also a severe competition. The project aims to develop an advancement model on small scale irrigation agriculture within the suburbs of large cities, by strengthening farmers/farmers 'associations and rehabilitating of the irrigation facilities. |
| 2. Vegetable Complex Promotion Project | ＜Target Area＞: Zone 1, Zone 2<br>＜Objectives＞<br>In order to benefit from a high potential water resource in the irrigation areas, the project aims to bring about a model for developing a vegetable complex, by initiating consistent production and improvement on product quality.<br>Also, in order to benefit from a high marketability and water potentials within the same zone, a model on small scale irrigation agriculture needs to be developed. This would provide a possibility to prepare a systematic cultivation base and also to produce high value (quality) products to satisfy the demands within and out of the state. |
| 3. Irrigated agricultural project with water source of the existing small scale dam | ＜Target Area＞: Zone 4, Zone 5<br>＜Objectives＞<br>Several small scale dams exist in Zones 4 and 5. The project aims to develop and propagate a model on the existing small scale dams to be reused in irrigation. |

## 5. Implementation of Master Plan

### 5.1 Phased Development

The M/P consists of three development phases.



### 5.2 Implementation Organization

#### (1) Counterpart Organizations

MACO is responsible for coordinating the project implementation organization in accordance with the project components. A Project Management Committee (PMC) shall be established to coordinate the overall project activities. The related Departments of MACO take the initiative in each sub program, namely DPP, DOA, DOC and DOAM. The DPP (Department of Policy and Planning) is responsible for the review of the project design and budget allocation plan from time to time as the planning section.

#### (2) Extension Support

The project is composed of various agricultural fields, i.e., farm management, marketing, irrigation and farmers' organization. It is therefore essential to create favourable environment to reinforce a Cross- Sectional Supporting Unit in each responsible DACO offices with intense collaboration with related departments in the MACO Headquarter (H/Q) .

### 6. Financial Plan

The project cost is estimated in 4-year A/P period and consecutive 5-year in the M/P. The numbers of sites are 3～4 for the A/P and 20 for the latter half of the M/P. The project cost is categorized into employment cost for MACO specialists/ engineers and input materials and labour costs for project activities. The local budget of MACO is allocated to the extent possible to the employment cost for capacity development of MACO staff, technical transfer of farming skill to the farmers and capacity development for marketing acquirement.

Project Cost (Unit: ZMK million)

| | Phase | Initial phase (A/P) | Intermediate/ final | Total |
|---|---|---|---|---|
| | Period | (4 years) | (5 years) | (9 years) |
| 1. | Employment cost | 11,469 | 5,645 | 17,114 |
| | 1.1 International experts | (9,100) | (1,020) | (10,120) |
| | 1.2 MACO experts, engineers | (2,369) | (4,625) | (6,994) |
| 2. | Operation cost for seminar, etc. | 492 | 535 | 1,027 |
| 3. | Agricultural equipment, materials | 240 | 1,500 | 1,740 |
| 4. | Construction cost | 3,724 | 12,765 | 16,489 |
| 5. | Administration cost *2 | 71 | 140 | 211 |
| 6. | Transportation cost | 1,016 | 1,795 | 2,811 |
| 7. | Office tools, materials | 114 | 725 | 839 |
| Total cost | | 17,126 | 23,105 | 40,231 |

### 7. Prospected Benefits

Direct beneficiaries are the small-scale farmers in peri-urban areas. With development of irrigated agriculture, small-scale farmers would increase vegetable production, become more efficient in land usage, and volume of sales and profits would finally increase by using proposed countermeasures. In addition to those benefits, improvement of management ability for irrigated agriculture, diversification of crops by irrigation, creation of a business chance by an activity of the

cooperative, and finally establishment of job opportunity by project activities are expected. The specific benefits are prospected through the M/P as follows;

- Benefits from crop rotation and organic fertilizer application
    1) Land restoration
    2) Protection from agricultural disease and pest
    3) Reduction of farm input cost
- Benefits from Contract farming
    1) Reduction of sales loss by contract farming and stable sales
    2) Production of specialty produces (Local brand)
- Benefits from improvement of farming practice
    1) Stable productivity
    2) Quality improvement
- Benefits from Collective Marketing
    1) Reduction of farmers' postharvest handling and shipment cost
    2) Reduction of marketers' cost for handling and transportation cost
    3) Increase of farmers' bargaining power
    4) Establishment of the linkage between farmers and marketers
- Benefits from the strengthening of practical marketing skill
    1) Market-oriented production is attained.
    2) Securing and expanding of marketing channels
    3) Enhancement of district officers' extension ability to support farmers
- Benefits from rehabilitation of the irrigation facilities
    1) Increase of farm production by sufficient water supply
    2) Cost down of irrigation canal maintenance cost
- Benefits from surface water use
    1) Increase of irrigable area by irrigation water supply
    2) Reduction of workforce for water lifting
    3) Promotion of initiative of collective maintenance of the irrigation facilities by farmers
- Benefits from improvement of water management skill
    1) Increase of farm production accompanied with high irrigation efficiency
    2) Capacity building on operation and maintenance skill of the irrigation system
- Benefits from the strengthening of farmers' organization
    1) Increase of farmers' incentive toward commercial farming
    2) Promotion of organized activities on decision making and business
    3) Promotion of registered cooperative as a business entity
    4) Improvement of new or existing cooperatives' organization management skill
    5) Reinforcement of government support for commercial activity of smallholder farmers

## 8. Action Plan

In the Action Plan, Pilot Projects will be implemented as model projects the first half of the M/P. Pilot Projects will be implemented in a 4-year-period from 2012 to 2015.Three to four sites will

be proposed.

### 8.1 Role of the Model Sites

Pilot Projects are expected to bring about exhibition-effect as the model for small-scale irrigated agriculture established on individual potentials for each Zone.

- Monitoring activities will be implemented as the monitoring verifies how potentials are utilized for each zone. Experience and projects effect will be summarized.
- Development process will be summarized in manual as technology package to facilitate application of the obtained experience to similar areas.

### 8.2 Selection of Model Sites

Model sites will be selected among high model potential sites in both the existing irrigation schemes and irrigation potential sites.

Outline of the Model Sites

| Site | District | Province | Beneficiary Area (ha) | Beneficiary (household) |
|---|---|---|---|---|
| 1. Chipapa Irrigation Scheme | Kafue | Lusaka | 7.5 | 120 |
| 2. Bwafwano Irrigation Area | Kalulushi | Copperbelt | 90 | 176 |
| 3. Natuseko Irrigation Area | Kabwe | Central | 20 | 76 |
| 4. Mulabalaba Irrigation Scheme | Kazungla | Southern | 5.5 | 64 |

Note: Beneficiary area and beneficiaries are in real figures.

### 8.3 Proposed Pilot Projects

(1) Small Scale Irrigated Agriculture Project for Promoting Brand Crops

【Target group】Chipapa Dam Garden Community in Kafue District, Lusaka Provence

【Brief overview】: Forming the model area for irrigated agriculture with promotion of value-added products including promotion of brand, packaging and small scale processing etc. Zone 3 holds urbanized big market of Lusaka city.

(2) Vegetable Complex Promotion Project (Zone 1)

【Target group】Bulimi Cooperative / Tiwonge Multi-Purpose Cooperative /Tusheni Cooperative in Kalulushi District, Copperbelt Provence

【Brief overview】: Forming the model area with advanced horticulture production in which quality control, planned production /marketing and value added activities are manageable by utilizing multipurpose sheds to compete with imported products and other production areas. Zone 1 holds diverse huge demand of agro-products.

(3) Vegetable Complex Promotion Project (Zone 2)

【Target group】Moto-Moto Gardening Group in Kabwe District, Central Provence

【Brief overview】: Forming the model area to promote efficient marketing surrounding local city markets in usage of dambo area in Zone 2. The smallholders target on both of local city markets and big markets such as Lusaka/Ndola etc.

(4) Irrigated Agricultural Project with Water Source of Existing Small Scale Dam

【Target group】Mukamba Multi-Purpose Cooperative Society in Kazungula District, Southern Province

【Brief overview】: Forming the model area to promote efficient use of small-scale dams within Zone 5. The smallholders target on tourist hotels in Livingstone Township, demands arising from within the Districts, and cross boarder trading for selling their products.

## 9. Conclusions and Recommendations

### 9.1 Conclusions

(1) While large scale farmers and enterprises in the suburb of city are cultivating horticultural and industrial crops to sell in the urban area, small scale farmers in the area with even usable irrigation facilities have low productivity with inconsistent production. Majority of these small scale farmers are independently selling their products and since there is less option on sale destination, selling price is low.

(2) Through study items such as “analysis on farmers’ organization” and “analysis on existing good practices made by cooperatives and farmers’ groups”, farmers taking agriculture as a business were confirmed even from the farmers’ organizations which had made small scale farmers as their main subjects. One can read as “an example which has achieved the merits on collective selling of agricultural products”, “an example of farmers with a business mind cooperated with their partnership farmers”, and “an example of the farmers’ organization cooperated with maketeers”.

(3) Additionally, “Matching meeting between farmers’ organizations and marketers” was held in this study. As the results of monitoring show, the merits on both sides were recognized and, most of all, both sides continued to exchange information.

(4) In the study area, there are many swamps, dambos and small to middle scale dams exist with a high potential to secure water for irrigation during the dry season.

(5) Some small-scale irrigation schemes have utilized rivers and dams as water sources and pump systems (electric pumps) to lift water. However, these schemes are currently not functioning as the majority of the benefited farmers are not capable to afford electricity charges.

(6) The proposed M/P has a set vision to “realize the smallholder irrigated agriculture based on market needs by small scale farmers”. In order to fulfil this vision, the M/P proposes to apply countermeasures such as “farm management”, “Marketing”, Irrigation and water management”, “Strengthening of farmers’ organization and “capacity development”, in order to comprehensively support the existing irrigation areas as well as the areas with a high potential in irrigation.

(7) Taking into consideration that good management has not been made in many conventional irrigation development areas, the M/P has set forth to develop models on small-scale irrigation. During the first half of the M/P, an appropriate and practical methodology will be developed for the models through the pilot projects, while in the second half, this methodology will be spread and developed in similar areas.

## 9.2 Recommendations

(1) The Government of Zambia highly values the initiative taken by the Agricultural Sector to promote irrigated agriculture through the assistance of small-scale farmers. Additionally, the Government considers important to solve the problems of small scale farmers through market-oriented farming and measures and policies geared toward strengthening farmers' association. Therefore, the content of the M/P proposed in the investigation is in line with the above. Thus, it is recommended to apply the M/P as a "small scale farmer assistance measure".

(2) The M/P indicates a direction for improving the productivity of small farmers who cannot fully take advantage of high market accessibility and irrigation potential. The M/P aims to promote small scale irrigated agriculture as a business model. In order to shift to irrigated agriculture as a business model, it is essential that farmers make decisions by themselves. Based on this consideration, referring to lessons learned and innovative activities obtained through research and analysis of outstanding farmers and farmers' organizations, capacity development training of farmers and farmers' organizations are taken in the M/P. Since vegetable production and distribution are left to market mechanisms namely competition, solution to improve productivity is not only one. Therefore, the M/P should focus on capacity development through training of farmers and farmers' organizations.

(3) The pilot projects to be implemented in the first half of the M/P aim in developing models of small-scale irrigated agriculture in different zones of the peri-urban area. Therefore, while rehabilitating the existing irrigation facilities, training farmers/famers' organization, developing capacity on marketing and providing technical assistances are essential activities to be undertaken in the pilot phase. Consequently, the Ministry of Agricultural and Cooperative needs to urgently request international technical assistances, especially for the activities which require technical supports related to capacity development.

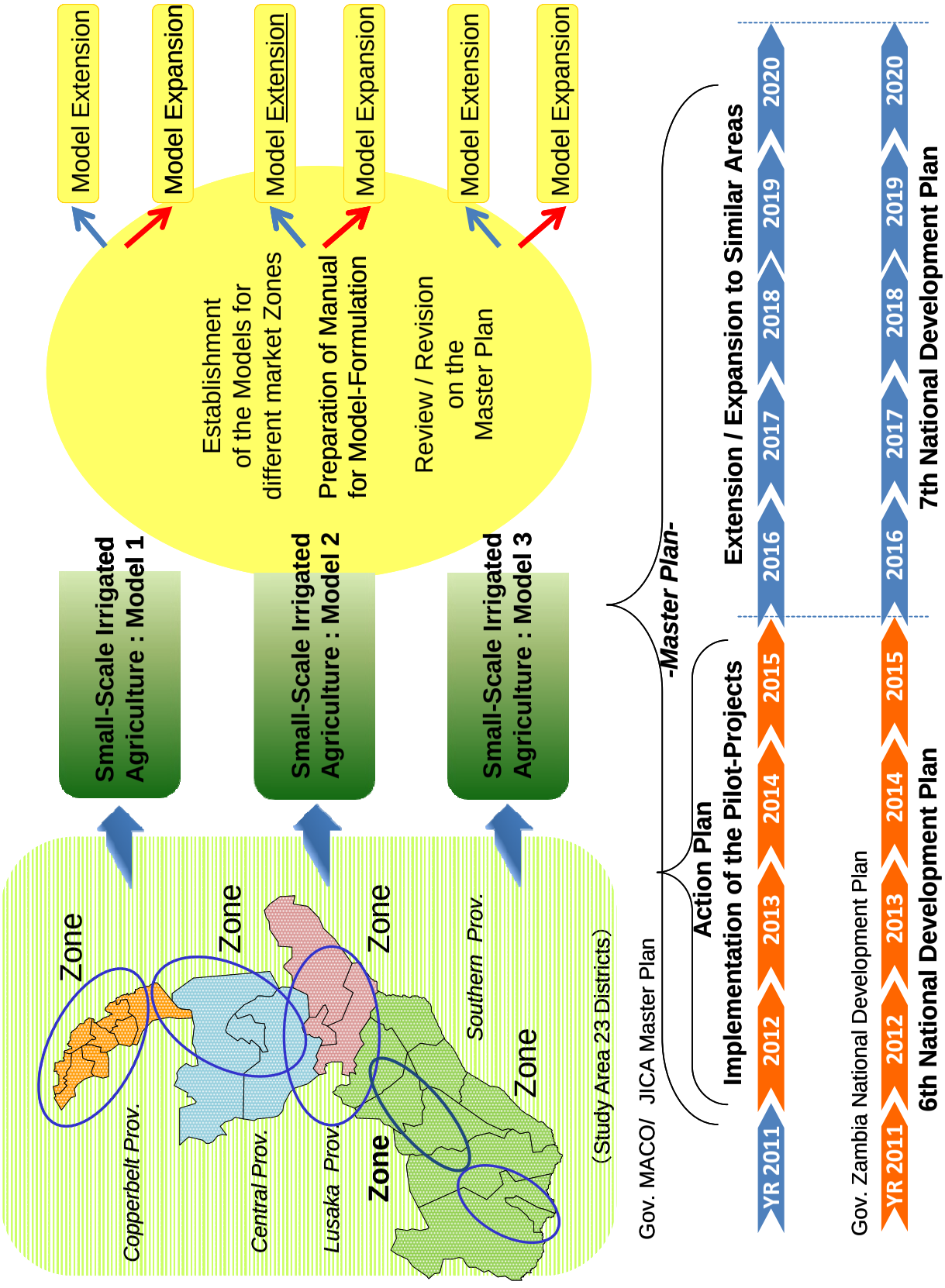
(4) The M/P is drawn up from the views mentioned above. The followings should be considered when implementing the M/P.

1) The M/P seeks to achieve project benefits gradually and efficiently, focusing on the linkage of the comportments of the value chain such as production, transport and market etc. The government is required to provide the necessary assistances in capacity development as related to farming and irrigation technologies and market information to farmers' organization.

2) Members and non-members of cooperatives and water users' associations are mixed in the irrigation schemes. It is necessary to promote collective activities for sustainable development of the project. It is indispensable to trigger project benefits, making facility maintenances easy and promoting collective product selling in the pilot projects, to raise the farmers' motivation to participate in the farmers' organization.

3) Dams and intake weirs are related to the irrigation water source; however, the majority of these facilities are neither well maintained nor managed properly at present. To make the water resources sustainable, the Government is asked to provide financial and technical support, and also to apply maintenance and repair works.

4) Irrigation development, constrained by unstable water resources and traditional land utilization system, needs to provide farmers with guaranteed water for irrigation and land usage rights. The initiatives of agricultural industries and the development of markets by farmers are expected to rise, provided that secured water resources and guaranteed cultivation rights are enabled by government through the “Construction of agricultural complex”.




**Implementation Plan of the M/P**

# The Master Plan for Promotion of Irrigated Agriculture for Smallholders in the Peri-Urban Area in the Republic of Zambia

## Final Report (Main Report)

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## Chapter 6 Action Plan

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## Abbreviation

| Abbreviation | Name |
|---|---|
| AfDB | African Development Bank |
| AMDP | Agriculture Market Development Plan |
| ASP | Agriculture Support Programme |
| BEO | Block Extension Officer |
| CEO | Camp Extension Officer |
| CLUSA | Cooperative League of USA |
| COMESA | Common Market for Eastern and Southern Africa |
| C/P | Counterpart Personnel |
| CSO | Central Statistical Office |
| DACO | District Agricultural Coordinator |
| DAO | District Agricultural Officer |
| DMDO | District Marketing Development Officer |
| DRC | Democratic Republic of Congo |
| ECZ | Environmental Council of Zambia |
| EDP II | Export Development Programme II |
| EIA | Environment Impact Assessment |
| EIZ | Engineering Institute of Zambia |
| EPOPA | Export Promotion of Organic Products from Africa |
| ERB | Engineers Registration Board |
| EU | European Union |
| FAO | Food and Agriculture Organization |
| FNDP | Fifth National Development Plan |
| FoDiS | Food Crop Diversification Project |
| FRA | Food Reserve Agency |
| F/S | Feasibility study |
| GIS | Geographic Information System |
| GOZ | Government of Zambia |
| GPS | Global Positioning System |
| IDA | International Development Association |
| IDF | Irrigation Development Fund |
| IDP | Irrigation Development Project |
| IFAD | International Fund for Agricultural Development |
| JASZ | Joint Assistance Strategy for Zambia |
| JICA | Japan International Cooperation Agency |
| MACO | Ministry of Agriculture and Co-operatives |

| Abbreviation | Name |
|---|---|
| MATEP | Market Access, Trade and Enabling Policies Project |
| MIS | Market Information System (MACO) |
| M/M | Minutes of Meeting |
| MOH | Ministry of Health |
| MPS | Multi-Purpose Shed |
| NAP | National Agricultural Policy |
| NGO | Non-Governmental Organizations |
| NIP | National Irrigation Plan |
| PACO | Provincial Agricultural Coordinator |
| PAO | Provincial Agricultural Officer |
| PaViDIA | Project for Participatory Village Development in Isolated Areas |
| PROFIT | Production, Finance and Improved Technologies Project |
| PRPEP | Project for Reduction of Poverty in Eastern Province |
| RSM | Roadside Market |
| SADAFS | Support to Agricultural Diversification and Food Security in West and North West Zambia |
| SAO | Senior Agricultural Officer |
| SEA | Strategic Environment Assessment |
| SIDA | Swedish International Development Cooperation Agency |
| SIP | Small-Scale Irrigation Project |
| SMS | Subject Matter Specialist |
| SMS | Short Message Services in Mobile Phones |
| SNDP | Sixth National Development Plan |
| S/W | Scope of Work |
| TSB | Technical Service Branch |
| USAID | United States Agency for International Development |
| WB | World Bank |
| WUA | Water Users Association |
| WWF | World Wildlife Fund |
| ZESCO | Zambia Electricity Supply Corporation |
| ZMK | Zambian Kwacha |
| ZNFU | Zambia National Farmers' Union |

Unit

| Unit | | Unit | |
|---|---|---|---|
| ZMK | Zambia Kawacha | lima | 0.25 ha |
| m/s | meter/second | ha | hectare |
| $km^2$ | square kilometer | acre | =0.4 ha |
| $km^3$ | cubic kilometer | | |

Exchange rate as of March 2011

(Source: Japan International Cooperation Agency)

US$ 1.00 = ZMK 4,808

ZMK1.00 = JP¥ 0.017

# Chapter 1 Background and Objectives of the Study

## 1.1 Background of the Study

In the Republic of Zambia, the population living under the poverty line occupies approximately 70 % of the total population, who is mostly smallholders, having a land area of less than 5 ha. About 90% of the annual rainfall, equivalent to 1,000mm is concentrated during December to March. Because of the uneven rainfall pattern, many farmers fall into serious food deficit due to unstable agricultural production. The country has a potential irrigation area of 420,000 ha, and the irrigation development potential of farmland is high, but only 150,000 ha of the land area is developed. The improvement of productivity of the smallholders through promotion of irrigated agriculture is urgently needed from the viewpoint of poverty reduction, food security, and economic development.

Recently, urbanization is advancing in Zambia, and the large-scale farmers and enterprises cultivate horticultural crops and industrial crops such as sugarcane in the peri-urban area of big cities, and sell them to the city zone areas. Even in the areas where the irrigation facilities are available, the agricultural productivity of smallholders is low, since the stable water usage is difficult due to inadequate maintenance and management of irrigation facilities. Most of the smallholders are often restricted to low selling price of products due to individual and small dealings of farm products, although they are located in areas which have a good accessibility to the peri-urban market. In these circumstances, it is necessary to grasp the market information, and promote a suitable farming type based on the market needs, and form the farmers group so as to increase their bargaining power through the dealing with the large quantities of farm products. For this purpose, it is necessary to establish a market information collection and delivery system, and strengthen the agricultural extension services related to new activities. In order to deal with the peri-urban area, formulation of a comprehensive Master Plan for productivity improvement of the smallholders is required through various measures such as promotion of irrigated agriculture and organization of farmers based on the market information.

## 1.2 Objectives of the Study

The overall goal of the Study is to contribute for poverty reduction through the promotion of commercial irrigated agriculture among smallholders in the Peri-urban area. The objectives of the Study are as follows:

1) To formulate a Master Plan with Action Plans to promote commercial irrigated agriculture of smallholders in the peri-urban area.
2) To carry out capacity development of the Zambian counterpart personnel through on the job training in the course of the Study.

## 1.3 The Study Area

The Study area of the M/P shall cover the districts which lie around the railway rail. The list of the targeted districts is as follows.

Table 1.3.1 The Study Area of the M/P

| Province (No.of Districts) | District | Area($km^2$) and Population | Features |
|---|---|---|---|
| Copperbelt Province (8) | Masaiti<br>Luanshya<br>Ndola<br>Kitwe<br>Mufulira<br>Kalulushi<br>Chingola<br>Chililabombwe | 13,000 $km^2$<br>1,958,623 | ・ Copper production motivates local development.<br>・ High population density: 39.6 man/$km^2$)<br>・ Rate of farm household: 54.4% |
| Central Province (3) | Chibombo<br>Kabwe<br>Kapiri Mposhi | 32,000 $km^2$<br>1,267,803 | ・ Kabwe, capital city of the province has a population of 180,000.<br>・ Main national road connecting Lusaka and Copperbelt Province has heavy traffic.<br>・ Kapiri Mposhi is strategic point connecting to Northern Province and Tanzania |
| Lusaka Province (3) | Kafue<br>Chongwe<br>Lusaka | 18,000 $km^2$<br>2,198,996 | ・ Various farming including vegetable in peri-urban area of Lusaka.<br>・ Largest Soweto market<br>・ Most of farmers are merging farmers |
| Southern Province (9) | Livingstone<br>Kazungula<br>Kalomo<br>Sinazongwe*<br>Choma<br>Gwembe*<br>Monze<br>Siavonga*<br>Mazabuka | 64,000 $km^2$<br>1,606,793 | ・ Composed of plateau (80%) and valley area along Kariba Lake (20%)<br>・ A fertile area spreads on plateau with annual precipitation of about 1,000 mm<br>・ Semi-arid condition in valley area with annual precipitation of less than 800 mm. |
| 4 Provinces | 23 Districts | 127,000 $km^2$<br>7,032,215 | |

* Sinazongwe, Gwembe and Siavonga are not located in the peri-urban area, but these districts are included based on theirs potential for water resource and marketing. *The population data was sourced from 2010 Census (October) as an open data information released by CSO on 19th February 2011 (CSO web source).*

## 1.4 Expected Output

The final report of the Master Plan study will be submitted for promotion of commercial irrigated agriculture for small scale farmers in the peri-urban area. And, at the same time, formulated Action Plans will be presented which suggest 3 to 4 different types of marketing in different districts as models of small holders' agricultural business.

## 1.5 The Scope of the Schedule of the Study

Schedule of the Study

| Stage | Period | Main Scope of the study |
|---|---|---|
| Phase 1 | | |
| The First Year | | |
| Preparatory (in Japan) | November 2009 | Preparation of the field study and Inception Report. |
| The first field study | November - December 2009 | Presentations and discussions with the counterparts (MACO) for the Inception Report, at the 1st Technical Working Group (TWG) Meeting*, planning of technology transfer for the counterparts, preparation of pamphlets, implementation of the field study and preparation of Progress Report 1. The 2nd TWG Meeting for the Report preparation. Procurement; the local consultants (2) for the surveys on marketing/distribution of agri-produces and natural environment (SEA: strategic environmental assessment). |
| The Second Year | | |
| The first field study | March - May 2010 | Presentations and discussions with the counterparts (MACO) for the Progress Report 1 at the 3rd TWG Meeting, conducting the field study, classification of the study area and field study on potential irrigation areas (including newly identified areas), investigation on selection-criteria of target districts for formulating the Action Plan, farm-management study and investigation of marketing-strategy for the potential irrigation areas including the existing and the new areas, and preparation of Progress Report 2. |
| The second field study | June - September 2010 | Presentations and discussions for the Progress Report 2 at the 4th TWG Meeting. Conducting the field study, preparation of a resource-map, preparation of a draft Master Plan, selection and determination of the target districts for the Action Plan formulation, preparation and related discussions with committee members in Zambia as well as in Japan, continuation of preliminary study for the formulation of the Action Plan. Preparation of Interim Report. Procurement; the local consultant (1) for GIS resource map and database. |
| Phase 2 | | |
| The Second Year (continued) | | |
| The second field study (continued) | October - December 2010 | Presentation and discussion for the Interim Report at the 5th TWG Meeting. Full-scale study for the Action Plan, Workshop on the M/P among stakeholders; MACO Districts' Officers, farmers' groups and the study Team at the A/P model sites. with stakeholders in the Action Plan for formulation of the Action Plan, preparation of a draft final report. Project (M/P & A/P) explanations to International Donner (AgCPG 02/Dec) and NGOs. |
| The first domestic working (in Japan) | January 2011 | Investigation and preparation of the Draft Final Report. Commentary discussion with JICA committee members for Zambia projects. |
| The third field study | February 2011 | Presentation and discussion for the Draft Final Report at the last, 6th TWG Meeting. Meeting with Rural Develop. Dept. / JICA HQs, Revision of the Draft Final Report for Final Report. |
| The second domestic work | March 2011 | Preparation and submission of the Final Report |

** Technical Working Group was set-up for coordination of the Study program within the MACO and its members comprise of various fields including; irrigation/water management, farm management, agribusiness & marketing, farmers' cooperative, environment and thus act as counterparts for the JICA Study Team members. The Meeting was held at MACO Mulungushi House (Lusaka) and jointed also by the JICA Zambia

## 1.6 The Study Approach

In order to attain the objectives of the Study, four (4) basic strategies are proposed as shown below. These basic strategies will be reviewed in the course of the Study, and finalized through the discussions with MACO.

| | |
|---|---|
| Basic Strategy 1: | To formulate the farming and support systems based on the market needs |
| Basic Strategy 2: | To seek new marketing channels and to improve sales methods through the improvement of the distribution of agricultural products |
| Basic Strategy 3: | To increase shipment quantity and to realize profitable prices for the farmers through the promotion of collective sales by farmers' organization |
| Basic Strategy 4: | To stabilize and to increase agricultural production and to adjust harvesting periods through the rehabilitation of the existing irrigation facilities, development of new irrigation facilities and strengthening of O&M capabilities |

The Study will be conducted in accordance with the following seven basic approaches:

**Basic Approach**

(1) Utilization of the results of value chain analyses
(2) Formulation of the farming and support systems based on the market needs
(3) Improvement of the distribution of agricultural products
(4) Promotion of the farmers' organizations
(5) Promotion of the irrigation development
(6) Undertaking of the Strategic Environmental Assessment
(7) Direction of the social consideration

(1) Utilization of the results of value chain analyses

In order to formulate the marketing strategies and the new farming system, the value chain analyses regarding major markets and products will be conducted together with the investigation of the agricultural product flows. Through the value chain analyses, the role of related players in each respective stage and their influences on price formulation will be studied. The strength and weakness of the smallholders at each respective stage will be identified through the comparison of the value chains of successful cases and present smallholders. Based on the comparison, the marketing strategies and the new farming system will be formulated.

(2) Formulation of the farming and support systems based on the market needs

This basic approach corresponds to the fore-mentioned basic strategy 1, and relates to four (4) items:

1) improvement of production technology, 2) improvement of post-harvest treatment, 3) increase of value added agricultural products, and 4) strengthening of farm support system, which are described below.

1) Improvement of production technology

Improvement of production technology should be systemized considering the methods of marketable crop introduction into the present cropping patterns, and the possibility of achievement of product quality required from market. In addition to this, in the study of the introduction of marketable products, its influence on the present self-sufficiency conditions of smallholders will be studied. On the other hand, in the case of small irrigation area to be introduced and/or small labor requirement that makes time to spare, the introduction of labor intensive and highly profitable products will be studied.

2) Improvement of post-harvest treatment

For the introduction of products which causes post-harvest losses, it is necessary to study the level of countermeasures that the farmers and/or farmers' organization can handle.

3) Increase of value added agricultural products

In the peri-urban area, it is expected that sales of perishable products is advantageous. However, the possibility of sales of value added production by farmers' organization will be studied.

4) Strengthening of farm support system

In the strengthening of farm support system, the diversification of the support service will be required. The cross sectional cooperation of relevant organizations is required to provide necessary information for the farmers, such as the combination of the receiving and sending of market information, the activities of farmers' organization and the O&M of irrigation facilities. This information is indispensable for the attainment of the proposed counter measures in the irrigated agricultural areas.

(3) Improvement of the distribution of agricultural products

This basic approach corresponds to the fore-mentioned basic strategy 2, and relates to four (4) items: 1) preparation of market information system, 2) provision of transportation facilities, 3) improvement of transaction manners and 4) standardization and demand driven production and marketing. The contents of these items are as follows:

1) Preparation of market information system

The main advantage of the smallholders is that they are located in the peri-urban area. However, they cannot utilize their opportunity mainly because of the difficulties of receiving information on market prices and the access to information regarding cash crops. Hence, the preparation of the system, that conveys this information to farmers and/or farmers' organization, is necessary.

2) Provision of transportation facilities

The smallholders cannot participate in the determination of sales prices. The background of this problem includes that the middlemen beat down the prices of products at the fields because smallholders do not have their transportation facilities. For the provision of transportation facilities, its possibility considering the capacity and funds of the farmers' organization will be studied.

3) Improvement of transaction manners

Some of the smallholders in the Study area are outgrowers for agricultural enterprises and large scale commercial farmers. However, the others depend on middlemen for their sales. Considering this situation, the increase of farm income will be attained through the improvement of transaction manners, e.g., the strengthening of sales power through collective sales with promotion of farmers' organization, contracting with enterprises and super markets, and promotion of direct sales. For this improvement, the quality and quantity of products that are required by buyers, and the upgrading of technical level and management capacity of farmers and/or farmers' organization are required.

4) Standardization and demand driven production and marketing

Diversification of needs is observed due to the change of lifestyle of consumers. Accordingly, the gap between producers (traders) and consumers will be enlarged. In order to cope with this gap, demand driven production and marketing (production and marketing according to consumer needs) will be one important strategy. In line with this idea, market distribution as well as non-market distribution (direct and/or sales out-grower) will be considered as a distribution system corresponding to consumer needs. For this distribution system, standardization of products may be required from buyers.

(4) Promotion of the farmers' organization

This basic approach corresponds to the fore-mentioned basic strategy 3. The principal objective of the farmers' organization is to introduce collective shipment under the promotion of irrigated agriculture. For smallholders, the merit of the collective shipment is that their position in terms of cost and transaction conditions becomes advantageous. In order to attain this, proposals of the effective and independent management methods of organizations, the effective collection and shipment methods, and the assistance to the GRZ on human resources and financial institution are important.

Regarding the organization management, the rural socio survey and analyses will be conducted placing the weight on the participation incentives, which differ among organization activities by places and groups of cultures, languages and gender. Based on the survey and analyses, the measures on the promotion and activation of farmers' organization activities will be studied from the viewpoint of how to provide incentive system that draw out farmers' contribution.

(5) Promotion of the irrigation development

This basic approach corresponds to the fore-mentioned basic strategy 4, and relates to three (3) items:

1) rehabilitation of the existing irrigation facilities, 2) development of new irrigation facilities and 3) strengthening of O&M capabilities. Attention to these items will be as follows:

1) Formulation of irrigation development plan and prioritized projects

   Irrigation development plan will be formulated based on the agricultural basic policy and plan, like NAP, NIP and IPS. In addition to this, the following items will be considered:

   a) Provision of the infrastructure for the increase of food production so as to cultivate yearly for smallholders
   b) Promotion of irrigated agriculture from rain-fed cultivation (including sustainable utilization of dambos and water harvesting)
   c) Easy O&M of irrigation facilities for water users association
   d) Assessment of irrigation potential considering the strengthening of production, distribution and marketing of agricultural products

2) Assessment of irrigation development potential

   Potentials on the agricultural production, markets and infrastructure, etc. will be studied comprehensively in order to assess the potential of irrigation development. One-sided assessment, which is only based on water resources, irrigation project, etc., will be avoided for this matter.

3) Strengthening of O&M capabilities of water users association

   The strengthening of O&M capabilities of water users association will begin after recognition of their potential capability. Then, their capabilities will be strengthened through the trial and error exertion of the greatest possible effort. In order to carry out these procedures, it is important to identify their problems as well as to think and execute things that they can do for their solutions. To provide them these opportunities is the point regarding to these matters in question.

(6) Undertaking of the Strategic Environmental Assessment (SEA)

SEA is undertaken aiming at the comprehensive environmental assessment from the early stage of the plan in order to attain the sustainable development. To this end, SEA will be undertaken in relation to the formulation of the programs and projects of the Master Plan. For this purpose, a number of discussions will be held through workshops/seminars with the Zambian Government and the related stakeholders (farmers, NGOs, scholars and private firms) from the early stage of the Study. A comprehensive assessment including cumulative influences on the environment, social and economic aspects will be analyzed in the SEA.

(7) Direction of the social consideration

In the formulation of the Master Plan, the following social consideration will be included:

1) Securing of impartiality

   The issues on impartiality and related necessary countermeasures will be discussed at the

workshops/seminars, and the results of the discussions will be incorporated in the Master Plan. The social and economic impartiality of the Study area will be secured through the strengthening of the farmers' organizations (such as possession of common purposes of cooperative works, the readjustment of organization, the provision of rules, the recognition of responsibilities and role division, the establishment of readership and the securing of transparency). The study on this item will be done along the value chain of agricultural activities.

2) Gender issues

The gender issues regarding the division of production and marketing works, the opportunities of social services and trainings and the distribution of profit and debt will be discussed at the stakeholder meetings, and the results of the discussions will be reflected into the Master Plan. In many cases, women in rural areas cannot receive market information and support services due to their illiteracy. The promotion of employment of these women will be included in the Master Plan.

## 1.7 Implementation Arrangement of the Study

The Department of Policy and Planning shall take responsibility for the management of the Study in Ministry of Agriculture and Cooperatives (MACO). A Technical Working Group is organized for the smooth implementation of the Study. The main members of the Working Group are 1) Department of Policy and Planning, 2) Department of Agriculture, 3) Department of Agribusiness and Marketing, and 4) Department of Cooperatives.

# Chapter 2 Outline of Country and Development Policy

## 2.1 General Situation of the Country

### 2.1.1 General

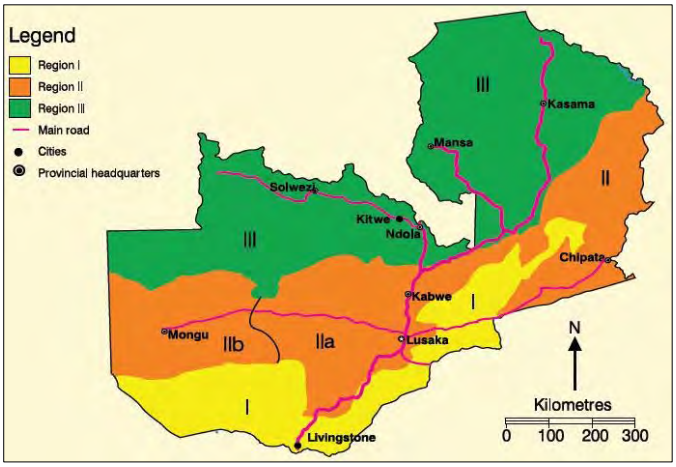
The landlocked Republic of Zambia covers 752,610 km$^2$ between the latitudes 8°15' and 18°7' South of the equator and the longitudes 22° to 34° East of the Greenwich Meridian. The cultivable area is estimated at 16.35 million ha. Almost 5.3 million ha, representing 7 % of the total area and 32 % of the cultivable area, are cultivated including sugar cane, coffee and bananas. About 100,000 ha of dambos or inland valley bottoms (wetlands) are utilized for crop production by small-scale farmers.

The Zambezi valley and Luangwa valley escarpments are mountainous and rocky, while the rest of the country is by and large a level to gently undulating plateau with slopes rarely exceeding 3 to 5 %. Interfluves mostly comprise deep weathered soils, which occupy large tracts of land in the main drainage systems consisting of the Zambezi, Luangwa, Luapula/ Chambeshi and Kafue rivers.

Although lying within the Tropics, much of Zambia enjoys a subtropical climate, which is characterized by two seasons:

- The cool and hot dry season from May to October. During this season rainfall is absolutely absent and full-serve irrigation and wetland utilization become important.
- The wet season between November and April is in every respect characterized by rainfall. December and January/February are the wettest months.

The country has been divided into agro-ecological zones I (Precipitation <800mm/yr), II (*P*: 800-1,000mm/y) and III (*P*: >1,200mm/yr), representing the south, central and northern parts of Zambia respectively and are characterized by the following rainfall pattern. Rainfall totals and intra-seasonal distribution vary greatly from year to year, particularly in the south under the zone I. This makes rain-fed agriculture, which is easily affected by droughts, highly undependable.




Source: Conservation Farming & Conservation Agriculture Handbook (ZNFU, 2007)

Paradoxically agro-ecological zone III with excessive high rainfall has acidic soils due to leaching, limiting crop production. Soils distributed over the zone II are considered the most fertile among three zones.

Zambia's population is about 10.9 million (2004), of which 64 % is rural. The annual population growth rate is about 1.5 %, showing a considerable reduction compared to the 3.1 % registered for the period 1980-1990. Water supply coverage shows that 36 % of the rural population and 90 % of the urban population respectively were using improved drinking water sources in 2000. More than 80 % of the population is believed to be below the poverty datum line. Although the unemployment level

of 18.2 % has decreased to 9.5 %, it has not reduced poverty primarily due to insufficient wages from informal sector jobs. Generally incomes are too low to meet livelihood demands adequately.

Total water withdrawal was 1.737 $km^3$ in 2000, with agricultural water use accounting for 1.320 $km^3$ (77 %), or more than three-quarters of the total municipal water use claiming 0.286 $km^3$ and dwindling industries taking 0.131 $km^3$. Future water use is estimated to reach 1.922 $km^3$/year by 2012, assuming that land under irrigation will continue to expand at the rate of 1,200-1,500 ha/year, industrial use will increase by 10 % and the population will increase at a moderate rate.

Zambia has an installed hydropower capacity of 1 670 MW. The present capacity of the Kafue Gorge dam mentioned above is 900 MW, while the Lake Kariba dam contributes about 600 MW and the Victoria Falls 108 MW. The hydropower stations Northeastern and ZCCM hydropower have capacities of 24 MW and 38 MW, respectively.

### 2.1.2 Economic Condition

The country's GDP was US$4.3 billion in 2002 showing an annual growth of 3 %. The inflation rate of 26.7 % poses a lot of hardships especially for the poor people. Agriculture's contribution to GDP is usually affected by characteristic droughts and was 19.3 % in 2003. The sector has been given top priority, in particular because mining activities have sharply declined and some mines have been closed. The agricultural export potential is enormous considering that it increased from US$46.5 million in 1995 to US$133.9 million in 1999. Out-grower schemes have led to accelerated crop diversification and subsequent commercialization. 80 % of the population is dependent on agriculture, which provides employment for about 70 % of the labor force.

On contrary to this fact, Zambia's economy has experienced strong growth in recent years, with real GDP growth in 2005-08 about 6% per year. Privatization of government-owned copper mines in the 1990s relieved the government from covering mammoth losses generated by the industry and greatly improved the chances for copper mining to return to profitability and spur economic growth. Copper output has increased steadily since 2004, due to higher copper prices and foreign investment. In 2005, Zambia qualified for debt relief under the Highly Indebted Poor Country Initiative, consisting of approximately US$ 6 billion in debt relief. Zambia experienced a bumper harvest in 2007, which helped to boost GDP and agricultural exports and contain inflation. Although poverty continues to be significant problem in Zambia, its economy has strengthened, featuring single-digit inflation, a relatively stable currency, decreasing interest rates, and increasing levels of trade. The decline in world commodity prices and demand will hurt GDP growth in 2009.

Table 2.1.1 GDP in Recent Years

| | 2006 | 2007 | 2008 |
|---|---|---|---|
| 1. GDP | US$15.55 billion | US$16.43 billion | US$17.39 billion |
| 2. GDP growth rate | 6.2 % | 5.7 % | 5.8% |
| 3. GDP per capita | US$1,400 | US$1,400 | US$1,500 |

Source: Zambia Economy 2009, CIA World Fact book

GDP composition by sector is agriculture 16.7%, industry 26% and service 57.3% in 2008. Labor force by occupation is agriculture 85%, industry 6% and service 9% in 2004. Major products of agricultural sector are corn, sorghum, rice, peanuts, sunflower seed, vegetables, flowers, tobacco, cotton, sugarcane, cassava (tapioca), coffee; cattle, goats, pigs, poultry, milk, eggs, hides, and industrial materials are copper mining and processing, construction, foodstuffs, beverages, chemicals, textiles, fertilizer, horticulture.

The export is US$5.632 billion in 2008, composed of copper/cobalt 64%, cobalt, electricity; tobacco, flowers, cotton, to the countries of Switzerland 41.8%, South Africa 12%, Thailand 5.9%, Democratic Republic of the Congo 5.3%, Egypt 5%, Saudi Arabia 4.7%, China 4.1% in 2007. The import is US$4.423 billion in 2008, composed of machinery, transportation equipment, petroleum products, electricity, fertilizer; foodstuffs, clothing mainly from South Africa 47.4%, UAE 6.3%, China 6%, India 4.1%, UK 4% in 2007. Debt is US$2.913 billion in December 2008.

### 2.1.3 Social Condition

Poverty rates have fallen from 68 % in 2004 to 64 % in 2006. However, it is estimated that at least 10 % of the population have very little or no productive capacity and are thus trapped in long term chronic poverty. These include the disabled and households affected by HIV/AIDS. An estimated 75,000 children are living on the streets. Primary education is the area in which Zambia is most likely to meet the MDGs with net enrolment in primary education of more than 90 % and gender parity achieved. This stops the previous long decline in education which has had the effect of showing Zambian men in their 40s are currently better educated than those in their 20s. Also in secondary education achievement rates increased in 2007, especially for girls. In the MTEF government expenditure on education is projected an increase from 15 % of total government expenditure to 15.30 % and an average of 5 000 teachers will be recruited each year.

The highest-growth sectors - mining, construction, financial services and tourism - only employ approximately 1 to 2 % of the population each. The vast majority of the workforce is self-employed (55 %) or employed as an unpaid family worker (26%). Formal private sector employees only account for 9 % of the working population of around 4 million people and government employees for 6 %. There is some indication that formal sector employment declined slightly between 2004 and 2006 and even in urban areas informal employment accounts for 75% % of all employment. However, in Lusaka and the Copperbelt it is less, at around 50 %.

The HIV prevalence rate among adults seems to have reached a plateau at around 17 % of the population. Women and especially young girls have much higher infection rates. Prevalence rates are also higher in urban areas, but while they seem to have stabilized there, they are increasing in rural areas.

### 2.1.4 Agriculture and Food Security

(1) Agriculture

The country’s GDP was US$11 363 million in 2007 and the value added by agriculture was 21.82 % of the GDP in 2006. The sector has been given top priority, in particular because mining activities have sharply declined and some mines have been closed. Eighty (80) % of the population is

dependent on agriculture, which provides employment for about 70 % of the labor force.

In rainfed farming, four farmer categories are distinguished based on land size owned by a respective farmer: i) small-scale farmers owning 0.5-10 ha and food crop oriented; ii) emergent farmers owning 10-20 ha that produce a mix of food and cash crops; iii) medium-scale farmers owning 20-60 ha; iv) large-scale, or commercial, farmers own more than 60 ha primarily producing cash crops. There are about 600,000 small-scale farmers of which 119,200 are emergent farmers. The number of medium-scale farmers is 100 000 countrywide whilst there are 740 large scale farmers with about 200 using irrigation on a commercial basis (World Bank, 2008).

(2) Food security

Zambia portrays a very high level of under nourishment; one out of two persons is undernourished. Both the proportion and the number of undernourished people have increased from 1990-92, benchmark period of the World Food Summit (WFS) and the Millennium Declaration, to 1999-2001, the last period available. Reduced crop production has been attributed to the heavy dependency on rainfed agriculture, which is unreliable due to severe droughts, and thus food deficits, particularly maize, frequently occur.

In 2004 the food import commercial bill of Zambia reached a value of US$ 51 million. The agricultural imports increased over times, showing peaks in occasion of the draughts occurred in 1992, 1993 and 2002 and of the flood which affected the country in 1997-1998. Zambia has always been characterized as a net food importer country, being its food imports clearly larger than its exports. In recent years, nonetheless, this trend inverted, the first time in 1999 and the second time in 2004.

The agricultural country’s export potential is enormous, considering that it increased from US$46.5 million in 1995 to US$133.9 million in 1999 and exceeded US$300 million (70% of this being sugar, cotton and tobacco) in 2005. Expansion of existing commercial irrigation and linked out-grower schemes have led to accelerated crop diversification and subsequent commercialization.

### 2.1.5 Smallholders in Agriculture

(1) Dual nature in agriculture

The target areas and beneficiaries targeted by the Study are small-scale farmers located in peri-urban areas along the railway line. Agriculture in Zambia consists of a distinct dual structure. Specifically, there is large scale commercialized farms along the railway line made up of a small number of major farmers and then there are the many traditional small-scale farmers located around the villages. This is a planned study targeting the latter group among farms that coexist in regions along railways. The purpose of the study is to promote small-scale commercial irrigation farming. The undertaking of this study was extremely challenging.

This section will provide a simple explanation of small-scale farmers in the agricultural policy and then statistical materials will be used to examine the positioning of small-scale farms within the nation's overall agricultural production.

(2) Small-scale farmers in agricultural policy

The Zambian government has promoted market-oriented agriculture since the liberalization of agriculture in 1992. Even the National Agricultural Policy (2004-2015) notes that there has been only limited support for small-scale farmers, which are part of the dual nature of agriculture in Zambia. Specifically, this support has been limited mainly to the Fertilizer Support Program (FSP), to assist the growing of the national staple maize, and the Food Reservation Agency (FRA). In other words, it is expected that small-scale farmers can make a contribution to agricultural growth based on the principles of market competition for crops other than the main staple maize. Moreover, the promotion of large-scale commercialized farms is expected to have a synergy effect for small-scale farmers. However, for agriculture based on the principles of competition, NAP is promoting the organization of famers, including cooperatives, other farmers' organization, taking into consideration legal procedures and with small-scale farmers at the district level.

(3) Number of small-scale farmers in Zambia

There are various types of statistical data on the number of farms in Zambia. In order to grasp the number of farmers by scale, it is essential to first understand the dual nature of agriculture in Zambia. The total number of farmers as of the 1990 Census of Population and Housing came to roughly 570,000 and this number increased 810,000 as of the 2000 census. Statistics typically classify farms based on the area under cultivation. As shown in Table 2.1.2, area under cultivation of less than 5 ha is "small scale", between 5 to 20 ha is "medium scale" and more than 20 ha is large scale. However, since the introduction of economic deregulation there has been an awareness of growth for not the conventional commercial farmer but a new class of "small-scale commercial farmer" that has increased the number as producers of agriculture for markets mainly. This group has been classified as "emergent farmer" in various statistics. It has been reported that some 120,000 such farms existed nationwide as of 2000, but more up-to-date statistics cannot be found. This number has likely continued to grow.

Table 2.1.2 Characteristics of Zambian Agriculture

| Statistics | Classification | Small-scale | Emergent Farmer | Medium-scale | Large-scale |
|---|---|---|---|---|---|
| 1990 | Cultivation area (ha) | Less than 5ha | - | 5.0-20 ha | More than 20 ha |
| 2000 (PRSP) | Cultivation area (ha) | 0.5-9.0 ha | 10-20 ha | 20-60 ha | More than 60 ha |
| | Crop Grown | Food Crops | Food/Cash Crops | Food/Cash Crop | Cash Crops |
| | Production Focus | Subsistence | Commercial/sub. | Commercial/sub. | Commercial |

Source: Atsushi Suzuki, FoDiS (2009) data cited from MAFF's Agriculture Statistic Bulletin (1997), Poverty Reduction Strategy Paper : PRSP by International Monetary Fund (2002).

There is no clear uniformity among the farmers classified as "small-scale". The range is from destitute farms that are unable to even produce enough to feed their family members to farms with enough capacity leeway to meet not only their own food needs, but have extra produce that can be sold on the market to earn cash income.

Mr. Suzuki (2009) summarized another useful classification using a classification method based on groupings from the references of the DFID (2003). Estimates for the number of farmers in each classification were also made (Table 2.1.3).

Table 2.1.3 Classification of Zambian Farmers

| Classification | Small-scale, Destitute | Small-scale, Poor | Small-medium Scale | Large Commercial | Corporate Management |
|---|---|---|---|---|---|
| Approx. Number | 200,000 | 300,000 | 300,000 | 2,100 | <50 |
| Main Crops | Crops for own consumption (insufficient) | Crops for own consumption (some extra) | Crops for own consumption and crops for sale | Crops for sale (domestic / exports) | Crops for sale Mainly exports |
| Characteristics | Households headed by women or the elderly with chronic food shortages and almost no access to cash. Isolated regions remote from major roads. | Have some money and/or livestock. Have the capacity to produce surplus crops depending on the conditions for that year. | Have the capacity to produce surplus crops to be sold on regional markets. Already participating in some contractual farming. | Produce crops mainly for exports and some domestic markets. Located near big cities or along railway routes. | Total corporate management. Uses large automated farming equipment to grow and process sugarcane, coffee, cotton, soya bean, wheat, and milk cows. |

Quoted from Atsushi Suzuki, FoDiS (2009) (Source: The Socio-Economic Impact of Commercial Agriculture on Rural Poor and Other Vulnerable Groups, DFID 2003)

(4) Percentage of Zambia's agriculture production attributed to small-scale farmers

The table 2.1.4 shows the percentage of major crop production in Zambia attributed to small-scale farmers based on data from the Crop Forecast Survey. However, this does not include vegetable cultivation and other garden crops as the relevant statistical data are not provided. Small-scale farmers handle most of the production of corps other than wheat, Irish potatoes, Virginia tobacco and soya bean. Small-scale farms account for a large percentage of the production of cotton and Burley tobacco, but in many cases this is based on contract farming.

Table 2.1.4 Percentage of Major Crops Produced by Small-scale Farmers

| Name of Crop | Cultivated Area (ha) | Production (Mt) | % Produced by Small-scale Farms** |
|---|---|---|---|
| 1. Maize | 1,125,466 | 1,887,010 | 87.8 |
| 2. Sweet potatoes | 64,341 | 200,450 | 99.6 |
| 3. Wheat | 34,296 | 195,456 | 0 |
| 4. Groundnut | 216,126 | 120,564 | 97.5 |
| 5. Soya bean | 64,680 | 118,794 | 14.7 |
| 6. Seed cotton | 103,154 | 87,018 | 99.2 |
| 7. Millet | 61,626 | 48,967 | 94.7 |
| 8. Mixed bean | 83,627 | 46,729 | 99.1 |
| 9. Rice | 31,032 | 41,929 | 100. |
| 10. Sunflower | 71,290 | 33,653 | 96.7 |
| 11. Sorghum | 40,485 | 21,829 | 99.3 |
| 12. Irish potatoes | 1,305 | 21,285 | 6.2 |
| 13. Virginia tobacco | 11,638 | 18,487 | 42.0 |
| 14. Burley tobacco | 7,785 | 8,758 | 98.6 |
| 15. Cowpea | 12,967 | 7,462 | 97.9 |
| 16. Paprika | 312 | 1,020 | 2.9 |

Source: Crop Forecast Survey 2008/2009 MACO

### 2.1.6 Governmental Administration

MACO is the responsible agency in the agriculture sector of Zambia. In the Department of Agriculture (DAO), there are three major branches: agricultural advisory service branch, crops production branch, and Technical Services Branch (TSB).

At the provincial level, organizational structure of the DOA reflects the one in the headquarters. All the related departments are under the authority of Provincial Agriculture Coordinator (PACO), who is designated by the Permanent Secretary (PS) of the ministry. As for the provincial DOA, Provincial Agricultural Officer (PAO) takes charge and, under PAO, there are also three branches as in the headquarters. At the district level, the same structure is replicated. Instead of PACO and PAO, there are District Agriculture Coordinator (DACO) and Senior Agriculture Officer (SAO) at district.

Under the district level, there are special units defined specifically by MACO for its extension operation in block and camp. Block is in general composed of several camps, on average; four blocks are under district, in which five to six camps are included in the Study area. For those units, Block Extension Officer (BEO) and Camp Extension Officer (CEO) are respectively assigned. Thus, CEOs are the tail-end agents of MACO, who deliver agricultural technologies to clientele farmers in the villages and then forward to the district the needs and feedback from the farmers. Organization chart of the MACO is in Fig. 2.1.1 and 2.1.2. The Technical Services Branch (TSB) in the Department of Field Services of MACO is the main institution mandated to plan and develop all aspects related to irrigation and water management. The TSB consists of three sections, namely: i) Irrigation Engineering Section; ii) Land Husbandry Section; iii) Farm Power and Machinery Section. The TSB through the Irrigation Engineering Section provides services to farming enterprises in irrigation agronomy, catchment hydrology and related hydraulic and civil engineering aspects. It also helps the Government to formulate policies for irrigation development, to carry out water resources assessments and to implement irrigation projects.

It is notable that the Ministry of Livestock and Fisheries (MLF) has newly been established in 2009, i.e., split from the MACO, and therefore some certain departments transferred to the structure of this new ministry. The MLF has an important role for issues of veterinary services, livestock and fisheries production.

While many other government agencies and some NGOs with interest in the irrigation sector exist, the Ministry of Energy and Water Development (MEWD) is the key one. It houses the Department of Water Affairs and the Water Development Board of Zambia, both of which are mandated to deal with water resources development and management. The Water Development Board of Zambia allocates water rights although no water charges have been levied on any irrigation abstractions. All land allocations for any development purposes, including irrigation, are the responsibility of the Ministry of Lands (MOL), which is also responsible for issuing title deeds. Its current policy is to set aside at least 30 % of the demarcated land for women and other vulnerable groups.

The private sector and NGOs play an important role in community mobilization for irrigation, with respect for traditional farmers or emerging farmers adopting irrigation.

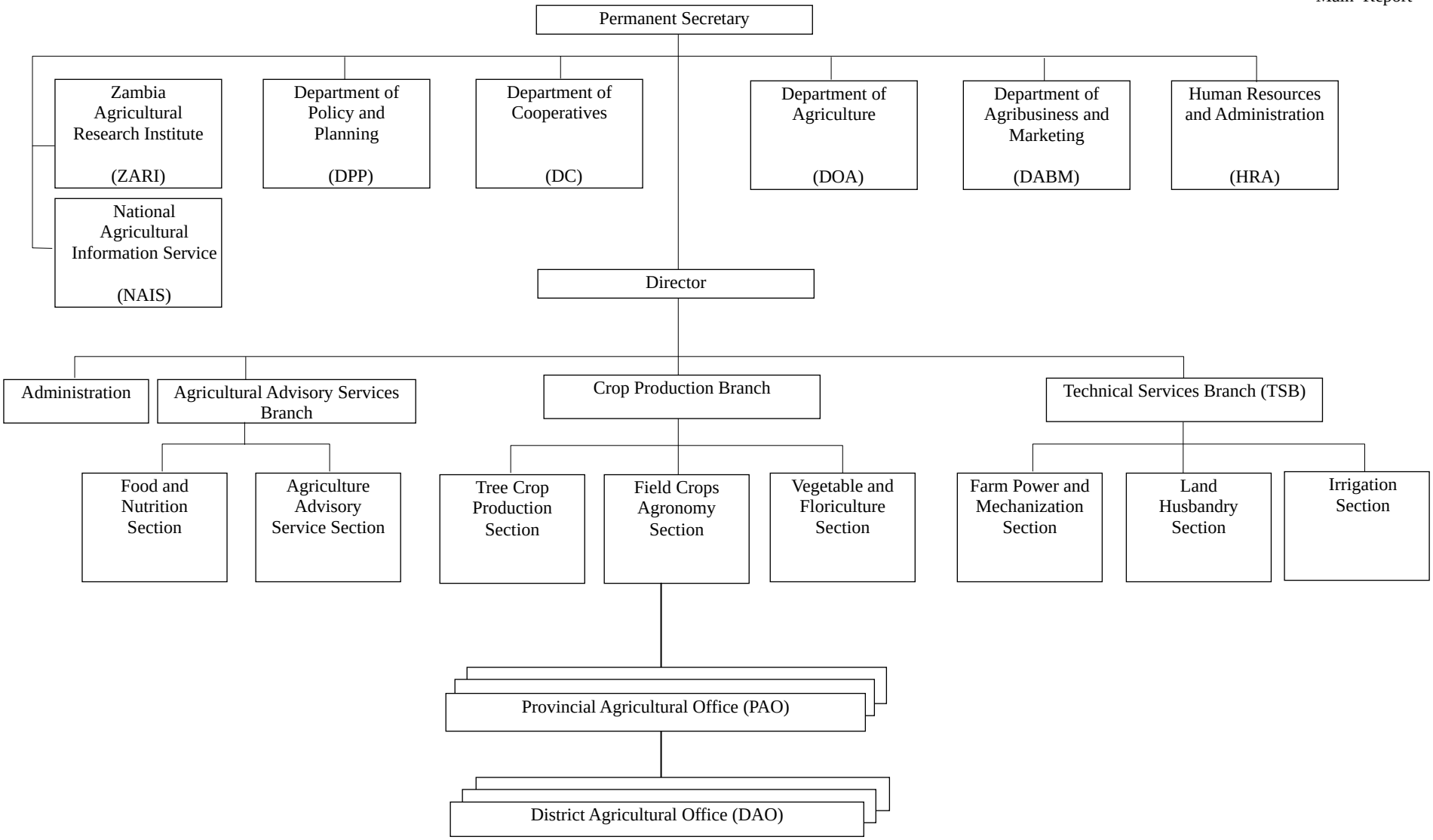



Fig. 2.1.1 Organization Chart of MACO

Source: MACO

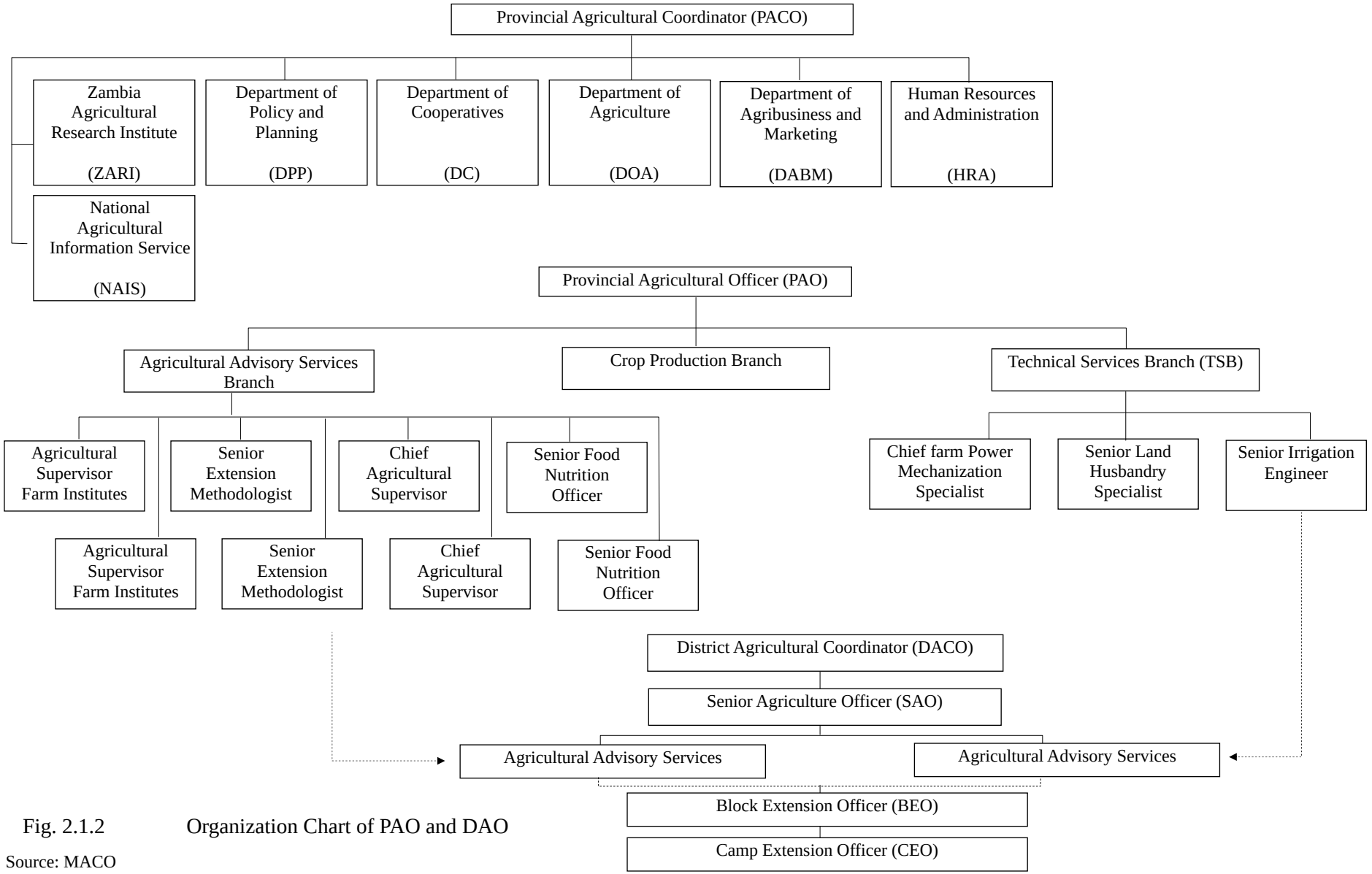



Fig. 2.1.2 Organization Chart of PAO and DAO

Source: MACO

Table 2.1.5 Budget Allocations to the Ministry of Agriculture and Co-operatives, 2005-10 (Kwacha billion)

| Source | MTEF* 2006-2008 | Budget 2005 | | MTEF 2006-2008 ceiling | Budget 2006 | | MTEF 2006-2008 projection | Budget 2007 | Budget 2008 | MTEF 2008-2010 Projections | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2005 allocation | 2005 execution | 2006 | 2006 allocation | 2006 execution | 2007 | 2007 allocation | 2008 allocation | 2008 | 2009 | 2010 |
| MACO of which | 345.5 | 352.3 | 346.3 | 359.8 | 580 | 597.2 | 396.48 | 1,062.8 | 800.5 | 868.5 | 1,060 | 1,182 |
| FSP** | 140 | 140 | 140 | 150 | 198.8 | 193.1 | 150 | 150 | 185 | 150 | 150 | 150 |
| FRA*** | 59.1 | 59.1 | 59.1 | 50 | 50 | 140 | 50 | 205 | 90 | 80 | 80 | 80 |
| Total govern-ment expenses | 9,316 | 9,395 | 8,846 | 7,792 | 9,942 | 8,618 | 8,412 | 12,034 | 13,761 | 12,810 | 13,882 | 14,925 |
| Share of MACO in total | 3.7 | 3.7 | 3.9 | 4.6 | 5.8 | 6.9 | 4.7 | 8.8 | 5.8 | 6.8 | 7.6 | 7.9 |
| Share of FSP/FRA in MACO | 57.6 | 56.5 | 57.5 | 55.6 | 42.9 | 55.8 | 50.4 | 33.4 | 34.2 | 26.5 | 21.7 | 19.5 |

Note: * MTEF: medium-term expenditure framework
** FSP: Fertilizer Support Programme
***FRA: Food Reserve Agency. Allocations do not include donor funding or other resources for the agricultural sector which are channeled through other ministries or agencies.

Source: Zambia Ministry of Finance and Planning (MoFNP) (2006a, 2006b, 2007a, 2007b, 2008).

## 2.2 National Development Plan

### 2.2.1 Sixth National Development Plan (SNDP)

With immense natural resources such as land, water and fertile soils and over 60 percent of its rural population depending on agriculture- related activities, Zambia has put agriculture the top priority sector in achieving sustainable economic growth and reducing poverty. The growth of this sector is therefore important for the attainment of the long-term vision for Zambia to become a prosperous middle income nation by 2030.

As was the case during the FNDP period (2005-2010), emphasis is put during the SNDP period (2011-2015) for the agricultural sector to continue being a strategic area of focus in promoting growth, reducing poverty and creating employment. In order to achieve this, the focus will be on enhancing investment for the 3 main sub-sectors, namely the crops, livestock and fisheries sub-sectors.

For the crops sub-sector, the SNDP will put emphasis on crop production increase through the expansion of area under cultivation, expansion of land under irrigation and on increased productivity through the use of improved seed varieties and improved linkages between research and extension services. In addition, the plan will continue to promote increased use of sustainable farming practices including conservation farming, agro-forestry, climate change adaptation and mitigation techniques, and control of crop diseases. Furthermore, it will promote the development of competitive, efficient and transparent public and private sector driven marketing system for agricultural commodities and inputs; facilitating the development of market infrastructure such as feeder roads, storage and market facilities and promoting improved agricultural commodities processing, marketing, distribution and storage.

For the livestock and fisheries sub-sectors, the main thrust during the period of the plan will be to increase livestock production through prevention and control of livestock diseases; improving production and productivity of the various livestock species and promoting the public-private partnership in value addition and processing of livestock products as well as in the provision of effective service delivery and marketing of these products. In the fisheries sub-sector, emphasis will be on capture fisheries, aquaculture development, fishery marketing development and investment promotion as well as research.

### 2.2.2 Agricultural Policy

(1) Changes in agricultural sector strategy

Zambia's agriculture policy has undergone dramatic changes since the early 1990s. Looking at the policy before the 1990's, there were doubts about the sustainability of agriculture due to the heavy dependence on farmer subsidies. Liberalization was started from the mid-1990s with the aim of bolstering private sector participation in such areas as farming inputs, marketing and processing. As one component of this transition to market liberalization, many of the functions previously handled by the Ministry of Agriculture, Fishery and Forestry were either abolished or transferred to agricultural trusts. These trusts used a commercial base for the management of public funds and provided researches, support for extension activities and offered training and other services based on a public-private sector partnership.

The 1996-2001 Agriculture Sector Investment Programme (ASIP) was the first program planned by the Zambian government and with donor support to facilitate the transition of agriculture to a market economy. The aim of this program was to realize private sector-led agriculture in which the implementation of sub-components is entrusted to private sector actors. However, the expected results were difficult to achieve. One unforeseen aspect of the business environment was that incentives for encouraging the private sector to cover remaining gaps were decreased due to government interference. ASIP soon turned into a government-led program, but there were problems with implementation and support was soon lost.

The disappointment of ASIP had an impact on the less ambitions Agriculture Commercialization Programme [(ACP), 2002-05] that followed. In fact, this program never really got off the ground. However, ACP promoted agriculture exports, created markets as a realistic method for encouraging the participation of small farmers in exporting and helped to recognize the importance of new out grower schemes.

These experiences were reflected in the New Agriculture Policy (NAP) [2004-2015]. NAP (the agriculture section of the current Sixth National Development Plan (SNDP)) coordinates the overall direction and framework for agriculture policy, and assigns important roles to the private sector. Cooperation is promoted between agriculture sector stakeholders and development supporters in order to realize appropriate extension services, agriculture research and monitoring & assessment. Meanwhile, the central functions (drafting policy, implementing laws and regulations) are concentrated with the Ministry of Agriculture and Co-operatives (MACO). Donors provide funds, technologies, skill development and other support to the stakeholders for the implementation of agriculture policy and programs. The goals and priorities of the National Development Policy (NDP) are drafted through consultations with the private sector and achieved through the implementation of specific strategies. These include the Agricultural Market Development Plan (AMDP), Agricultural Inputs Marketing Plan (AIMP) and the National Irrigation Plan (NIP), but implementation has tended to be delayed.

(2) National agricultural policy (2004-2015)

Past agricultural policies were restrictive and constraining with strong government intervention and participation. In addition, the strategies pursued were not sustainable because of their heavy reliance on subsidies. Consequently, these policies and strategies failed to stimulate growth in the sector. Up to early 1990s, the sector was poorly developed and dominated by a single crop-maize. The sector also lacked private sector participation in the areas of agricultural marketing, input supply and processing.

In 1992, the government embarked on agricultural sector policy reforms, which were part of the overall economic reforms pursued under the Structural Adjustment Programme. The main policy thrust of the reforms was liberalization of the agricultural sector and promotion of private sector participation in production, marketing, input supply, processing and credit provision.

Government recognizes that the dual nature of the agricultural sector in which the vast majority of small-scale farmers is resource poor, have low production and productivity and are usually food insecure. The main thrust of the National Agricultural Policy are increased production, sector

liberalization, commercialization, promotion of public and private sector partnerships and provision of effective services that will ensure sustainable agricultural growth. In doing so, the Government will not ordinarily intervene in inputs distribution or crop marketing in a way that will undermine or undercut private sector participation especially if the private sector has the will or capacity to do so.

The vision for the agricultural sector is "to promote development of an efficient, competitive and sustainable agricultural sector, which assures food security and increased income". It recognizes the need to strengthen and expand the emerging opportunities and to also deal with the challenges facing the agricultural sector. This vision also strives to contribute to the overall goal of the Poverty Reduction Strategy Paper (PRSP), which is to achieve "poverty reduction and economic growth".

In line with this vision, the specific objectives of the agricultural sector are:

- To assure national and household food security
- To ensure that the existing agricultural resource base is maintained and improved upon
- To generate income and employment to maximum feasible levels
- To contribute to sustainable industrial development and
- To expand significantly the sector's contribution to the national balance of payments.

(3) National marketing plan

The FNDP formulated Nine (9) Programs in Agricultural Sector, among which the Program titled "Agricultural Marketing, Trade and Agribusiness Development" aims at promotion of the development of a competitive, efficient and transparent public and private sector driven marketing system for agricultural commodities and inputs. The program's strategy includes a) Facilitate market information flow among stakeholders; b) Impart agri-business skills to market participants and farmers, especially women; c) Create an enabling environment for an improved agricultural input and output market, especially for small-scale farmers in rural areas; and d) Promote crops with both domestic and export markets. The program is targeting small-scale farmers as main beneficiaries.

In line with the FNDP, MACO formulated the NAP. The NAP stresses to facilitate entrepreneurship in agricultural marketing and input distribution through cooperatives, farmer organizations, traders and other businessmen; and also to facilitate the development of farmer-driven marketing organizations.

MACO also prepared Agricultural Market Development Plan (AMDP, Final Report, 2004). The AMDP set three (3) main categories of activities: a) Improving institutional & market performance (Immediate term); b) Improving policy & legal environment (Immediate to medium term) and c) Increasing access to finance, investments & infrastructure services (Medium to long term). The activities include Building small-scale farmers' capacity; Encouraging stakeholders to use the warehouse-receipt system; and Promoting the establishment of financial institutions to establish in rural areas.

This Study aims to promote commercial irrigated agriculture for smallholders in the peri-urban areas. From marketing aspect, the Study is totally in line with above-mentioned policy and development programs set by the government of Zambia / MACO, in terms of encouraging smallholders' marketing capacity.

(4) National irrigation plan

Within this overall framework and taking into account the vulnerability of Zambia's agricultural sector to weather and climatic vagaries, MACO has recently designed a National Irrigation Strategy that would provide guidance to all levels and types of investments in irrigated agriculture. It is therefore, now logical for MACO to develop a National Irrigation Plan (NIP) as part of the National Development Plan (NDP) that would run from 2006 to 2011 and to specify a quoted strategic investment and activities required to initiate and operate a competitive and sustainable agricultural sector.

Within the framework of the NAP and as part of the emerging FNDP, this NIP has the objective to promote the use of irrigation to accelerate sustainable agriculture development. For the purposes of designing this plan, the interventions proposed are analyzed and presented tailored to the resolution of constraints. In this regard, the NIP is organized around resolving four sets of constraints categorized as: 1) Finance and Investment, 2) Policy and Legal, 3) Institutional and Social and 4) Market Linkages.

Table 2.2.1 Fund for the NIP

| | Strategy | Mean UnitCost (US$) |
|---|---|---|
| 1. | Irrigation Development Fund (IDF) | 113,020,833 |
| 2. | Infrastructure Development (public) | 18,000,000 |
| 3. | Institutional and Social | |
| 3.1 | Capacity Building of MACO Extension | 13,735,833 |
| 3.2 | Capacity Building - Farmers' Organizations | 2,812,873 |
| 3.3 | Capacity Building - Out Grower Promoters | 115,200 |
| 3.4 | Strengthen Irrigation Research Capacity | 1,836,000 |
| 3.5 | Capacity Building -Technology Development and Advisory Unit – UNZA | 480,000 |
| | Grand Total | 150,000,739 |

Source: NIP

(5) National cooperative development policy

The National Cooperative Development Policy (NCDP) has outlined the implementation strategies in Zambia. The NCDP enables the cooperative movement to play a more effective role in the nation's development as well as face challenges in line with Fifth National Development Plan (FNDP), Vision 2030 and Millennium Development Goals (MDGs). The NCDP aimed at promoting all types of cooperatives will also endeavor to outline the relationship between the cooperative sector and the government as well as among the cooperatives also including stakeholders such as the Non Governmental Organization (NGO).

The overall objective of the NCDP is to create an enabling institutional and legal environment for the development of autonomous, effective, transparent, viable and demand-driven cooperatives that will contribute to wealth creation and poverty reduction. In order to achieve the objective of the NCDP the following strategies are pursued:

a) Develop a legal and institutional framework to facilitate the re-orientation and reformation of the cooperative organization.
b) Ensure the physical presence of the ministry and relevant stakeholders in all districts of the

country through field staff directly dealing with cooperatives matters.

c) Provide logistical support.
d) Develop human resource capacity.
e) Develop education and training programmes and materials that address the felt needs of cooperative members and meet the current socio-economic environment.
f) Encourage the establishment and development of financial services cooperatives.
g) Promote development of viable business-oriented cooperatives.
h) Promote formulation of pre-co-operative groups
i) Develop sensitization materials for all particularly women and youth participation
j) Enhance the capacity of cooperatives to access financial resources by facilitating the establishment of a Cooperative Development Fund (NCDF) in partnership with other stakeholders' establishment.
k) Promote partnership between cooperatives, stakeholders and other sectors of economy in co-operative development.
l) Facilitate the identification and promotion of viable cooperative economic activities.
m) Promote partnership between cooperatives and other sectors of the economy in cooperative development.

### 2.2.3 Consistency with Specified Study Fields

Peri-urban agriculture has become much more important since the 1992 liberalization of the agricultural sector. During this period, small farmers had to contend with a reduction in subsidies that accompanied the shift from government-led agriculture to market-oriented agriculture. Rain-fed agriculture was also heavily damaged by the severe droughts that struck all of Southern Africa. In order to cope with these challenges, small farmers began to focus more on small-plot irrigated farming of vegetables, in addition to staple food crops, in order to maintain their livelihoods. 90% of Zambia's annual rainfall is concentrated during the 4-month rainy season and rain patterns are irregular, which result in unstable agricultural production. The introduction of irrigated agriculture has helped to raise the productivity of small farms, but reducing poverty and securing a stable supply of food at the household level are still very pressing problems.

Near the big cities and along the railway lines the large farms and corporations have been successful in producing industrial and horticultural crops such as sugar cane and Irish potatoes destined to be sold in urban areas. On the other hand, productivity has remained low for small farmers. Even in areas where there is access to irrigation facilities, a stable water supply can still be hard to come by as these facilities are often not properly managed and maintained. Even when they are blessed with a close proximity to markets in urban areas, most of the small farmers are still unable to fully benefit from these advantages.

In the Zambian government's agriculture sector strategy the promotion of irrigated agriculture, especially at the small farmers level, is seen as indispensible for improving food supply security at the household level. However, small farmers that have been integrated into market-oriented agriculture are still struggling to access markets and agriculture extension services. Therefore, the Zambian government recognizes the promotion and enhancement of cooperatives and farmer organization as

important tools for addressing these problems.

Considering the difficult conditions confronting small farmers, particularly peri-urban small farmers, it will be important to grasp market needs and then introduce types of farming that conform to these needs, while at the same time improving the bargaining positions of these farmers through organization. Therefore, systems for providing and receiving market information will need to be created and systems for agriculture extension service will need to be enhanced. Specifically, the aim must be to improve productivity through a multilateral approach that includes the organization of producers and the introduction of irrigated agriculture based on market needs and information.

This study is conducted with the aim of formulating a Master Plan for improving the productivity of peri-urban small farmers through the promotion of irrigated agriculture and from the above-mentioned perspectives.

## 2.3 Environmental and Social Consideration

### 2.3.1 Legal and Institutional Framework of Environmental Consideration

(1) Institutions and legislations

The lead institution responsible for the development of environmental policy and legislation in Zambia is the Ministry of Tourism, Environment and Natural Resources (MTENR). Aside from this ministry, several others are mandated to initiate policy on specific sectors of the environment. The lead institution for the implementation of environmental policies is the Environmental Council of Zambia (ECZ).

Various government institutions and agencies are involved in environmental management, and Zambia has formulated many laws and regulations addressing environmental matters. The country has also enacted several statutory instruments that amplify the provisions of various acts. A brief summary of the provisions of a few pieces of legislation that have a bearing on the environment is as follows:

1) Environmental protection and pollution control act, No. 12 of 1990, and environmental protection and pollution control amendment act No. 13 of 1994

   The Act provides for the protection of the environment and the control of pollution, and creates the Environmental Council of Zambia (ECZ), which is responsible for pollution control (land, air, and water, ozone depletion) and environmental quality (control of general and hazardous waste), including the regulation of EIA. The ECZ is also mandated to develop and enforce regulations in terms of the Act, which was recently amended to include powers of arrest and prosecution.

2) National parks and wildlife act of 1991 (Chapter 316)

   The Act provides for the establishment, control and management of national parks; the conservation and protection of wildlife and objects of interest in national parks; the establishment of game management areas; the licensing of hunting; the control of possession of trophies; and the control of bush fires. The Act has been repealed since the passing of the Zambia Wildlife Act No. 12 of 1998. The Zambian Wildlife Authority (ZAWA), previously National Parks and wildlife Resources, is the implementing authority of this act.

3) Forest act, No. 7 of 1999

The Act provides for the establishment and management of national and local forests; the conservation and protection of forests and trees; and the licensing and sale of forest products through joint forestry management with the communities. This act is implemented by the Forest Department under MTENR.

4) Draft national policy on wetland conservation, September 2001

This draft Policy aims to provide a holistic programme of action to promote the conservation and wise use of wetland ecosystems. It acknowledges the importance of wetland ecosystems in Zambia in providing major fisheries, and as important habitats for wildlife species. The implementing authority of this act is the ECZ.

5) Water act, 1957 (Chapter 198)

The Water Act provides for the control, ownership and use of water, excluding that of the Luangua, Luapula and Zambezi Rivers, which form international borders. The Act established the Water Board under the Ministry of Energy and Water Development and regulates the use of public water, including protecting it against pollution. The Water Board has powers to grant water rights through the issue of permits.

6) Land act of 1995 and land acquisition act of 1995

The Department of Lands administers the Lands Act for alienation of land under statutory leaseholds. Under the Land Act of 1995, land has been divided into the following categories: State, Local Authority and Traditional land.

7) Agricultural lands act, 1960 (Chapter 29)

The Act provides for the protection and alienation of land for solely agricultural purposes.

8) National heritage conservation act, 1989 (Chapter 173)

The Act provides for the conservation of ancient, cultural and natural heritage, relics and objects of aesthetic, historical, pre-historical, archaeological or scientific interest. It establishes the Commission and sets out its functions. It is implementing the legal framework in Zambia of the World Heritage Convention of 1972, under which the heritage sites (such as Victoria Falls) are included in the World Heritage List as World Heritage sites. The implementing authority is the National Heritage Conservation Commission under MTENR.

(2) International conventions and protocols

In addition to the local legal instruments, Zambia is a signatory and party to more than thirty International Conventions and Protocols. Among the most relevant environmental conventions are; Convention on Biological Diversity (1992) ratified in 1993 and the RAMSAR Convention, Convention dealing with the Protection of the World Cultural Vestige and Heritage (1972) and ratified by Zambia in 1982, Convention on Climate Change, Statutes of the International Union for the

Conservation of Nature and Natural Resources (IUCN), Convention on International Trade in Endangered Species of the Wild Fauna and Flora (CITES), 1973, ratified in 1981.

Through this cooperation with other countries and international organizations, Zambia will benefit through privileges such as accessibility to international funding. Today many international donor organizations are intervening in the environmental conservation sectors or projects. These include NORAD (Norway), CIDA (Canada), IUCN, World Bank, WWF, UNEP and others.

(3) Regional cooperation and agreements

At regional level, Zambia cooperates with its neighbours to conserve and manage the region's natural resources and the environment. The main cooperative agreements at regional level include: Lusaka Agreement on cooperative enforcement operations directed at illegal trade in wild fauna and flora (ratified in 1994); African Convention on Conservation of Nature and Natural Resources (ratified in 1972); Action Plan for the environmentally sound management of the common Zambezi River system (ratified in 1987).

### 2.3.2 Environmental Impact Assessment Procedure in Zambia

(1) EIA practise

The Environmental Impact Assessment (EIA) procedure is illustrated in Fig.2.3.1. The requirement to undertake an EIA depends on whether the proposed development falls within the stipulated criteria listed in the EIA regulations. The criteria fall into two categories: those projects requiring only the preparation of a *project brief*, and those requiring a full EIA to be undertaken and an EIA report (environmental impact statement or EIS) to be prepared.

A *project brief* refers to an IEE level report. It is prepared by the developer and should include preliminary predictions of a proposed project's potential impacts on the environment, as well as recommended to minimize negative impacts. It represents the first stage in the EIA process, and is submitted to the ECZ for review.

Based on the project brief and the criteria for EIA requirement, the ECZ determines whether the proposed project requires an EIA. If the ECZ judges that the project brief adequately addresses the potential impacts and these can be easily mitigated, an EIA is not required and the ECZ will approve the proposed project. Thus, without an approved project brief, or an approved EIA report, developers cannot implement the type of project or activity listed in the EIA regulations. The regulations state that a developer shall not implement a project for which a project brief or an EIS is required under the regulations, unless a project brief or an EIA has been concluded in accordance with the Regulations and the ECZ has issued a Decision Letter.

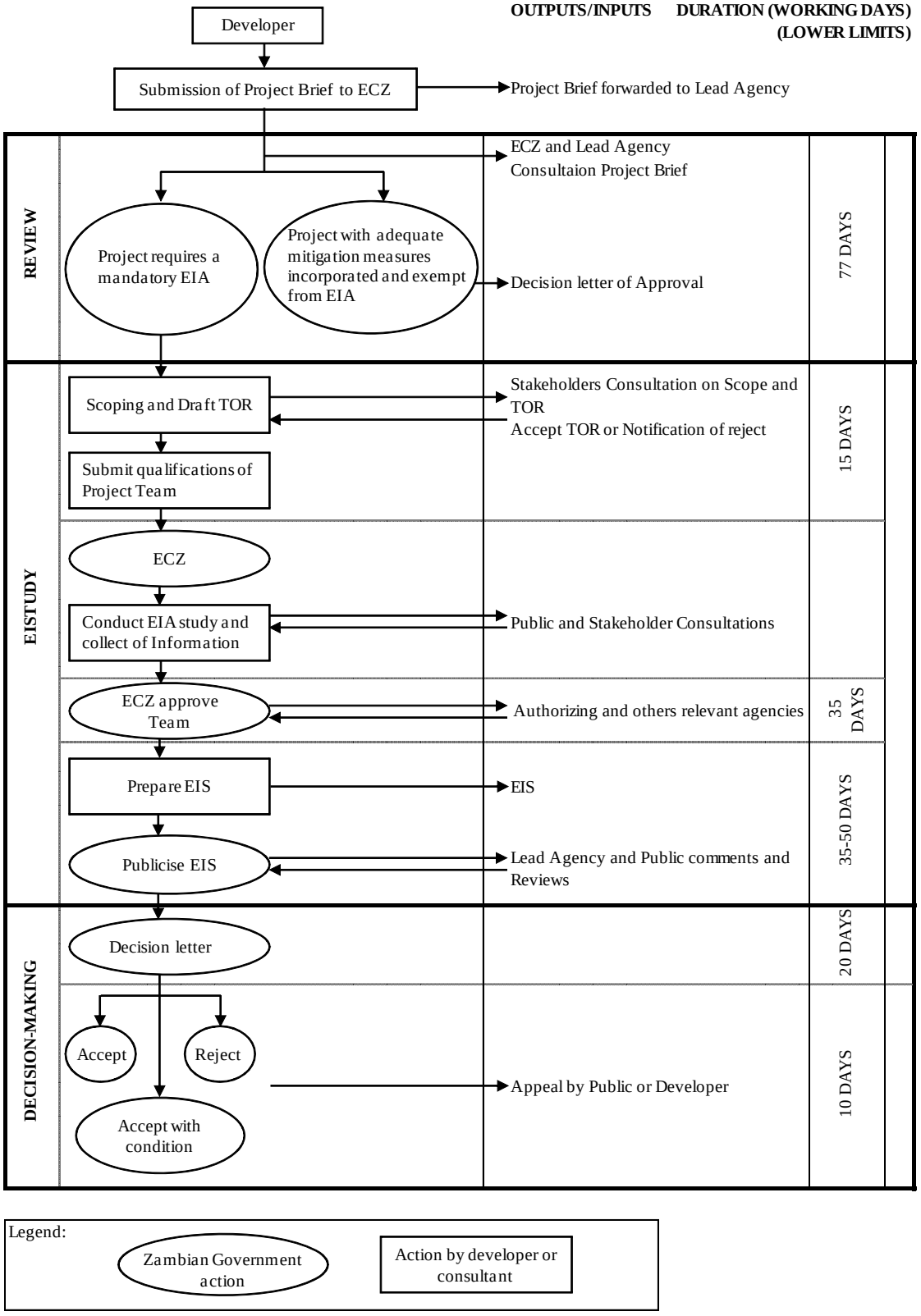



Fig. 2.3.1 Flow Chart: EIA Procedure

Second Schedule (Regulation (7) (2) Section 5 (a) under the heading: Forestry Related Activities) states that Clearance of forestry in sensitive areas such as watershed areas or for industrial use 50 ha or more shall require an EIA.

Second Schedule (Regulation (7) (2) Section 6 (a) under the heading: Agriculture) states that Land clearance for large scale agriculture shall require an EIA.

The regulations stipulate which types of projects require a project brief and those which require a full EIA study before they will be considered by the Environmental Council of Zambia (Please refer to Table 2.3.1).

Table 2.3.1 Projects Requiring a Project Brief or EIA

| Projects requiring a project brief |
|---|
| • Urban area rehabilitation<br>• Water-transport schemes<br>• Flood-control schemes<br>• Exploration for, and production of, hydrocarbons, including refining and transport<br>• Timber harvesting and processing in forestry<br>• Land-consolidation schemes<br>• Mining and mineral processing, reduction of ores, minerals, cement and lime kilns<br>• Smelting and refining of ores and minerals<br>• Foundries<br>• The manufacture of brick and earthen materials<br>• Glassworks<br>• Brewing and malting plants<br>• Plants for manufacturing coal briquettes<br>• Pumped water storage schemes<br>• Bulk grain processing plants<br>• Hydropower and electrification schemes<br>• Chemical processing and manufacturing<br>• Resettlement schemes<br>• Storage of hydrocarbons<br>• Hospitals, clinics and health centres<br>• Cemetery designation<br>• Tourism and recreational development in national parks or similar reserves, and<br>• Projects located in or near environmentally sensitive areas such as:<br>(i) Indigenous forests;<br>(ii) Wetlands;<br>(iii) Zones of high biological diversity |
| Projects requiring an EIA |
| • Urban development<br>• Transportation networks<br>• Development of dams, rivers and water resources<br>• Mining activities, including quarrying and open-cast extraction<br>• Forestry-related activities<br>• Agricultural development<br>• Processing and manufacturing<br>• Electrical infrastructure<br>• Waste disposal, and<br>• Projects in nature conservation areas. |

(2) Time and cost associated with EIA review

EIAs in Zambia are strictly regulated by set time frames, as illustrated in the EIA procedure flow chart

shown above. The minimum time for the project brief review is 77 working days, while an additional minimum of 122 working days is required for the EIA review. Thus, the project brief is likely to take no less than three months, and the EIA report six months, to review. There are no time limits for undertaking studies or compiling report. While all parties are required to conform to strict time frames, this system does not allow much flexibility for accelerated processing of urgent developments. The cost associated with the review is shown in Table 2.3.2, which is to be paid by the developer or the donor organisation:

Table 2.3.2 EIA Review Fees

| Project cost | Kwacha equivalent | US$ equivalent |
|---|---|---|
| Review of project brief | 7,799,940 | 1,957 |
| Less than US$100,000 | 7,799,940 | 1,957 |
| US$100,001–500,000 | 38,999,700 | 9,783 |
| US$500,001–1,000,000 | 97,499,160 | 24,457 |
| US$1,000,001–10,000,000 | 194,998,320 | 48,914 |
| US$10,000,001–50,000,000 | 389,997,000 | 97,828 |
| More than US$50,000,000 | 584,995,500 | 146,742 |

WSP Walmsley (Pty) Ltd. Zambia Country Report (2002).

US$1 = K3,986.57 as at April 2002

## 2.4 Assistances by the Donors

Donors assistance to the agricultural sector including rural development averaged US$38 million per year over 2001-05 in committed base. According to the estimates of the GRZ, assistance to agriculture should amount to at least US$214 million, representing 9 % of total project aid (European Community, 2007). Of this latter amount, US$78.3 million would come as loans from the African Development Bank (AfDB) and the World Bank (WB), the remaining being grants from bilateral and multilateral donors.

Recent projects emerged with a strong focus on reorienting smallholders to take a more business-minded approach and facilitating their access to markets. The development of market linkages, especially via out-grower schemes and other forms of contract farming, has borne good results in helping farmers to increase production, raise quality standards and even enter into international commodity chains. The new projects include: the Agriculture Support Programme (ASP) funded by Sweden; the Smallholder Enterprise and Marketing Programme (SHEMP) funded by the International Fund for Agricultural Development (IFAD); various USAID-funded projects, such as the Co-operative League of the USA (CLUSA), the Zambia Agribusiness Technical Assistance Centre (ZATAC) and Land o'Lakes.

Agriculture became attractive again for donor funding in the mid-2000s. The adoption of the NAP and of the PSD agenda favored the approval of a new breed of projects that incorporate the lessons from past interventions. Donors and the GRZ acknowledge the need to complement sector-specific

interventions with programmes aimed at improving the overall business and investment climate. Moreover, inadequacies observed in past interventions, which mainly focused on production improvements while ignoring the role of markets, convinced many donors to adopt different approaches. This resulted in more attention being paid to the whole agricultural value chain, acknowledging the key role played by input suppliers and agribusiness firms. These new programmes include USAID‘s Production, Finance and Improved Technologies (PROFIT) and Market Access, Trade and Enabling Policies (MATEP) projects, the Finnish Programme for Luapula Agriculture and Rural Development (PLARD), the World Bank Agriculture Development Support Programme (ADSP) and the Smallholder Agricultural Production and Marketing Support Project (SAPMSP) by the AfDB. The European Community (EC) has also launched a major new project in agriculture, which has, however, a narrower food-security focus. Major on-going projects in agricultural sector are shown in Table 1.7.1 (Business for Development 2008, OECD)

Table 2.4.1 Major Ongoing and Planned Donor Projects in Agriculture

| Donor | Project | Amount | Duration | Objectives |
|---|---|---|---|---|
| AfDB | Agricultural Sector Investment Programme (ASIP)/ZAMPIP | $21.9 million (UA 15.0 m) | 1998-08 | The AfDB support to ASIP has four main components: Agricultural Development, Livestock Development, Infrastructure and Technical Assistance. It is directly implemented by the MACO.<br>ZAMPIP aimed at stimulating private sector participation in agricultural production and marketing in three provinces by improving access to credit and investment financing for rural infrastructure. The Zambia National Commercial Bank administers the project's Rural Credit Facility and Rural Investment Fund. An international NGO manages the scheme. |
| | Small-scale Irrigation Project (SIP) | $8.83 million (UA 6.05 m) | 2002-09 | To increase food security and generate income of households in Lusaka and Southern Provinces through six small-scale irrigation schemes. |
| | Smallholder Agricultural Productivity and Marketing Support Project (SAPMSP) | $29.6 million | 2008-13<br>(not approved yet) | Improve smallholders' production and marketing capacity in food and cash products for domestic and export markets through: (i) support to existing OGS; (ii) formation of new farmer groups and training (especially in Integrated Pest Management and compliance with EurepGAP); (iii) support to seed growers and distributors through supply of improved seeds and planting material; (iv) dairy development activities. |
| | Smallholder Irrigation and Marketing Infrastructure Support Project (SIMISP) | $56.0 million | 2008-14<br>(not approved yet) | Contribute to increased agricultural productivity through the development of rural irrigation and marketing facilities (especially for dairy and livestock) and targeted institutional capacity building. |
| IFAD | Smallholder Enterprise and Marketing Programme (SHEMP) | IFAD loan: $15.9 million (Total cost: $18.4 m) | 2000-08 | Strengthening smallholder enterprise groups;<br>Improved access to suppliers and markets, including rehabilitation of feeder roads;<br>Development of agribusiness sector and trading enterprises serving small-scale farmers. |
| | Smallholder Livestock Investment Project (SLIP) | IFAD loan: $10.1 million (Total cost: $15.0 m) | 2007-14 | Improve livestock disease control and to re-establish and restock poor smallholder farmers who lost their cattle to disease;<br>Improve related policy formulation and implementation. |
| | Rural Finance Programme (RFP) | IFAD loan: $13.8 million<br>Co-financing: SIDA US$4.5 million | 2007-14 | Support the development of long-term rural financial services for rural poor people through sustainable community-based financial institutions. |

| Donor | Project | Amount | Duration | Objectives |
|---|---|---|---|---|
| World Bank | Agricultural Development Support Project (ADSP) | $37.2 million (IDA loan) | 2006-2012 | To support increased commercialization of smallholder agriculture through improved productivity, quality and efficiency o f selected value chains by *i)* providing resources for working capital and term lending for capital investments in agricultural production and marketing; *ii)* developing innovative business linkages between smallholders and other actors in the supply chains; and *iii)* targeting investments in public goods and in key public sector functions. |
| | Commercial Agriculture Project (CAP) | $30 million (IDA loan) | Under discussion | Promote the development of commercial agriculture through: *i)* Irrigation Development; *ii)* Land administration and land use planning; and *iii)* Market development and information. |
| EU (**) | Agricultural Diversification and Food Security Project (ADFSP) - under 9th European Development Fund (EDF) | EUR15 million | 2006-08 | Assisted in the design of a national food security strategy; support small scale farmers and vulnerable households Western and North Western Provinces;<br>Support to Ministry of Agriculture extension staff |
| | Food security and agriculture diversification (under 10th European Development Fund (EDF) | EUR30 million | 2008-13 (disbursements in 2010-212) | Continue and extend the implementation of the food security plans;<br>Supporting new public initiatives and investments planned under FNDP to promote agriculture production, diversification, marketing and local-value addition. |
| | Promotion of Conservation Farming and Crop Diversity for Increased Rural | EUR1.97 million | 2005 – 07 | Promoting conservation farming practices in Southern, Central and Eastern provinces |
| | 10th EDF EPA/Trade related support | EUR2 million | 2008-13 | Capacity building for policy, regulatory and marketing interventions to enhance SPS standards, certification and marketing conditions. |
| Finland | PLARD | EUR10 million | 2007-10 | Promoting sustainable commercialization and development of fisheries, agriculture and agribusiness;<br>Fostering a supportive policy, regulatory and institutional environment. |
| Netherlands | BDS Voucher projects | ZMK20 732 billion<br>Co-financed by The Netherlands (12.5 bn), Finland (7.5 bn) and ILO (0.732 bn) + GRZ ZMK 4 bn counterpart financing | 2007-10 | Promote the development of demand-drive BDS for SME, including in agribusiness, through a voucher system. |
| Sweden | ASP | $42-44 million (SEK331.5 m) including a SEK20 m contri-bution from Norway | 2003-08 | Entrepreneurship and Business Development;<br>Improved Land, Seed, Crops and Livestock productivity;<br>Improved Service Delivery of Support Entities |

| Donor | Project | Amount | Duration | Objectives |
|---|---|---|---|---|
| United States (***) | Production, Finance and Improved Technologies (PROFIT) Project | $15 million | 2005-10 | Improve the competitiveness of selected agro-industries with large numbers of micro and small enterprises (MSE) through: *i)* better inter-firm co-operation; *ii)* more developed support markets; *iii)* building credibility and confidence in market mechanisms. |
| | Market Access, Trade and Enabling Policies (MATEP) Project | $10 million | 2005-10 | Increase agriculture exports and tourism revenue by working to overcome barriers to trade and forging trade linkages. |
| | Land O'Lakes | $13 million | 2004-09 | Enhancing the productivity of smallholder dairy farmers and dairy processors through: *i)* improved quality of dairy cattle; *ii)* development of reliable milk marketing channels; *iii)* adoption of new processing technologies and better safety and quality management systems; *iv)* marketing and promotional campaigns; *v)* development of warehouse receipt system. |

Source: Donor agencies

Note: exchange rate Currency Equivalents: UA1 = $1.45949 (October 2006 Exchange Rates).

(*) No detailed information was available on the cost of the SAPMSP project. The reported amount was deducted from its Environmental and Social Management Plan Summary. The AfDB also supports two multi-country projects. The African Development Fund provided a $4.5 million grant to COMESA for an Agricultural Marketing Promotion and Regional Integration Project (2004-2007) to enhance safe intra– and extra–regional agricultural marketing. The AfDB provided a loan to Burundi, DRC, Tanzania and Zambia for the Lake Tanganyika Integrated Regional Management Programme (2005-2011) where Zambia's share amounts to $4.76 m (UA3.26 m).

(**) The EU also finances a EUR7.9 million project for the Promotion of Regional Integration in the SADC Livestock Sector and a EUR10 million Regional Food Security and the SADC Livestock Sector and a EUR10 million Regional Food Security and Risk Management Programme (REFORM) for Eastern and Southern Africa, to be implemented by IGAD and COMESA. Under the 10th EDF the EU will also fund a EUR465 million regional support programme for the Eastern and Southern Africa-Indian Ocean Region to promote regional integration, management of natural resources and food security. See European Community (2007).

(***) USAID also finances the Southern Africa Regional Competitiveness Hub which provides technical assistance in areas such as sanitary and phytosanitary (SPS) capacity, business linkages, transport/energy sector activities.

# Chapter 3 Study Area

## 3.1 General Conditions

### 3.1.1 Population

Total population in Zambia was 9,885,590 according to the 2000 population census. The population of the Study area accounts for 45.8 % of the country's population with 4,535,371 as of the above census, while the total area of the study area accounts for 30.0 % of the country's area with 225,963 $km^2$.

In the decade following the census, the population growth rate in the area has been 2.2% per annum which is lower than the national population growth rate by 0.3 %. The population density of the area has increased from 16.2 in 1990 to 20.0 inhabitants per $km^2$ in 2000. This is higher than the population density of the whole country by 6.9 inhabitants per $km^2$.

Table 3.1.1 Population in the Study Area

| Province | District | Population | Province | District | Population |
|---|---|---|---|---|---|
| Copperbelt | | 1,581,221 | Lusaka | | 1,391,329 |
| | Chililabombwe | 67,533 | | Chongwe | 137,461 |
| | Chingola | 172,026 | | Kafue | 150,217 |
| | Kalulushi | 75,806 | | Lusaka | 1,084,703 |
| | Kitwe | 376,124 | | | |
| | Luanshya | 147,908 | Southern | | 1,212,124 |
| | Masaiti | 95,581 | | Choma | 204,898 |
| | Mufulira | 143,930 | | Gwenbe | 34,133 |
| | Ndola | 374,757 | | Kalomo | 169,503 |
| | | | | Kazungula | 68,265 |
| Central | | 1,012,257 | | Livingstone | 103,288 |
| | Chibombo | 241,612 | | Mazabuka | 203,219 |
| | Kabwe | 176,758 | | Monze | 163,578 |
| | Kapiri Mposhi | 194,752 | | Siavonga | 58,864 |
| | | | | Sinazongwe | 80,455 |

Source: CSO, 2000 Censuses of Population and Housing

### 3.1.2 Geographical Location

Lying along the Zambia railway, the study area has a total landmass of about 226,000 $km^2$ as described above. It shares borders with Democratic Republic of Congo in the north, and Zimbabwe, Botswana and Namibia in the south. The area covers 23 Districts in 4 Provinces i.e. Copperbelt, Central, Lusaka and Southern Provinces.

The Copperbelt Province has a tropical climate with three distinct seasons, the cool and dry season, the hot and dry season and the hot and wet season. The province has reliable rainfall of about 1,400 mm per annum with moderate temperatures suitable for crops. Perennial streams and rivers exist in the province, providing excellent conditions for irrigation throughout the year. Average temperature ranges from 15°C in July to 37°C in October.

The Central Province, northern part is characterized by high rainfall ranging from 1,000-1,400 mm and poor leached soils, and the central and southern plateau zone is characterized by fertile soils

which are suitable for cotton and maize cultivation. The Luangwa- Zambezi Rift Valley Zone is characterized by low rainfall. The main soil types are red clays and red-brown loams, suitable for commercial farming. Temperatures range from 24°C in October to 16°C in July. Annual rainfall varies from 1100 mm in the northeast to under 800 mm in the southern areas of Luangwa Valley and Kafue Flats.

The Lusaka Province has two major rivers, namely the Kafue and Luangwa Rivers. Some of the largest variations in altitude in the country are found in this province. The area surrounding the city rests on a highland plateau covering a quarter of the province. It also has a valley and escarpment along the eastern and southern parts. Altitude ranges from 300-400 m above sea level in the valley to 1,200-1,400 m above sea level on the plateau. The plateau has rich soils and sufficient rains, while the valley has poor soils and insufficient rains.

The Southern Province lies in a low rainfall zone of the country. Temperatures range from 14°C to 35°C. The soil type of this province is mostly sandy loam, which is a plateau soil. Topographically, the province is divided into four areas, which are valley, plateau, escarpment and Kafue Flats. Kalahari sands are also found in the western parts of the province.

### 3.1.3 Geology and Soil

The Zambezi valley located at the most southern boundary of the South Province is mountainous and rocky, while the rest of the Study area is by and large a level to gently undulating plateau with slopes rarely exceeding 3 to 5 %. Interfluves mostly comprise deep weathered soils, which occupy large tracts of land in the main drainage systems consisting of the Zambezi and Kafue Rivers. Major soil types include the black clays (vertisols) and sandy clays commonly found in the Kafue basin and the dambo (seasonally saturated wetland[1]) areas. Red clays, sand veldt and clay loam soils are common in plateau areas. These soils are generally of moderate fertility status with no salinity problems.

### 3.1.4 Hydro-Meteorological Conditions

(1) Climatic conditions

Zambia enjoys an enviably pleasant climate, being a land-locked tropical country. In general, a year in Zambia is divided into two distinct halves, a dry half from May to October and a wet half from November to April. It is however more convenient to divide a year into four (4) unequal seasons from the synoptic point of view as follows:

- Winter season : June to August
- Pre-wet season : September to October
- Wet season : November to March
- Post wet season : April to May

(2) Meteorological conditions

(a) Temperature

Lusaka, the capital city of Zambia, is located almost in the center of the country at an elevation of

[1] McCartney, M.P., Daka, A.E. and G. Phiri (1998) *Design of an Environmental Monitoring Programme for Dambos in Zambia*, a research paper submitted for the Institute of Hydrology (accepted), Institute of Hydrology, Oxfordshire, UK.

1,280 m above sea level. The mean daily maximum temperature is 30.1°C in October and the daily minimum temperature is 9.1 °C in July.

Since the temperature is greatly influenced by elevation, the temperature in Siavonga and Sinazongwe located at about 500 m is 3 to 4°C lower than the provincial mean temperature, assuming that the temperature drops at a rate of about 0.8 per 100m altitude. Provincial mean temperature is shown as Table 3.1.2.

Table 3.1.2 Provincial Average of the Annual Mean Temperature

| Province | Annual mean temperature (°C) | Province | Annual mean temperature (°C) |
|---|---|---|---|
| Lusaka | 20.9 | Northwestern | 21.1 |
| Copperbelt | 20.7 | Western | 22.5 |
| Central | 20.5 | Luapula | 21.3 |
| Southern | 21.5 | Northern | 21.1 |
| | | Eastern | 22.0 |
| | | Average in Zambia | 21.3 |

Source: Meteorological Department

(b) Rainfall

The annual rainfall in Zambia ranges from 600 mm in the extreme southwest to 1,200 mm in the north. The mean annual rainfall is 857 mm over Lusaka. Provincial average of the annual rainfall is as follows:

Table 3.1.3 Provincial Average of the Annual Mean Rainfall

| Province | Annual rainfall (mm) | Province | Annual rainfall (mm) |
|---|---|---|---|
| Lusaka | 857 | Northwestern | 1,173 |
| Copperbelt | 1,231 | Western | 808 |
| Central | 947 | Luapula | 1,259 |
| Southern | 737 | Northern | 1,138 |
| | | Eastern | 961 |
| | | Total average in Zambia | 1,001 |

Source: Meteorological Department

Due to a belt of low pressure area at the surface over the equator and trade winds, the Inter Tropical Convergence Zone (ITCZ) moves generally north and south at the tropics. The change of the rainfall pattern (wet and dry seasons) occurs in the same month throughout the country. From the data analysis observed at meteorological stations in the Study area, annual rainfall distribution is summrized as follows:

- In the Copperbelt, Central, Lusaka and Southern Provinces, isohyetal lines are almost parallel from west to east and annual rainfall is decreased from the Copperbelt to Southern Provinces.
- In the Southern area, i.e., the Southern Province, it is the least rainy area with an annual rainfall range of 600 mm.

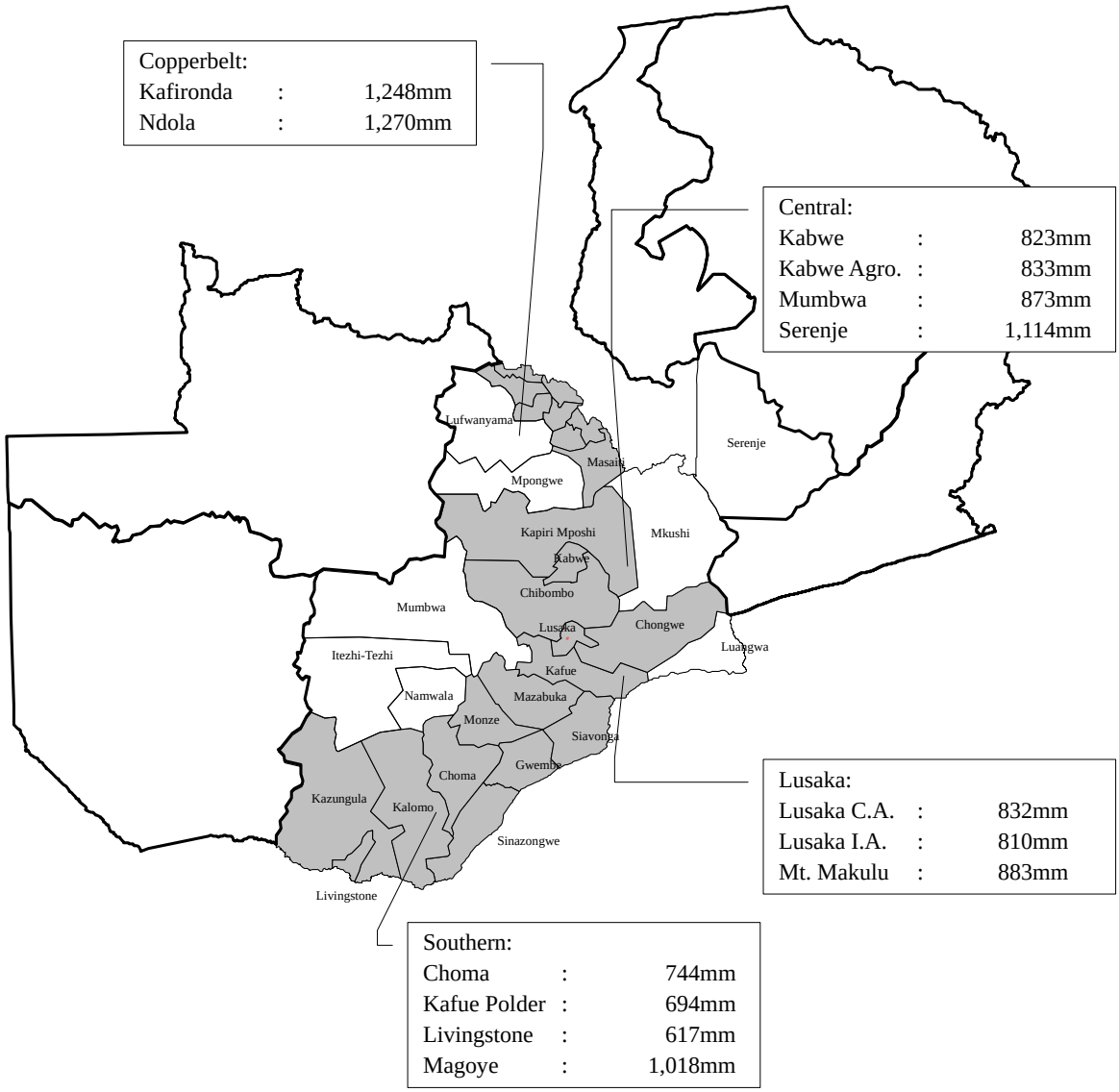



Fig. 3.1.1 Annual Rainfall in the Study Area

(c) Other meteorological conditions

1) Evaporation

The average annual pan-evaporation ranges from 1,666mm to 2,814mm, and its average is 2,061mm in Zambia. Copperbelt Province has the lowest annual pan-evaporation of 1,865mm on average. Monthly pan-evaporation is high from August to November, and is low from December to July.

Table 3.1.4 Provincial Average of the Annual Mean Pan-Evaporation

| Province | Annual pan-evaporation (mm) | Province | Annual pan-evaporation (mm) |
|---|---|---|---|
| Lusaka | 2,218 | Northwestern | 1,932 |
| Copperbelt | 1,865 | Western | 2,300 |
| Central | 2,105 | Luapula | 1,983 |
| Southern | 2,045 | Northern | 1,907 |
| | | Eastern | 2,211 |
| | Total average in Zambia | | 2,061 |

Source: Meteorological Department

2) Sunshine duration

Table 3.1.5 Provincial Average of the Annual Mean Sunshine Duration

| Province | Annual sunshine duration (hr) | Province | Annual sunshine duration (hr) |
|---|---|---|---|
| Lusaka | 2,800 | Northwestern | 2,670 |
| Copperbelt | 2,760 | Western | 3,104 |
| Central | 2,943 | Luapula | 2,671 |
| Southern | 3,064 | Northern | 2,783 |
| | | Eastern | 2,773 |
| | Total average in Zambia | | 2,842 |

Source: Meteorological Department

3) Relative humidity

Table 3.1.6 Provincial Average of the Annual Mean Relative Humidity

| Province | Annual sunshine duration (%) | Province | Annual sunshine duration (%) |
|---|---|---|---|
| Lusaka | 63.9 | Northwestern | 65.1 |
| Copperbelt | 65.5 | Western | 62.5 |
| Central | 64.2 | Luapula | 65.8 |
| Southern | 59.4 | Northern | 65.5 |
| | | Eastern | 65.0 |
| | Total average in Zambia | | 64.2 |

Source: Meteorological Department

4) Wind speed

Table 3.1.7 Provincial Average of the Annual Mean Wind Speed

| Province | Annual sunshine duration (m/sec) | Province | Annual sunshine duration (m/sec) |
|---|---|---|---|
| Lusaka | 1.8 | Northwestern | 1.4 |
| Copperbelt | 1.6 | Western | 1.5 |
| Central | 1.8 | Luapula | 1.6 |
| Southern | 1.8 | Northern | 1.7 |
| | | Eastern | 1.4 |
| | Total average in Zambia | | 1.6 |

Source: Meteorological Department

(2) Hydrological conditions

The Study area is broadly divided into three (3) river basins, namely the Zambezi, Kafue and Luangwa river basins. The following are characteristics of the river basins in Zambia:

Table 3.1.8 River Basins in Zambia

| River basins | Catchment area ($km^2$) | | | No. of discharge ref. points | No. of river basin | Main tributaries |
|---|---|---|---|---|---|---|
| | In Zambia territory | Out of Zambia territory | Total area | | | |
| Zambezi | 268,235 | 418,814 | 687,049 | 17 | 20 | Kabompo<br>Lungwebungu<br>Luena<br>Luaninga |
| Kafue | 156,995 | 0 | 156,995 | 13 | 15 | Mwambashi<br>Luswishi<br>Lunga |
| Laungwa | 144,358 | 3,264 | 147,622 | 5 | 8 | Lukusashi<br>Lunsemfa |
| Chambeshi | 44,427 | 0 | 44,427 | 3 | 3 | Lukulu |
| Luapula | 113,323 | 60,073 | 173,396 | 6 | 6 | Kalungwishi |
| Lake Tanganyika | 15,856 | 233,144 | 249,000 | 1 | 2 | Lufugu |
| Other basins | 8,658 | - | 8,658 | - | 2 | |
| Total | 751,852 | 482,151 | 1,225,345 | 45 | 56 | |

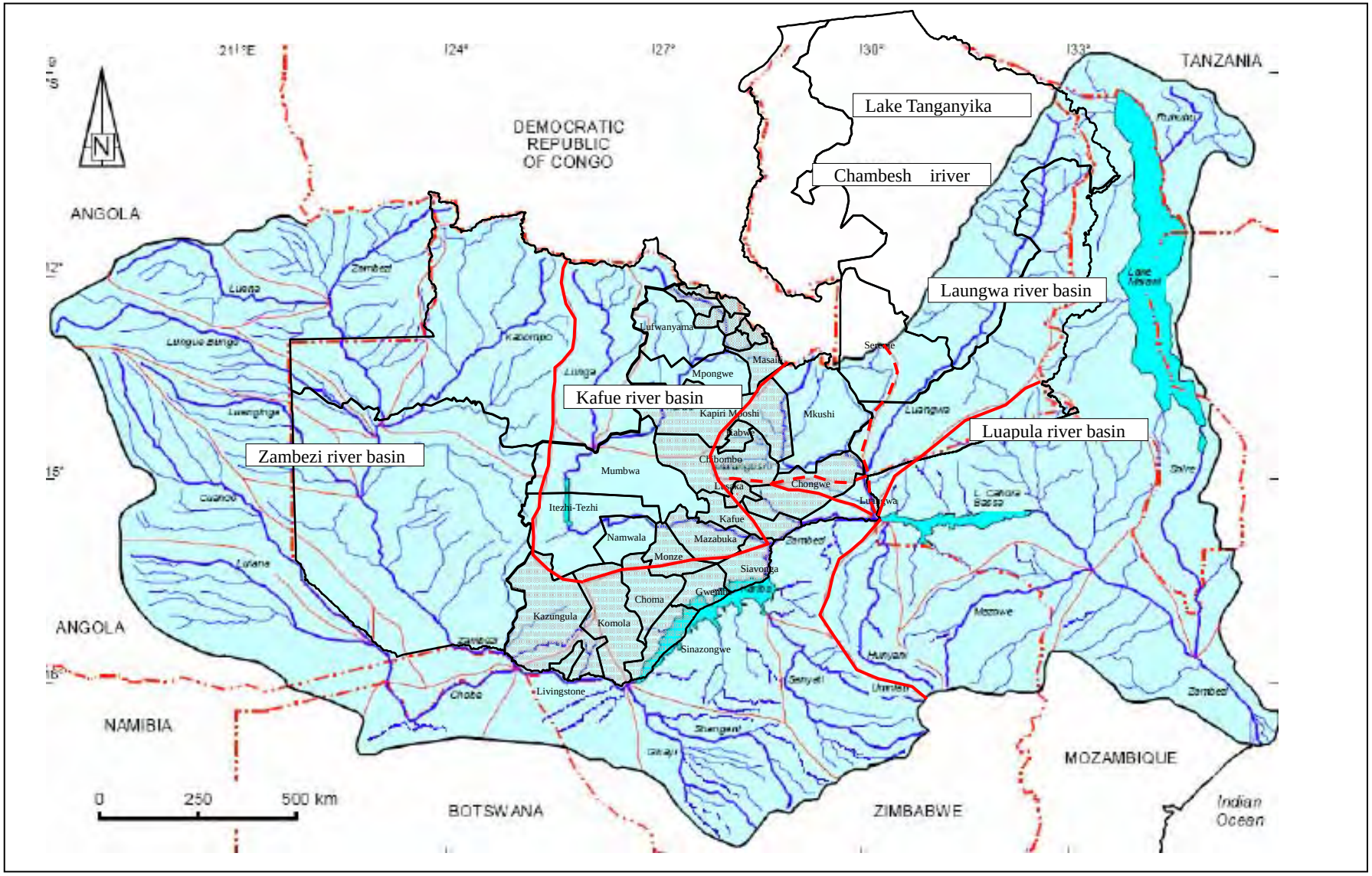
Source: Department of Water Affairs

Table 3.1.9 Flow Regime of River Basins

| River basins | Observation site | Discharge ($m^3$/sec) | |
|---|---|---|---|
| | | High discharge | Drought discharge |
| Zambezi | Kariba dam | 1,083 | 482 |
| Kafue | Influence with Zambezi river | 431 | 125 |
| Laungwa | Influence with Zambezi river | 912 | 43 |

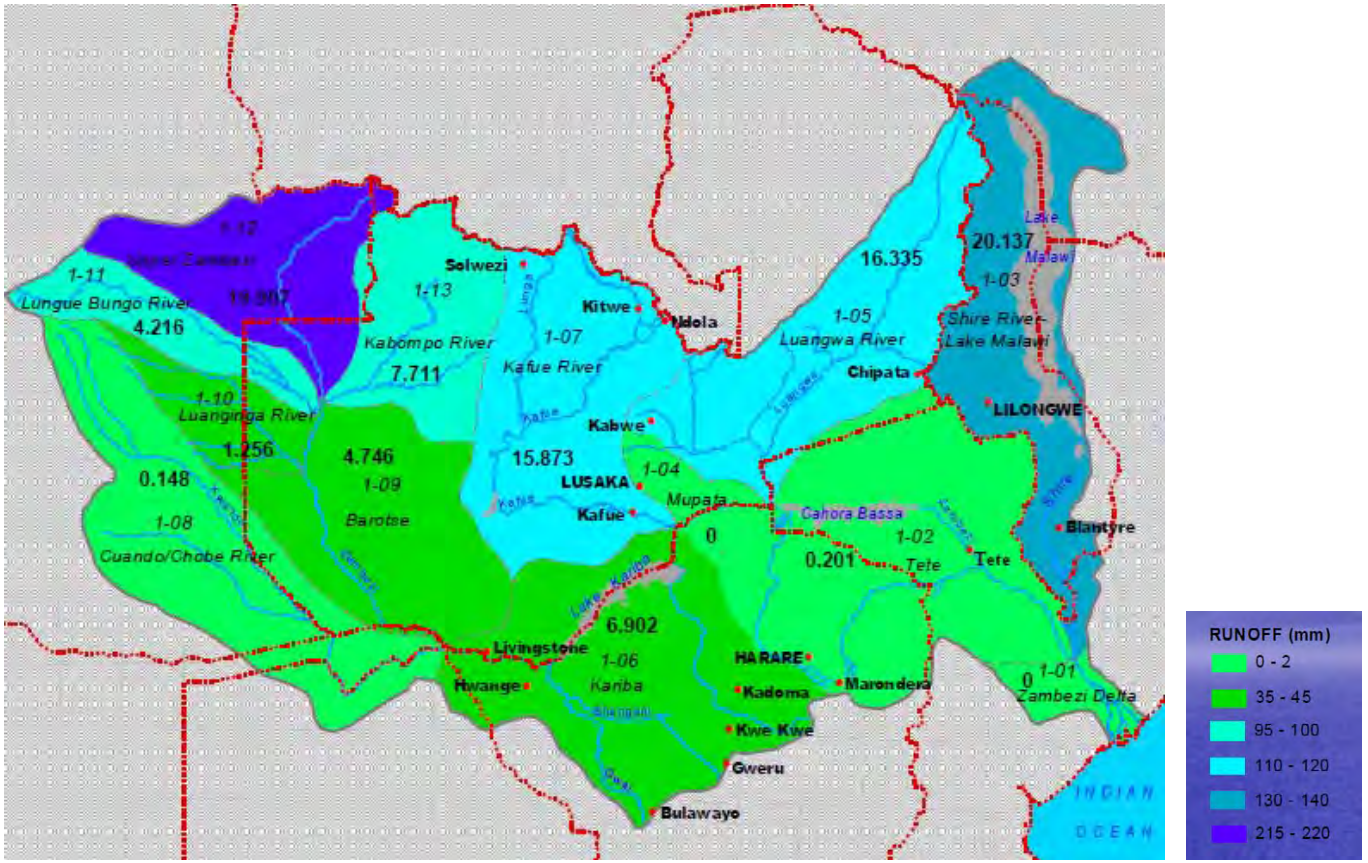
Source: Department of Water Affairs

Main Catchment area in Zambia is shown in Fig. 3.1.2, and runoff rate of each river basin is shown in Fig. 3.1.3 Run-off rate of about 95 to 100 mm (about 16% of run-off coefficient) is observed in the Kafue River basin.




Source: Ministry of Energy and Water Development, Zambia

Fig. 3.1.2 River Basins of the Zambezi River




Source: Ministry of Energy and Water Development, Zambia

Fig. 3.1.3 Runoff Rate of the Zambezi River Basin

"Dambo" water is also one of the surface water resources. However few observation studies have been conducted in Zambia.

### 3.1.5 Vegetation and Land Use

Based on the Integrated Land Use Assessment (ILUA) classification, the national vegetation is classified into the forest areas; 1) the evergreen forests, 2) the deciduous forests, 3) the semi evergreen forests, 4) the shrub thickets and all tree less areas comprising riverlines, plains, dambos are 5) grasslands (or wooded grasslands), and non forest areas; 1) crop land, 2) built up land, 3) inland water land and 4) other land, respectively.

In addition to the natural vegetation types, plantation forests of tropical pine and eucalyptus covering an area of about 61,000 ha have been established countrywide with 80 % of these occurring in the Copperbelt Province. About 51,000 ha of industrial plantation are managed by parastatal companies.

Concerning the land use of the targeted Study four (4) provinces, the largest portion of the total land area is found under the forest land use (54.4%), which is lower than the Zambian average with 61.9%. The Lusaka Province has the lowest case with only 43.2% of forest cover against the total land. Among the forest area of the Study Provinces, the semi-evergreen forest occupies more than half of the total forest area.

The area of crop cover per respective total provincial land area indicates that the Central Province is most cropped area with 29.3 %, following the Central Province are Lusaka Province with 28.9 %, Southern Province with 25.8 % and Copperbelt Province with 22.5 % respectively. In term of acreage, the total crop land area of the Provinces in the Study area is estimated to be 64,170km$^2$ of which 27,680km$^2$ in the Central Province; 22,590km$^2$ is the Southern Province; 7,300km$^2$ is in the Copperbelt Province; and 6,600km$^2$ in the Lusaka Province.

The largest portion of the built up land (both urban and rural) in the Study area is 26.0 % in the Lusaka Province which is the highest portion in all Zambia.

Table 3.1.10 Land Use of the Study Area

| Province / Classification | Zambia | | Study Area (Province) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Copperbelt | | Central | | Lusaka | | South | | Total | |
| Total Land Area (km$^2$) | 752,610 | (100.0%) | 32,450 | (100.0%) | 94,520 | (100.0%) | 22,830 | (100.0%) | 87,410 | (100.0%) | 237,210 | (100.0%) |
| Forest Area | 465,570 | (61.9%) | 18,940 | (58.4%) | 49,140 | (52.0%) | 9,860 | (43.2%) | 51,030 | (58.4%) | 128,970 | (54.4%) |
| Evergreen | 18,620 | (2.5%) | 760 | (2.3%) | 1,970 | (2.1%) | 390 | (1.7%) | 2,040 | (2.3%) | 5,160 | (2.2%) |
| Deciduous | 121,980 | (16.2%) | 4,960 | (15.3%) | 12,880 | (13.6%) | 2,580 | (11.3%) | 13,370 | (15.3%) | 33,790 | (14.2%) |
| Semi-evergreen | 262,580 | (34.9%) | 10,680 | (32.9%) | 27,710 | (29.3%) | 5,560 | (24.4%) | 28,780 | (32.9%) | 72,730 | (30.7%) |
| Shrub | 13,970 | (1.9%) | 570 | (1.8%) | 1,470 | (1.6%) | 300 | (1.3%) | 1,530 | (1.8%) | 3,870 | (1.6%) |
| Grass land | 48,420 | (6.4%) | 1,970 | (6.1%) | 5,110 | (5.4%) | 1,030 | (4.5%) | 5,310 | (6.1%) | 13,420 | (5.7%) |
| Non-Forest Area | 287,040 | (38.1%) | 13,510 | (41.6%) | 45,380 | (48.0%) | 12,970 | (56.8%) | 36,380 | (41.6%) | 108,240 | (45.6%) |
| Crop land | 151,050 | (20.1%) | 7,300 | (22.5%) | 27,680 | (29.3%) | 6,600 | (28.9%) | 22,590 | (25.8%) | 64,170 | (27.1%) |
| Built up land | 81,320 | (10.8%) | 5,730 | (17.7%) | 14,220 | (15.0%) | 5,930 | (26.0%) | 12,520 | (14.3%) | 38,400 | (16.2%) |
| Inland water land | 30,240 | (4.0%) | 320 | (1.0%) | 2,480 | (2.6%) | 200 | (0.9%) | 1,160 | (1.3%) | 4,160 | (1.8%) |
| Other land | 24,430 | (3.2%) | 160 | (0.5%) | 1,000 | (1.1%) | 240 | (1.1%) | 110 | (0.1%) | 1,510 | (0.6%) |

Source: Integrated Land Use Assessment (ILUA) Zambia 2005-2008, MTEN/FAO

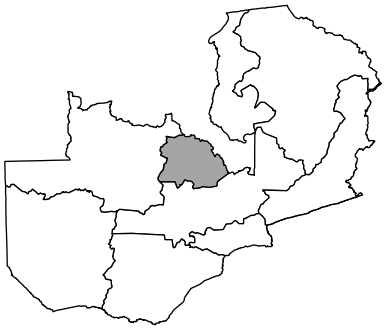
## 3.2 Profile of Targeted Provinces and Districts

The Study area is composed of 23 Districts in the four provinces. The profile of the Provinces is as follows:

### 3.2.1 Copperbelt Province

(1) Geography

Copperbelt Province covers an area of 31,328 km$^2$, which is about 4.2% of the total area of Zambia.



Administratively the province is divided into ten districts, namely: Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Lufwanyama, Masaiti, Mpongwe, Mufulira abd Ndola. Ndola is the Provincial Headquater.

The province has a tropical climate with three distinct seasons, the cool and dry season, the hot and dry season and the hot and wet season. The province has reliable rainfall of 1,400 mm per annum with moderate temperature suitable for crops. Perennial streams and rivers exist in the province, providing excellent conditions for irrigation throughout the year. Average temperature ranges from 15ºC in July to 37ºC in October.

(2) Economy

Copperbelt Province is one of the most developed provinces in the country due to its rich mineral deposits. The province hosts the copper mines that have for many years been the mainstay of the country's economy and have provided over 80 % of the foreign earnings. The mines have been the major employers of the Zambian population. Apart from copper, the province is also endowed with other non-ferrous metals such as cobalt, silver, gold, precious and non-precious stones.

(3) Agriculture

The province has now gone into accelerated agricultural production following the drive to diversify its economy to reduce dependency on copper mining. However, the province has not fully exploited its agriculture potential. Out of the 3,132,829 ha, 1,577,000 ha are arable land. Of the arable land, only 307,000 ha are under cultivation. Crop farming is the primary agricultural activity. Major crops grown include: maize, tobacco, coffee, cotton, and sugar cane, oil seeds, cashew nuts, paprika, ginger, fruits and vegetable. The province through not a traditional livestock area has a number of poultry, cattle, diary and small ruminants rearing farmers. However, the province is still not self-sufficient in livestock and cattle dairy products and depends on other provinces to meet the demand. Fish farming is also practiced in the province. It boasts 1,062 fishponds and 259 fish farmers. (Poverty Reduction Strategy Paper 2002- 2004)

Copperbelt Province is one of the major suppliers of hardwood and softwood. It has well established forestry related activities, such as saw milling, paper, pulp and furniture industries. Saw milling is the most developed industry. Furthermore, the province is rich in melliferous tress that provides raw materials for bee's food. However, the province has in the past ten years experienced depletion of forests due to unstable exploitation such as charcoal burning and inappropriate agricultural farming practices. This has led to soil erosion, loss of bio-diversity, dwindling ability to recharge both surface and ground water and general environmental degradation. (Poverty Reduction Strategy Paper 2002-2004)

(4) Working Population by Occupation

The three most common occupations for males are production and related works (25.5 % in 2000), agriculture (31.9 % in 2000) and professional, technical and related occupations (11.8 % in 2000).

The three most important occupations for females are agriculture (48.1 % in 2000), sales works (19.4 % in 2000) and professional, technical and related occupations (10.7 % in 2000. In rural areas, the distribution of workers among the various occupations is similar to the one for total Copperbelt, except that the proportion of workers who are in agriculture and related occupations is much higher in rural areas.

### 3.2.2 Central Province

(1) Geography

Lying in the heart of Zambia, the Central Province has a total landmass of 94,394 km$^2$. It shares borders with Lusaka Province in the south, Southern and Western Provinces in the west, Eastern Province in the east, Copperbelt, North-Western, Northern and Luapula Provinces in the north.

It is the fourth largest province in terms of land area after Northern, Western and North-Western Provinces. Administratively Central Province is divided into six Districts, namely, Chibombo, Kabwe, Kapiri Mposhi, Mkushi, Mumbwa and Serenje. Kabwe is the provincial headquarters.

Three of the four main agro-ecological zones identified in Zambia are found in this province. The north high rainfall zone characterized by high rainfall ranging from 1,000- 1,400 mm and poor leached veld soils, central and southern plateau zone characterized by the most fertile soils in the province suitable for cotton and maize cultivation and Luangwa- Zambezi rift valley zone characterized by low rainfall. The main soil types are red clays and red-brown loams, suitable for commercial farming. Temperatures range from 24°C in October to 16°C in July. Annual rainfall varies from 1,000 mm in the northeast to under 800 mm in the southern areas of Luangwa valley and Kafue flats.

(2) Economy

Until 1990s, mining was an important economic activity in the province. However the closure of the mines has made mining less important. The mining operations are Kabwe Lead and Zinc mines and a small gold mine in Mumbwa closed in 1993/94. Currently, Nampundwe Copper mine is the only operational mine in the province. Competition in imported products and the increasing cost of production have caused the closure of several important industries, which include the renowned Kapiri Glass Factory. However, a number of factories still exist, including Mulungushi Textiles and Mumbwa Cotton Ginnery.

(3) Agriculture

Agriculture is now the main economic activity in the province, following the closure of mines and other manufacturing enterprises. The province is the most important producer of nearly all-edible crops marketed in the country the major one being maize. Other crops include sunflower, cotton, soya beans, wheat, tobacco, groundnuts and kenaf.

Fishing is also a major economic activity in the province. Fishery resources consist of South Bangweulu, Lusiwashi and Lukanga flats. However, fish production has been declining over the years.

For instance annual fish production from Lukanga was 1,481 metric tons in 2000, down from 1,632 in 1998. Similar trends have been observed in Lusiwashi fishery. There is also an increasing interest in aquaculture in the province. The province has 1,240 fishponds and 536 fish farmers. These are mainly concentrated in Mumbwa, Serenje and Mkushi districts. (Source: Zambia Poverty Reduction Strategy Paper, 2002-2004) Central Province has considerable tourists' sites and access to a number of parks and important national heritage sites.

(4) Working Population by Occupation

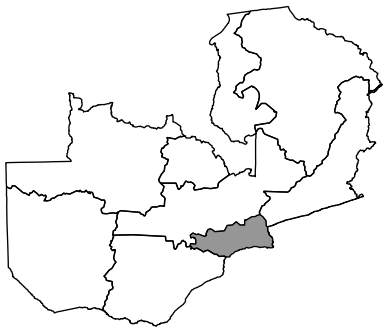
The industrial structure in Central province continues to be dominated by the agriculture industry. In 2000 the agriculture sector employed 77.4 % of the labor force, the mining industry employed 0.3 %. In comparison to 1990, agriculture and trade were the only sectors that had recorded an increase. Agriculture had increased from 60 % in 1990 to 77.4 % in 2000 and trade had increased from 3.0 % in 1990 to 4.9 % in 2000.

The industrial distribution of workers by employment status revealed that the unpaid family workers (90.1 % in 2000) and the self-employed (81 % in 2000) are mostly in the agricultural sector. Employees are more widely distributed over the industries than any other employment status. Employers were more predominant in agriculture (46 % in 2000) and community and personal services (13 % in 2000).

### 3.2.3 Lusaka Province

(1) Geography

Lusaka Province has the smallest surface area covering 21,896 $km^2$ among other provinces in Zambia. It shares boundaries with Central Province in the north, Southern Province in the south and Eastern Province in the east. It also shares an international boundary with Mozambique in the southeast side. Administratively, the province is divided into four districts, namely: Chongwe, Kafue, Luangwa and Lusaka. Lusaka city is both the provincial headquarter as well as the capital city of Zambia.



The province has two major rivers, namely Kafue and Luangwa Rivers. Some of the largest variations in altitude in the country are found in Lusaka Province. The area surrounding the city rests on a highland plateau covering a quarter of the province. It also has a valley and escarpment along the eastern and southern parts. Altitude ranges from 300-400 m above sea level in the valley to 1,200-1,400 m above sea level on the plateau. The plateau has rich soils and sufficient rains while the valley has poor soils and insufficient rains with annual rate of 600 to 800 mm.

Lusaka's major tourism attractions include: Lower Zambezi National park, Munda Wanga Gardens, Kabwata Village, Lusaka Museum and Chinyunyu hot springs. Lusaka also serves as an entry point for foreign tourist destined to Zambia's countryside. Lusaka International Airport is connected to tourist centers such as Livingstone, Mfuwe and all the province and district centers.

(2) Economy

There are a lot of economic activities taking place in Lusaka Province. Among these there are manufacturing, quarrying, trading and farming. The province is also the headquarters to many companies, institutions and organizations such as banks, trading and manufacturing companies, mining companies, Government Departments and Non-Governmental Organizations. There are no major mineral deposits in the province. Quarrying and stone crushing are the only mining related activities being done by a number of private quarry owners.

(3) Agriculture

Lusaka Province saw a decline in maize production between 1990 and 2000 due to large-scale farmers' shift from its production to other crops of high value such as flowers and baby corn. An increase in production was recorded for crops like cotton seed and wheat in the period under review. Other crops produced in Lusaka Province are sorghum, sunflower, groundnuts, seed cotton, soya beans, paddy rice and barley tobacco.

(4) Working Population by Occupation

The industrial structure in Lusaka Province continues to be dominated by the community industry. In 2000 the community sector employed 25.5 % of the workers, the trade industry employed 20.7 % and agriculture employed 16.4 %, while transport industry employed 8.6 %. In comparison to 1990, the trade sector has recorded the highest increase from 10.3 % in 1990 to 20.7 in 2000, while agriculture and electricity industry recorded the slightest increase.

The most significant is manufacturing (8.4 % in 2000). A study of the shifts of workers from one industry to another shows that all non-agricultural industries (with the exception of trade, electricity and community industry) experienced manpower losses during the 1990's, while the agricultural, trade and community gained manpower. The industrial distribution of workers by employment status revealed that the unpaid family workers (60.5 % in 2000) were mostly in the agricultural sector. Self-employed and Employees are more widely distributed over the industries than other statuses. Employers were more predominant in trade (41.7 % in 2000) followed by agriculture (17.6 % in 2000).

### 3.2.4 Southern Province

(1) Geography

Found in the southern part of Zambia, the province covers an area of 85,283 km$^2$, about 11.8 % of the total area of Zambia. It forms boundaries with Western Province in the western side, Central Province in the north and Lusaka Province in the north-eastern side. It also shares borders with Zimbabwe, Botswana and Namibia in the south. Administratively, the province is divided into eleven (11) districts, namely: Choma, Gwembe, Itezhi-tezhi, Kalomo, Kazungula, Livingstone, Mazabuka, Monze, Namwala, Siavonga and Sinazongwe. Livingstone is the administrative capital of Southern Province boasts of many tourist

attractions, the major one being Victoria Falls.

There are four main rivers, Zambezi, Kafue, Kalomo and Ngwezi and two artificial lakes, Kariba and Itezhi-tezhi. Other attractions include wildlife and bird viewing in Musi-oTunya, Kafue and Lochnivar National parks, etc.

The province lies in a low rainfall zone of the country. Temperatures range from 14°C to 35°C. The soil type of this province is mostly sandy loam, which is a plateau soil. Topographically, the province is divided into four areas, which are valley, plateau, escarpment and Kafue flats.

(2) Economy

Prior to 1991, Southern Province, especially Livingstone had many manufacturing (textile) industries. Currently, there are two textile industries, one dairy, one wood processing and one grain milling. There is a substantial dairy and game ranching and a number of agro-processing operations in Choma and Mazabuka Districts. In addition, medium scale ginneries are also established to support cotton industry in Kalomo and Sinazongwe. Sugar is produced in Mazabuka by Nakambala Sugar Plc, which employs about 6,036 people, while about 1,400 are employed by small-scale sugar cane out growers. Coal Production at Maamba Collieries is the main mining activity in the province. Coal deposits are also found in other parts of Sinazongwe District. There is also exploitation of amethyst at Mapatizya Mine in Kalomo and tin in Choma at a small-scale level.

(3) Agriculture

Before 1991, Southern Province was the main producer of Zambia's staple food (maize). However, frequent droughts have led to a fall in production coupled with poor produce and input marketing arrangements. In spite of the drought, however, the soils in Southern Province have a large potential for Upland rice, wheat, maize and vegetables. Other crops include sorghum, cotton, tobacco and beans.

Since 1990, livestock population in the province has been going down. The number of cattle, pigs, sheep and goats decreased by half between 1996 and 1999.

Animal diseases contributing to the decrease include corridor, east coast fever and foot and mouth.

(4) Working Population by Occupation

The industrial structure in Southern Province continues to be dominated by the agriculture industry. In 2000 the agriculture sector employed 73.4 % of the workers, the mining industry employed 0.5 %, and secondary activities together employed 5.1 %, while tertiary industries together employed 15.4 %. In comparison to 1990, agriculture, construction, trade and community sectors recorded an increase. However, it must be noted that there was major increase in the agriculture sector as compared to the other three sectors. This suggests that the majority of the retrenches, retirees and those who are fired have taken up agricultural activities. The industrial distribution of workers by employment status revealed that the unpaid family workers (90.8 % in 2000) and the self-employed (76.5 % in 2000) were mostly in the agricultural sector. Employees are more widely distributed over the industries than other statuses. Employers were more predominant in agriculture (31.8 % in 2000) and community and personal services (17.2 % in 2000).

## 3.3 Agriculture

### 3.3.1 Faming Systems

The analysis of the four Study areas on the condition of small-scale farming system confirmed that the areas can be divided into three agro-ecological zones (I, II, and III). Due to the mixed densely-inhabited and remotely-situated districts, variety of farming styles are observed with its backbone in cereal crops such as rain-fed crops of maize.

### 3.3.2 Crop Production

Among the Study areas, Central and Southern Provinces are the main production area of maize, sorghum, black-eye pea, tobacco, paprika and wheat. Lusaka province is the smallest of all however, it's the top in the production of potato, paprika, wheat and soya beans. As a whole, the four provinces produce more than half of the national production of wheat, paprika, black-eye pea, potato, Virginia tobacco, and soya beans. In contrast, the Study areas are hardly involved in rice production.

(1) Copperbelt Province

Copperbelt Province has a total area of 3.1 million ha. The province borders the Democratic Republic of Congo on the east and north. The population is approximately 1.58 million in 2004, and thus it is the largest province in Zambia. 80% of the population lives in the urban areas.

The province belongs to the agro-ecological zone III, with 1,000-1,400mm of rainfall per year. It is a characteristic of this province that many of the farm workers began to farm after leaving mining companies. The province ranked third for the production of sweet potato and soya beans as well as wheat.

(2) Central Province

Central Province is indeed situated in the center of Zambia, and has a total area of 9.1 million ha. The population is approximately 1.01 million, with the half living in rural areas. The entire province locates on a plateau at an elevation of around 1,000m, and belongs to the agro-ecological zone II. Annual rainfall is 800-1,000mm. There are reported to be approximately 120,000 small scale agricultural households in the province. The province ranked in the first for the production of wheat, soya bean, sweet potato and Virginia tobacco, nationwide. Moreover, it is also the second in the production of wheat. Livestock has been an important industry, thus the lands are also used for animal plowing.

(3) Lusaka Province

The capital, Lusaka, is situated in Lusaka Province, which has a total area of 2.3 million ha. It is the smallest of the Zambian provinces. The population is approximately 1.53million, the second largest population after Copperbelt Province. 82% of the population lives in the urban areas; hence the rural population is rather small.

The south and east of the province belong to the agro-ecological zone I. With 800mm or less of rainfall per year, they are constantly threatened by drought. The highland areas of the north, including the city of Lusaka, and the west, belong to the agro-ecological zone II, with 800-1,000mm of rainfall

per year. Maize accounts for 90% of crop planting in the province, with some cultivation of sorghum, sunflower, groundnuts and cotton. The productions of wheat and soya beans are the second highest, nationwide. Agriculture in suburban areas is common to supply the city with fresh vegetables

(4) Southern Province

Southern Province is situated in the south of Zambia, and has a total area of 8.5 million ha. The population was approximately 1.21 million of which 77% lives in rural areas. It is on the border with Zimbabwe in the south and Botswana in the southwest. There are abundant water resources, such as Lake Kariba, Zambezi River and Kafue River, but irrigation facilities have not been developed across the whole area, other than on commercial farms. Thus in the dry season, water shortage is the problem for agricultural production.

This province is split into the agro-ecological Zones I and II. Zone I is a lowland (500-1,000m) which spreads along the Zambezi River, covering around 20% of the total area of the province. It is a semi-arid zone with annual rainfall of 800mm or less, and is not suitable for agricultural production. The remaining 80% of the province is Zone II, which is a plateau at 1,000-1,400m elevation, with annual rainfall of 800-1,000mm. There are many large farms along the railway lines. The soil is relatively rich, and the land is well suited for agricultural production, if irrigation water is available. In crop cultivation, the production of sorghum, that is a type of drought resistance crop, is the first in nationwide followed by maize. Groundnuts, sunflower, wheat and cotton are also the main crops of the province.

### 3.3.3 Agricultural Situation of Selected Irrigation Schemes

This sub-chapter provides information on the agricultural situation of selected irrigation schemes as related to the farm management study carried out from November to December 2009 on sample farms in 5 schemes, namely Chunga in Lusaka district, Chipapa in Kafue district, Ipafu in Chingola district, Chapula in Kalulushi district, and Nkandabwe in Sinazongwe district,.

(1) Main crops

Maize as the staple crop is also the basic crop for all farmers who also cultivate vegetables and beans in a limited area. However, the types of crops and area of cultivation differ from farmers and regions.

The number of crops cultivated per farm varies on average from one to five depending on the available labor, the area of arable lands and the available irrigated fields. Among the schemes, Chunga scheme records the highest number of crops cultivated with 10 crops, which may confer to this scheme the most advanced area of crop diversification. Chunga scheme is followed by Ipafu scheme with 8 crops cultivated. In fact, market mammies and buyers come to both schemes to directly buy crops in the fields.

The cropping pattern in Chunga scheme consists of associating maize cultivation with fresh maize and vegetables in the dry season. On the other hand, the number of crops cultivated in Chipapa scheme is limited, and the cropping pattern includes maize cultivation and beans in the dry season. Bean is given a high importance as a cash crop. The cropping pattern in Ipafu scheme includes the cultivation of maize and vegetables in the dry season. A few farmers grow coffee in this scheme. In Chapula scheme, the cropping pattern consists of maize cultivation, and the inter-cropping of fresh maize and ground

nuts in the dry season. Furthermore, sweet potatoes and cabbages are grown in limited areas in this scheme. The cropping pattern in Nkandabwe scheme is similar to that in Chapula scheme which consists of maize cultivation and the mixture of fresh maize, cowpea, and tomatoes in the dry season.

(2) Cash crops

Various crops are cultivated in the irrigation schemes. The combination of crops is different from one scheme to the other. However in every scheme maize and fresh maize are considered important cash crops. The main cash crops in Chunga scheme are rape, mustard spinach, leaf vegetables such as cabbages, which is closer to big markets.

On the other hand, in Ipafu scheme where the market opportunities are abundant, variety of vegetables are grown such as cabbages, tomatoes and so on for the regional markets as well as Solwezi district in North-West province and the cross-border trading with the DRC.

In Nkandabwe scheme, which is far from regional markets, dry cowpea and maize are mainly cultivated. In Chipapa scheme fresh cowpea is grown as the main crop. In addition, chili, which is not found in other schemes, is also grown. These may be sale strategies for farmers

(3) Cropping season for smallholders

The prices of vegetables vary greatly depending on season, demand and supply. Therefore, sales amount heavily depends on the cultivation/shipping season decided by farmers. The following figure shows the wholesale’s prices of tomato in 2008 and 2009 at Soweto Market and different cropping seasons for smallholders in the study area. There are two-fold differences in wholesale prices during the cropping seasons. Currently, most smallholders are unable to cultivate during high price seasons.

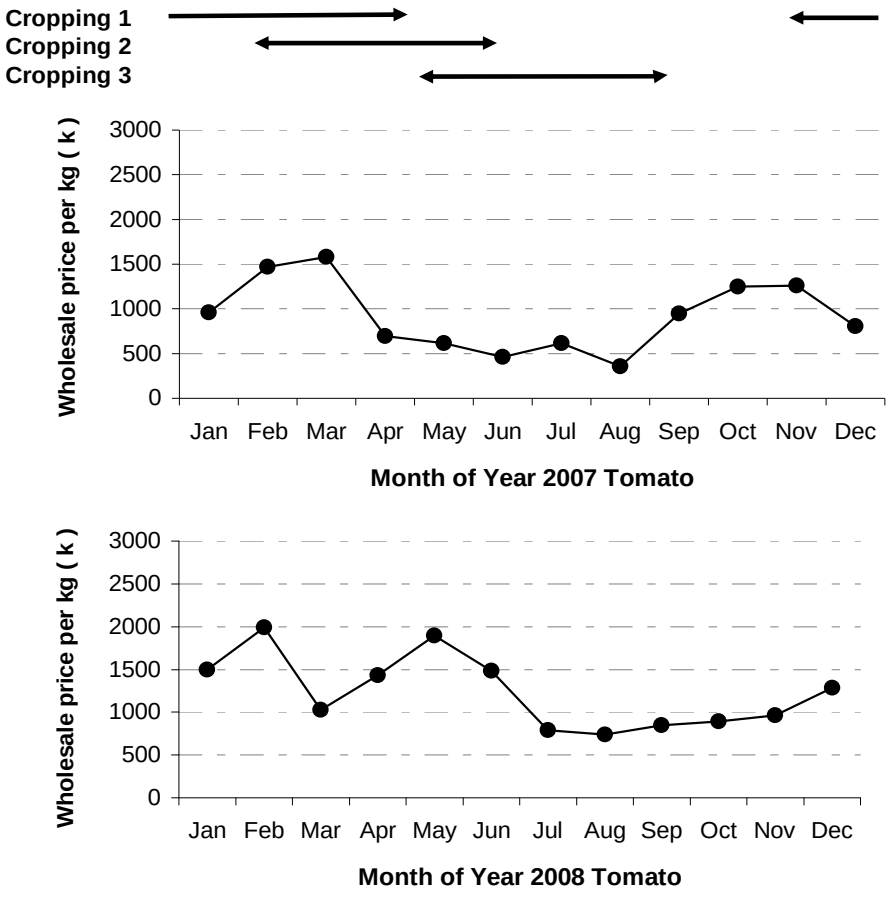



Fig 3.3.1 Cropping Season and Wholesale Prices of Tomato

Notes: Wholesale Price / Area: Soweto Market
Source: JICA Study Team and Munguzwe Hichaambwe (May, 2010)*
*Munguzwe Hichaambwe (2010) Data for the JICA Study on the Master Plan for Promotion of Irrigated Agriculture for Smallholders in Peri-Urban Areas in the Republic of Zambia.

(4) Profitability of crops

In the study area, it is expected that high yield of vegetables can be achieved with the dissemination of hybrid seeds. According to the farm survey, tomatoes, carrots, green beans, cabbage, okra and rape are comprehensively high potential vegetables due to profitability, yield potential, easy selling etc. Green beans and cabbage have good profitability, making them suitable for key crops. In addition, tomatoes and okra can prolong the harvesting periods if well managed. The following data concern the dry season and income is expected to increase in the pre-harvest selling period.

Table 3.3.1 Profitability of Major Products

| Crop | Production Cost | Gross Income | Net Income | | |
|---|---|---|---|---|---|
| | ZMK/lima | ZMK/lima | ZMK/lima | ZMK/0.5lima | ZMK/0.25lima |
| Tomatoes | 3,513,000 | 7,325,000 | 3,812,000 | 1,906,000 | 953,000 |
| Carrots | 3,600,000 | 7,812,000 | 4,212,000 | 2,106,000 | 1,053,000 |
| Green beans | 2,482,000 | 10,416,000 | 7,934,000 | 3,967,000 | 1,983,500 |
| Cabbage | 2,468,000 | 10,868,000 | 8,400,000 | 4,200,000 | 2,100,000 |
| Cauliflower | 2,410,000 | 11,589,000 | 9,179,000 | 4,589,500 | 2,294,750 |
| Okra | 1,700,000 | 4,800,000 | 3,100,000 | 1,550,000 | 775,000 |
| Rape | 2,044,000 | 4,285,000 | 2,241,000 | 1,120,500 | 560,250 |

Source: JICA Study Team (2010), see also Annex A (Farm Management) / 4.2 Crop Budgets of Major Vegetables.

### 3.3.4 Conservation Farming (CF)

a) Objectives of conservation farming

The key objectives of CF are defined by its promoters as follows:

- To restore soil fertility to land damaged by years of excessive ploughing (compaction and formation of plough-pan layer) and heavy application of chemical fertilizers
- To improve on-farm yields and incomes with moderate input use, with the aim of achieving 8 t/ha yield of maize in typical smallholder conditions
- To use rainwater efficiently (especially for the agro-ecological zone I; part of Southern province where fields are susceptible to drought condition)

Accordingly, the following 4 standards or technological packages should be applied at the same time by farmers in order to achieve the above mentioned objectives.

- Dry season land preparation using minimum tillage methods
- No burning but rather retention of crop residue from the prior harvest (for surface mulching or incorporation into soil)
- Planting and input application in fixed planting stations
- Nitrogen-fixing crop rotations[2]

b) Expansion of CF and its effects

CF has been practiced by more than 120,000 farmers in Zambia. In addition, the Conservation Farming Unit (CFU) of ZNFU aims that 250,000 households or about 30 % of small scale agriculture community practice CF by 2011[3]. Furthermore, the impact of CF confirmed that the yield had been increased by 50 to 100 % at the first year without considering seeds and fertilizer effects. And gradual soil improvement and decrease in weed density have also been verified (idem).

Although many researches on CF have been carried out in agro-ecological regions I and II, very little has been done in agro-ecological Zone III until recently. As a result, Kitwe district in Copperbelt Province together with the Provincial Technical Services Branch and the Copperbelt Research Station (ZARI-Mufulira) have been developing practices from the experiences acquired from agro-ecological Zones I and II through local research using demonstration plots installed in various places of the district, which are used as on- farm training centers for farmers in the province.

CF is a significantly effective farming method in Zambia as a whole, and government has been promoting it through its agricultural policy. Conservation Farming Unit (CFU) of the ZNFU is implementing field technical transfer to local farmers. The branches of ZNFU distribute the technical hand books (Conservation Farming & Conservation Agriculture Handbook) to farmers without cost. This handbook is categorized by each Agro-ecological region, and is translated into major language in Zambia. Currently CA (Conservation Agriculture) is well recognized as integrated approach as

[2] Haggblade S. and Tembo G. (2003), 'Conservation Farming in Zambia,' EPTD DISCUSSION PAPER NO. 108, International Food Policy Research Institute

[3] Mizuho Information and Research Institute (2009), "An examination study report on ways of contribution by food, agriculture, and farming community fields to global scale issues –promotion of environmental conservation agriculture and its adaptation for climate change- [*Tikyuteki kibo no mondai ni taisuru shokuryou, nougyou, nouson bunya no kouken shuhou ni kansuru kentou chousa houkokusho*]," MHIR, Tokyo.

farming system (including fertility control and crop rotations) other than CF, i.e., the narrower term that normally stands for specific field techniques for soil moisture control / water harvesting (with micro-basins) etc.

### 3.3.5 Extension Services

PEA is an extension approach and concept which includes a transformation of the ways of interaction between extension agents and farmers. The core of PEA is community-based extension and joint learning. Elements of participatory technology development (PTD) and social development approaches, for instance action learning and Training for Transformation, are integrated. '*The PEA learning cycle and operational framework suggests a holistic and flexible strategy, with steps in which a variety of extension methodologies and tools (including PRA tools) are flexibly integrated into each step*[4].'

### 3.3.6 Agricultural Credit

1) Historical background

Agriculture credit has been largely provided by quasi government institutions or parastatal companies since independence which did this through the provision of inputs credit and marketing of agricultural produce. The first widely known organization was the National Agricultural Marketing Board (NAMBOARD) which operated in all parts of the country. This institution became excessively big and was operating inefficiently at great cost to the government and was consequently disbanded. As a result, the input and output marketing functions were transferred to the Zambia Cooperative Federation (ZCF) to which provincial, district and multi-purpose cooperatives at the sub-district levels were affiliated. The inputs were available to farmers without collateral, and repayments were made, deducting the cost of inputs at the time of payments for the produce. Some level of lending to the sector also took place from commercial banks and specialized banks (Lima Bank) set up for the purposes of providing agriculture credit. Concessionary lending terms were developed for lending to especially small scale farmers using the placement of agricultural charges with the marketing institutions. In addition, input credit was provided to farmers through specialized crop out-grower schemes which included cotton, tobacco, sugar cane and paprika among others.

The cooperative movements were encouraged to generate their own resources in order to meet their agricultural input and output marketing functions. Quite often the provincial cooperatives ended up borrowing from commercial banks under government guarantees which made the government to pay the banks when the cooperatives failed to pay the huge debts that they accumulated with the banks.

Following the economic liberalization policies of the early 1990s, the new government opted to withdraw from agricultural marketing and appointed agents from the private sector to carry out this function. This meant that the cooperatives could not survive without government support and hence went under. These agents were initially Lima Bank, CUSA Zambia and ZCF Finance Services and later Cavmont Merchant Bank and SGS Zambia. This did not work well and the government had to

[4] J. Hagmann, E. Chuma, K. Murwira, M. Connolly (1999), '*PUTTING PROCESS INTO PRACTICE : OPERATIONALISING PARTICIPATORY EXTENSION*," Agren Network Paper No. 94, pp 2-3, Overseas Development Institute (Odi), London.

re-build the situation. Throughout this reform process, the official government objective was to encourage a vibrant private sector driven input distribution system to serve the needs of small-scale farmers. While private trade has been legalized, the government throughout the liberalization program continued to distribute large quantities of fertilizer either on loan or at a substantial subsidy, or both, in the major agricultural areas of the country, through the Food Reserve Agency (FRA) in the late 1990s. Three key difficulties encountered with these programs include: poor loan repayment, poor targeting, and late deliveries. In addition, the programs were costly and reduced financing available for other investments that might have increased fertilizer use more substantially. Repayments were reportedly less than 43% and the program had to be briefly stopped for further review. Consequently, only 11.4% of the small and medium scale farmers reported receiving credit in 2002/2003 season down from 42.3% in 1999/2000 season (see the table below). This led to over 80% of the seed transactions used by this category of farmers to come from cash purchases (23%) and use of own harvests (60%) as is shown in table 3.3.11.

Further reforms gave birth to the Fertilizer Support Program (FSP) administered through MACO district offices for registered members of primary cooperatives. The FSP has been undergoing reforms in recent years with the first of these having been implemented in the 2009/2010 season as the Farmer Input Support Program (FISP). Further reforms to the program are envisaged in the coming seasons.

Table 3.3.2 Proportion of Small and Medium Scale Farmers Using Different Transactions to Obtain Seed in 2002/2003 season

| | Main transaction used to get seed | | | | | |
|---|---|---|---|---|---|---|
| | Loan | Barter | Grant / gift / free | Own harvest | Cash purchase | Total |
| Central | 9.8% | 0.6% | 5.8% | 50.0% | 33.8% | 100.0% |
| Copperbelt | 6.8% | 0.0% | 8.7% | 50.8% | 33.7% | 100.0% |
| Eastern | 18.1% | 1.0% | 7.9% | 60.8% | 12.1% | 100.0% |
| Luapula | 2.1% | 0.8% | 8.2% | 70.0% | 18.9% | 100.0% |
| Lusaka | 9.7% | 0.0% | 8.2% | 14.6% | 67.5% | 100.0% |
| Northern | 1.6% | 0.5% | 6.6% | 77.2% | 14.1% | 100.0% |
| Northwestern | 3.0% | 0.0% | 4.3% | 81.4% | 11.3% | 100.0% |
| Southern | 8.6% | 1.4% | 16.6% | 29.7% | 43.7% | 100.0% |
| Western | 6.2% | 1.7% | 14.2% | 56.0% | 21.9% | 100.0% |
| Total | 7.9% | 0.8% | 8.7% | 60.0% | 22.6% | 100.0% |

Source: CSO/MACO/FSRP Second Supplemental Survey, 2004

2) Current situation and current system

Currently, agricultural credit is provided largely through the FISP, commercial banks, out-grower schemes and other private sector-farmer arrangements. According to the ZNFU (2009[5]), Zambia's agricultural finance market is largely dysfunctional with the farmers' perspective showing that credit is scarce and expensive and heavily skewed towards the larger, corporate sector. It is said that loan

[5] Taylor, M.; J. Dougherty and R. Munro, 2009. Zambia's Agricultural Finance Market: Challenges and Opportunities. PROFIT/ZNFU.

terms are quite often too short to accommodate the long term nature of agriculture, and the procedure of loan applications by banks takes too long. Bankers, on the other hand perceive lending to the agricultural sector as being too risky and expensive especially without very high collateral coverage. Non-performing loans in the agricultural sector now exceed 37%, against 13% across all other sectors of the economy. This high level of distress represents a serious loss for banks – one which will make them even more reluctant to lend in future. Thus, the agricultural finance market is caught in a self-perpetuating cycle of risk and loss, which benefits no one.

In addition to the normal risks associated with agricultural production – weather, macroeconomic instability, and price volatility – three factors account for the fundamental problems facing Zambia's agricultural finance market:

- A highly-risky lending environment caused largely by unpredictable government intervention as well as weaknesses in the legal framework;
- Limited understanding of agricultural markets and limited expertise in agricultural finance among most banks and other financial institutions;
- Poor risk management practices and limited financial analysis and management capabilities within the agricultural sector.

The difficulty of accessing loans from commercial banks is even more for the small and medium scale farmers dotted across the country. These categories of farmers have to rely on FSP to access input credit especially that for fertilizer. A smaller proportion is engaged in cotton outgrowing in Central, Southern and Eastern provinces, tobacco outgrowing especially in Eastern Province and sugar cane in Mazabuka district of Southern Province. Nationally representative data shows that only 5.6% of the seed planted by small and medium scale farmers in the 2007/2008 season was acquired through loans while 28.5% came through cash purchases and the majority (56.8%) from own harvests.

3) Future perspectives

Government and private sector stakeholders as well as cooperating partners are committed to making agricultural input and output marketing a success through reforms aimed at establishing a Private Public Partnership (PPP) marketing institutional arrangements in Zambia based on the riding principles of the Agricultural Marketing Development Plan (AMDP) and the Agricultural Input Marketing Plan (AIMP). One of the things that prevented the development of the agricultural credit market is the weak enforcement of legislation relating to contracts as well as agricultural marketing such as side selling in the case of out- grower schemes.

The Agricultural Credit Act was passed in 1995 as a means to reaffirm government commitment to market liberalization. The Act emphasized the building of the capacity of the private sector through institutionalized assistance and the promotion of joint ventures between public and private sectors to tap the potential complementarities between the two sectors in service delivery. This was a very welcome development as the Act provides for value, interest rate and charges, fees or penalties that should form part of any transaction entered. In addition, the Act spells out the obligations of the borrower i.e. the farmer, and the lender i.e. a credit institution and also protects out-grower operators by allowing input suppliers a lien over the crop and provides for associated offences for crop raiders (crop piracy, buying from farmers who have taken out loans from other traders) and defaulting

farmers. However, the enforcement of the Act is very weak. The key level for effective enforcement of the Act is the district but the charge registers are not well established at this level and thus limiting the ability of the lenders to register charges and buyers to ascertain the indebtedness of the potential borrowers.

Amendments have been proposed to address these weaknesses and passage of the Amendments would establish a more robust platform for agricultural lending by, among other things, strengthening banks' ability to accept alternative forms of collateral, such as warehouse receipts and crops in the ground.

### 3.3.7 Issues on Irrigation Farming System by Small-Scale Farmers

In this chapter, based on the discussion before, problems which are involved in the small scale farmers in the existing small irrigation schemes are arranged in this chapter. It is emphasized the change in the consciousness of farmers/farmer's organizations, which is the feature of the M/P, and the applicable issues by farmers / farmers' organizations are focused on.

The M/P emphasizes the changes in the consciousness of farmers/farmers' organizations, and focuses on the applicable issues by farmers/farmers' organizations, also contributing to the development approach.

(1) Consolidation of problems

1) Significant differences of farming techniques among farmers

There are various farmers with different cropping seasons, farming practices and farming management practices in the same irrigated area. Taking advantage of the merit of the production area in the irrigated area would be inefficient even though there is a self-contained farming. It is essential to adopt basic practices which can bring about stable production in the whole area.

2) Lack of marketing strategy

Small scale farmers produce and sell in an easy season; however markets are saturated with the same crops, making selling prices to be low. It seems that practical farmers sell in the pre-harvest selling period in the same area. It is necessary to improve farming techniques and change farmers' awareness in selling in the high selling season to increase income.

3) High price of fertilizer, chemical and seeds, etc.

Production cost of cabbage is 55 % higher and that of tomato 70 % for small scale farmers around Kabue, Central Province. F1 vegetable seeds are widely spread, but the price of the fertilizer purchased in the market has doubled in the last few years. Farmers who do not have organic manure such as cattle dung and chicken drops seem to buy it.

4) Weakness of current extension system

T&V system as extension method has been introduced to Zambia in 1991; however it has not functioned well because of the limitation of human resources and the financial constraints. Currently, there are 382 extension workers allocated in 23 districts target areas (in 2010) and there are 34,000 farmers (agricultural census in 2000). Therefore, one extension worker covers more than 1,000 farmers. Based on these situations, MACO is going to transfer to the PEA method.

5) Low consciousness as a business

According to the PRA workshops in the existing irrigated area, farmers suggested their low consciousness of looking to agriculture as business. Extension workers also pointed out that farmers produce and sell their productions at the same period even if they understand their situation. Additionally, some traders come to purchase vegetables at the fields nearby the urban area. They sometime buy all the production at the field. At this time, farmers do not know the sale quantity and unit price. Most farmers do not keep a record on agricultural cost and benefit. They are just sentient of whether it is profitable or not, therefore it is difficult to consider appropriate countermeasures.

(2) Countermeasures issues by farming field during the period of the M/P

In the above mentioned problems, production materials and extension system are difficult to solve by farmer's efforts; however most issues can be reduced through new information, training and counter measures. The said problems not only necessitate appropriate countermeasures in farming but also in marketing, strengthening of farmers' organization, and in irrigation for effective improvements. The following items are concerned as issues necessitating countermeasures.

1) Lack of marketing capacity
2) High cost of production materials
3) Planning of cropping pattern
4) Thorough basic farming practices
5) Insufficient extension system

## 3.4 Distribution and Marketing of Agricultural Products

The Study Team conducted a field survey to clarify the current situation of distribution and marketing of vegetables, fruit, cereals and industrial crops in the target areas (23 districts, 4 provinces).

### 3.4.1 Marketing Features by Crop

(1) Cereals

The main cereal crops grown in Zambia are maize, sorghum, millet, etc., of which maize is a staple food of the country and widely grown nationwide. Production of maize is reported to more than cover the demand generally on nation level, although some difference is observed by area*[6]. The government (FRA) is involved in domestic distribution of maize. FRA plays a role of supply/demand adjustment from the viewpoint of food security. Every year, FRA procures maize from farmers through cooperatives (nominated as agent), announcing prices and total quantity for purchase in advance. One of the main channels of domestic distribution of maize is a processing stage (milling, whitening, etc.).

(2) Industrial crops

The main industrial crops are cotton, tobacco, sugarcane, groundnuts, sunflower, etc., of which cotton

[6] National Food Balance Sheet 2009/2010 (MACO/CSO)

is the main target for contract farming (out-grower scheme). Approx. 1/3 of the smallholders in Zambia is said to be involved in contract farming in various patterns, of which more or less 80 % is engaged in growing cotton. Cotton is the biggest exporting agricultural product in Zambia and its contract farming is dominated by a few foreign companies.

(3) Vegetables and fruit

Growing of vegetables and fruit are mostly dependent on smallholders. Production of vegetables is far more than that of fruit. Many fruit are imported to cover domestic demand. The main commodities of vegetables are tomato, cabbage, rape and onion, while the main fruit grown in Zambia is banana. Marketing by farmers is usually conducted individually. Compared with cereals and industrial crops, vegetable/ fruit growing farmers are less involved in the marketing chain.

(4) Overview of market supply-demand of fresh vegetables in the Study Area

Supply trend of major fresh vegetables in the studied 4 provinces was presumed based on national sales share and supply share for Soweto market as the availability of related parameters (such as shift of cultivated area for current several years etc.) remains poor. The trend of market demands was also viewed with a focus on national census.

1) Trend of fresh vegetable supply

National sales share of six fresh vegetables for two different periods are shown in Table 3.4.1. Relatively high sales share is marked for Copperbelt Province for tomato, rape and cabbage. In 2004, Southern Province gained share increments for tomato, rape and onion; while Central Province ranked as one major supplier for tomato. The data cited here are obsolete and need updating; however, they provide evidence that the four provinces along the peri-urban area play an important role in supplying valuable fresh vegetable among the broad vegetable suppliers (provinces) in the nation.

Table 3.4.1 Top 3 Provinces for National Sales of the 6 Major Fresh Vegetables

| Vegetable | YR 2001 | | | YR 2004 | | |
|---|---|---|---|---|---|---|
| | % Share National Vegetable Sales | Top 3 Provinces for sales | % Share for National Sales | % National Vegetable Sales | Top 3 Provinces for sales | % Share for National Sales |
| Tomato | 37.8 | Copperbelt | 36.2 | 38.4 | Northwestern | 32.0 |
| | | Central | 24.5 | | Copperbelt | 20.6 |
| | | Eastern | 12.4 | | Central | 11.3 |
| Rape | 22.7 | Eastern | 20.9 | 23.2 | Copperbelt | 20.9 |
| | | Central | 19.7 | | Southern | 19.0 |
| | | Copperbelt | 17.5 | | Eastern | 16.3 |
| Cabbage | 17.2 | Copperbelt | 31.8 | 12.3 | Copperbelt | 36.4 |
| | | Northwestern | 16.7 | | Southern | 13.1 |
| | | Eastern | 11.8 | | Eastern | 12.1 |
| Onion | 3.1 | Eastern | 24.6 | 3.4 | Eastern | 21.7 |
| | | Northen | 14.7 | | Copperbelt | 19.8 |
| | | Luapula | 13.2 | | Southern | 15.1 |
| Eggplant | - | | | 4.3 | Lusaka | 33.7 |
| | | | | | Central | 33.1 |
| | | | | | Copperbelt | 14.3 |
| Okra | 2.8 | Central | 47.6 | - | | |
| | | Lusaka | 19.4 | | | |
| | | Southern | 17.0 | | | |

Source : Hichaambwa and Tschirley (2006) FSRP Working Paper No.17

On the other hand, market share (volume basis) in Copperbelt Province for three fresh produce appears very little in the national largest consuming area (Soweto market); whereas the produce from Central Province and within Lusaka Province show a share of more than 90% for tomato and rape (Table 3.4.2). For tomato, market supplies in Lusaka and Central Provinces are balanced and show a dominant share; while, share in Lusaka Province alone amounts nearly to 80% for rape.

Table 3.4.2 Relative Share of Vegetable-supply to Soweto Market by Production Areas (Mean values for the period January 2007 to August 2010)

| Production Areas | Tomato | Rape | Onion |
|---|---|---|---|
| Cooperbelt | 0.05 | 0.00 | 0.17 |
| Central | **50.80** | **23.57** | 7.81 |
| Lusaka | **47.11** | **76.23** | 35.21 |
| Southern | 0.06 | 0.02 | 0.11 |
| Other Provinces | 1.96 | 0.18 | 0.94 |
| Import | 0.02 | 0.00 | **55.76** |

Source : Hichaambwa (2010) Characterization of JICA Proposed Smallholder Horticultural Market Zones.

Slight share increase in Southern Province and complementary supply of vegetables by Central Province are expected when supply volume of vegetables by Lusaka Province shrinks due mainly to deficit of rainfall amount in the cropping season. Overall, fresh vegetable produce from Copperbelt Province have relatively less impact on Lusaka market than that of other adjoining provinces of Lusaka though the remarkable high selling share of vegetables holds true for Copperbelt Province.

2) Trend of fresh vegetable demand

Result of the 2011 Census (released in February 2011 by CSO web source) shows relatively high population growth rate for Southern Province (7.1%) while that of Copperbelt and Lusaka Provinces stays only a few increments (nearly 1% growth) after year 2006. From this trend of population growth, Southern Province can have high market demand of vegetables for years after in the future; whereas, market demands in Copperbelt and Lusaka provinces may remain unchanged. It is presumable that vegetable consumption shifts proportionally with growth of provincial population hence absolute number of consuming population. Although the population growth has slowed down, percentage of total value of food consumption is high for fresh vegetables in Kitwe and Lusaka urban areas (Table 3.4.3). In these urban consuming areas, market demand becomes high as urban population size is scaled up. It is therefore vegetable demand over the two major consuming areas that is expected to have similar trend.

Table 3.4.3 Food Consumption Share of Vegetables* in Kitwe & Lusaka (mean of Jul/Aug 2007 and Jan/Feb 2008)

| Urban Area | % Share of Food Consumption | |
|---|---|---|
| Kitwe / Copperbelt Province | Meat & Eggs | 17.2 |
| | Vegetables | 12.6 |
| | Wheat | 10.5 |
| | Maize | 9.8 |
| Lusaka / Lusaka Province | Meat & Eggs | 17.6 |
| | Vegetables | 11.7 |
| | Wheat | 9.6 |
| | Maize | 7.6 |

Source : Hichaambwa (2010)"Characterization of JICA Proposed Smallholder Horticultural Market Zones", Manson and Jayne (2009) FSRP Working Paper No 42. *Vegetables include Tomato, Rape, Cabbage, Onion and fruits (Banana and Orange).

### 3.4.2 Marketing Channels

(1) Features by crop

As described above, marketing channels tend to largely differ by type of crop. FRA is involved in the domestic distribution of maize, thus substantial quantity of it has been purchased from farmers at preset prices. In the industrial crops, many smallholders are engaged in contract farming for cotton. As for growing vegetables and fruit, however, such system is not or very little available yet at present. Smallholders usually sell their product individually to intermediary traders. Among the various crops, smallholders growing vegetables and fruit are in the weakest position in marketing.

(2) Features by area

With similar commodities, marketing channels found in different areas are fundamentally the same.

(3) Regional distribution

In response to “supply and demand”, inter-districts, inter-provinces and inter-nations (cross-border trade) movements are widely observed nationwide for various crops. Many “border markets” are established near and along the long border of Zambia. Within Copperbelt Province (Kasumbalesa), one of the target areas of the study, there exist a typical border market and substantial amount of agricultural commodities are being exported to the neighboring country (DRC). Previous data of the Kasumbalesa market indicates that the export value exceeded ZMK 19 billion and the quantity reached nearly 72,000 ton (19 billion ZMK) within a year (Oct 2007 - Sep 2008). The main exported commodities are vegetables and beans. Most of the trades are informal and thus at this point on December, 2010, there has not been any trade data on the ball. Within Copperbelt Province, there has been a deficiency in supply caused by enterprising exports and this has been covered by imports from other provinces and countries. Accordingly the province is forming a big market zone with external demand (cross-border trade) and internal demand (within province). Further market expansion is expected with the development of COMESA. Also, there is a market near the border of Southern Province (Kazungura), where agricultural commodities are mainly exported to Botswana. Although the market size is not as big at the moment, future market expansion by exports to the three neighboring countries (Botswana, Namibia and Zimbabwe) is expected. Export prices are generally much higher than domestic prices, reflecting the growing demand in DRC. Therefore, it is often observed that traders to procure some commodities in Soweto market in Lusaka, and then to transport it to Kasumbalesa for cross-border export. A trend in “cross-border export” is not only for the border regions, but also found nationwide and thus has a considerable influence on the market of Zambia.

### 3.4.3 Marketing Characteristics by Area

Marketing characteristics by area (province and district) is summarized in Table 3.4.4.

Table3.4.4 Market Characteristics by area

| District | | Marketing Characteristics by District | Marketing Characteristics by Province |
|---|---|---|---|
| Copperbelt Province | | | |
| 1 | Chililabombwe | -Maize production is deficient for the demand of district. 60% of the production is dependent on smallholders.<br>-Fertilizer market is dominated by a few suppliers.<br>- There is a "cross-border trade market" near the border of Kasumbalesa and it exports substantial agricultural commodities to DRC. According to the data from 2007, the export value reached almost ZMK 2.5 billion per month with the main commodities of vegetables and beans. | [Pattern]<br>High market potentiality with external and internal demand<br>-High market potentiality, forming big market zone with external demand (cross-border trade) and internal demand (within province)<br>-Provincial deficiency of supply caused by export is covered by import from other provinces/ countries<br>-At the farthest north of province (Kasumbalesa, Chililabombwe district), "cross-border trade market" is in operation. Further market expansion is expected with COMESA .<br><Common situation to all provinces><br>-Majority of smallholders (particularly vegetables/fruit growers) are in weak position in marketing.<br>-Marketing infrastructures (Road; Transportation; Storage; Quality standards/grades; Market information system, etc.) are not well developed, resulting in negative impact on farmers' and maketeers' activities. |
| 2 | Chingola | -Maize production is deficient for the demand of district. 75% of the production is dependent on smallholders. FRA is a major actor in marketing channels.<br>-Fertilizer market is dominated by a few suppliers.<br>-"Roadside marketing" is under planning by DACO's office for the benefit of smallholders. | |
| 3 | Mufulira | - Maize production is mainly dependent on smallholders. As it is deficient for the district demand, the majority is dependent on the imports from the other provinces/districts.<br>- Vegetable production is high. Contract farming on vegetables and bananas has started under ZATAC (USAID project); 30 target farmers with an average individual area of 2 ha (MACO/DACO are not involved.<br>- Private sectors are mainly involved in marketing. Less purchasing of maize by FRA, hence there are not many large-scaled processors. | |
| 4 | Kalulushi | - A supply base for the nearby large city with high consumption, Kitwe (within 30km). Vegetable production is high.<br>- Along with Mufulira, it implements contract farming under ZATAC (USAID project) for vegetables and banana. | |
| 5 | Kitwe | - A district with the largest population and high consumption. Low in agricultural production thus depended majorly on the imports from the other districts/provinces.<br>-Main marketing actors (supermarkets, processors, agro-input suppliers, etc.) are based in this district.<br>- There are two types of large scale markets in Kitwe. Chisokone market is the biggest green market for fresh vegetables and fruit in Zambia. Nakadori market is specialized in handling cereal grains. | |

| District | | Marketing Characteristics by District | Marketing Characteristics by Province |
|---|---|---|---|
| 6 | Ndola | - Provincial capital and has the second largest population after Kitwe with relatively high consumption.<br>- Maize production is deficient for the district demand. Depended on the imports from other districts / provinces.<br>- Vegetables and fruit are grown much within the district.<br>- As in Kitwe, main marketing actors (supermarkets, processors, agro-input suppliers, etc.) are based in this district.<br>- The main masala market is the distribution center of agricultural products in the province, outgoing to nearby medium/small markets and DRC, and incoming from other provinces/countries depending on commodities. | |
| 7 | Luanshya | - Increasing production of maize with substantial commercial farmers.<br>- The main target area of FRA. Three major processors are the next buyers after FRA. | |
| 8 | Masaiti | - The main target area of FRA. Surplus production of maize.. | |
| Central Province | | | |
| 9 | Kapiri Mposhi | -Maize production abundantly covers the district demand. 90% of maize is distributed by in-state FRA.<br>-40% of vegetables and fruit production is covered in the district. Rest of 60% is imported from the other provinces/districts. Chiawa Banana Irrigation Schemein Kafue is well known for banana. Through Kapiri Mposhi market, a part of it is distributed to other regions especially to the Copperbelt province. A broker separates the bananas into poor and good quality products and the former is sent to the neighboring area of Kafue and the latter is sent to Lusaka/Copperbelt areas.<br>-100% of cotton production in the district under contract farming is dominated by a foreign company, namely Dunavant. | [Pattern]<br>High self-sufficiency rate, categorized as a supply source<br>-Self-sufficiency rate of agricultural commodities are generally high over the province.<br>-Surplus of the province is outgoing to other provinces.<br>-Watermelon grown in Chibombo district is known as popular brand.<br><Common situation to all provinces><br>-Majority of smallholders (particularly vegetables/fruit growers) are in weak position in marketing.<br>-Marketing infrastructures (Road; Transportation; Storage; Quality standards/grades; Market information system, etc.) are not well developed, resulting in negative impact on farmers' and maketeers' activities. |
| 10 | Kabwe | -Self-sufficiency rate is generally high.<br>-90% of maize production in the district. 70% is distributed by in-state FRA<br>-80% of fruit production in the district. The majority is sent to green markets in Kabwe.<br>-95% of vegetables production in the district and 70% of it is exported to other districts/provinces.<br>-85% of cotton production in the district under contract farming is dominated by a foreign company, namely Dunavant. | |
| 11 | Chibombo | -Self-sufficiency rate is generally high.<br>-80% of maize production in the district. 60% is distributed by in-state FRA and 30% is processed by millers.<br>- 100% of vegetables/fruits production in the district. Chibombo is well known for watermelon and banana, often distribute the products to Lusaka and the Copperbelt provinces.<br>- 90% of cotton grown in the district is under contract farming with the one (1) dominant foreign company. | |

| District | | Marketing Characteristics by District | Marketing Characteristics by Province |
|---|---|---|---|
| Lusaka Province | | | |
| 12 | Chongwe | -Self-sufficiency rate is generally high.<br>-90% of maize, 95% of vegetables and 70% of fruit are grown within the district.<br>-75% of maize is distributed through FRA.<br>-Main destination of vegetables and fruit are Chongwe market.<br>- The main industrial crop is cotton. Contract farming on cotton by a foreign company, namely Dunavant.. | [Pattern]<br>High market potentiality, Center of domestic distribution<br>-High market potentiality with the capital of Lusaka<br>-"Sowet market" in Lusaka is the center of domestic distribution. Many kinds of agricultural commodities grown in wide areas are incoming to and outgoing from this market.<br>-Main marketing actors (supermarkets, processors, agro-input suppliers, etc.) are based in this province.<br>-Banana grown in Kafue district is known as popular brand.<br><Common situation to all provinces><br>-Majority of smallholders (particularly vegetables/fruit growers) are in weak position in marketing.<br>-Marketing infrastructures (Road; Transportation; Storage; Quality standards/grades; Market information system, etc.) are not well developed, resulting in negative impact on farmers' and maketeers' activities. |
| 13 | Lusaka | - The capital of Zambia and has the highest consumption and the largest population.<br>-70%of the district demand on maize is dependent on import from other provinces.<br>-Cotton is grown mostly under contract farming with the one (1) dominant foreign company, and also with small scale companies. 80% of cotton materials for ginnery are imported from other districts / provinces.<br>-60% of vegetables and 95% of fruit are imported from other districts / provinces, mostly distributed through Sowet market.<br>-Main marketing actors (supermarkets, processors, agro-input suppliers, transporters, machinery manufacturers, etc.) are based in this district. | |
| 14 | Kafue | - A transit distribution point of maize. 90% of maize from the other districts/provinces (mainly, central province) is distributed into Kafue and 95% of it is outflows into the other areas (mainly to Lusaka and the Copperbelt province).<br>- The main industrial crops (cotton/ sugarcane/ rice) are mostly imported from the other districts/provinces.<br>- Kafue, especially Chiawa Banana Irrigation Scheme is well known for banana, which covers 70% of the district yield. It is also distributed into the Copperbelt province through the Sowet market.<br>- Vegetables production is low. 80% of vegetables from the other districts/provinces (mainly, the central province) are distributed into Kafue and through the Sowet market, 60% of it will then outflows into the other areas such as the main cities in the Copperbelt and Southern provinces. | |

| District | | Marketing Characteristics by District | Marketing Characteristics by Province |
|---|---|---|---|
| Southern Province | | | |
| 15 | Mazabuka | -80% of maize for the district demand is imported in from the other districts/provinces. 60% is distributed by FRA.<br>- The main industry crop is sugarcane under contract farming of Zambian Sugar Company. 95% of sugarcane is produced in the district.<br>-Chiawa banana is distributed in the district.<br>-90% of district demand of vegetables are grown within the district. 80% of distribution is through Sowet market. | [Pattern]<br>Dispersed provincial markets, Expected potentiality of export (cross-border trade)<br>-Markets for destination are dispersed, i.e. Lusaka, Livingstone and local market, depending on location of districts.<br>-Kazungula (center of Kazungula district) is a strategic point in marketing, being located at 60 km from Livingstone, near Western province, and adjacent to neighboring 3 countries. Future expansion of export is expected with COMESA.<br><br><Common situation to all provinces><br>-Majority of smallholders (particularly vegetables/fruit growers) are in weak position in marketing.<br>-Marketing infrastructures (Road; Transportation; Storage; Quality standards/grades; Market information system, etc.) are not well developed, resulting in negative impact on farmers' and maketeers' activities. |
| 16 | Monze | -Main industrial crop is cotton under contract farming with the one (1) dominant foreign company.<br>- Monze is famous for cotton, produced under contract farming of Dunavant Company.<br>-80% of vegetables are distributed through intermediary traders/ wholesalers, while 20% are directly distributed to retailer or consumers. | |
| 17 | Siavonga | -Maize production is deficient for the demand of district. 80% of demand is dependent on other districts / provinces.<br>- As for fruits, mainly banana is well distributed. 70% of the bananas from Chiawa is distributed to Lusaka and the Copperbelt province and the rest of 30% is distributed within the district.<br>-80% of vegetables distributed are from the other districts / provinces.<br>-Chiawa banana is distributed in the district. | |
| 18 | Gwembe | -Cotton is major crop in the district, totally grown under contract farming with the one (1) dominant foreign company.<br>-Vegetables and fruit are deficient for district demand. | |
| 19 | Choma | -Main production area in the southern province.<br>-65% of distribution of maize is under control of private sector (marketers, millers, etc.).<br>-Main industrial crops are cotton, tabacco and sunflower, all under contract farming.<br>-95% of vegetables are distributed through intermediary traders/ wholesalers, while 5% are directly distributed to retailers. | |
| 20 | Kalomo | -One of the main production areas in the Southern province.<br>-70% of distribution of maize is under control of private marketers, 20% by FRA and 10% by millers.<br>-Cotton is totally grown under contract farming with the one (1) dominant foreign company.<br>-90% of vegetables are distributed through intermediary traders; retailed within the district and wholesaled in Livingstone and Kazungura. | |

| District | | Marketing Characteristics by District | Marketing Characteristics by Province |
|---|---|---|---|
| 21 | Sinazongwe | -Main industrial crop is cotton under contract farming with the one (1) dominant foreign company.<br>-95% of maize grown in the district are sold to FRA.<br>-More than 80% of vegetables are distributed through intermediary traders/ wholesalers/ retailer. | |
| 22 | Kazungura | - Kazungura is the central city of the province, located 60km in west from Livingstone. It is also closely located to the Western province in adjacent to the three neighboring countries (Namibia, Botswana and Zimbabwe). Kazungura Border Market is established near the border within the city.<br>- Sufficient production of maize for the district demand. 65% of maize is distributed to the millers in Choma, Livingstone and Lusaka through intermediary traders.<br>- Vegetables and fruit are deficient for the district demand. 80% of distribution is controlled by intermediary traders. | |
| 23 | Livingstone | -Provincial capital and large consuming area.<br>-Agricultural production is generally deficient for the district demand.<br>-80% of maize grown in the district is sold to FRA. | |

### 3.4.4 Current Situation and Constraints of Main Actors and Functions

(1) Farmers

Majority of vegetables and fruit growing farmers (nearly 100% for smallholders) conduct production, harvest and selling of their products individually. Collective marketing through cooperatives are very limited. The main role of cooperatives is in most cases recognized as a delivery of agricultural input (fertilizers, etc.), not active for collective marketing. Products for selling are mostly fresh and small lots, and sold to individual intermediary traders. They just wait for traders coming to buy or carry products by themselves to nearby market for selling, depending on availability of transportation. Going to market is usually by foot (putting products on head) or bicycles or public bus. Because of perishable products and necessity of cash, farmers are forced to sell to traders immediately after harvest. There is almost no room for farmers to select traders and negotiate prices. Individual transactions made between farmers and traders, therefore, are generally unfair and less transparent, leading to inefficient distribution.

There is no comprehensive system for making partnership (market-linkage) between farmers' organizations (cooperatives, groups, etc.) and marketers' organizations (cooperatives, groups, etc.). Between individual farmers and traders, however, some linkages are often observed, in which traders provide farmers with agro-input, market information, etc., while farmers are bound in outlet and prices.

Losses in production, harvest and postharvest treatment are substantial in quantity and quality. High production cost and low productivity are major challenges of smallholders. High input cost (fertilizers, etc.) burdens farmers seriously. Fertilizers are totally dependent on import, and its suppliers are very limited.

(2) Marketers

As shown in Fig. 3.4.2, main marketing channels are "farmers - intermediary traders (rural & wide areas) - wholesalers - retailers - consumers", in which a key role is played by intermediary traders covering wide areas. They are linked with rural traders, wholesalers, retailers and also involved in cross-border trade. Multi-functioning actors covering several stages of the channels are also often observed.

There are many serious challenges related with marketing infrastructures, such as:

1) Terribly poor feeder-road
2) Incomplete market information system
3) Inefficient marketplaces
4) Incomplete quality standards and grades
5) High risk for foreseeing future marketing (area; quantity; quality; prices)
6) Substantial postharvest losses

Under such difficult situation, however, many marketers (particularly intermediary traders) seem to try to work actively and efficiently, making the best use of their competent ability of timely collection of market information, and also high mobility depending on the market situation.

(3) Marketplaces

Many marketplaces exist over the country, ranging from large scale markets in urban areas up to medium / small scale ones in peri-urban and rural areas. Marketplaces are the places for transaction of agricultural products and play an important role in distribution of products. However, following common features and constraints are pointed out.

1) Management of marketplaces

Large/ medium scale markets are usually owned by local governments (district) who organize specific “Council” for management of the marketplaces. Actual daily management, however, is undertaken by “Committee” which members consist of traders stationing in the markets. The council collects market fees every day from traders who occupy space for shops in the markets. It is allowed for farmers (individuals or groups) to have their own shops in the market, however actually no farmers’ shop is observed in large scale markets.

Small scale marketplaces in rural areas are in many cases established by community, where farmers and marketers have their shops in same market, the former being even more than the latter sometimes. There seems to be some competition and conflict between farmers and marketers in same market, since farmers’ prices of same commodity are naturally lower than marketers’.

Improper practices by “brokers” against farmers are often reported particularly in Sowet market in Lusaka.

2) Efficiency and hygienic environment

Marketplaces of agricultural products, without regard to the scale, are generally superannuated, congested and not kept hygienic enough, in addition to daily occurrence of dead stock, increasing losses. It seems that current available spaces do not meet the increasing number of traders. Cold storage for perishables such as fresh vegetables and fruit are not made available enough.

3) Transaction record

Daily transaction data are not recorded by the market, although there are some cases where market committee members (traders) take record of daily transaction data for the personal use. It is reported that some of urban market (Main masala market in Ndola, etc.) has a future plan to establish “transaction recording system”, but not realized yet.

4) Legal framework

Fundamental factor behind constraints as above is a lack of relevant laws. Legal framework governing marketplaces needs to be established.

(4) Private service provider

This section takes up Private Service Providers who act for the benefit of smallholders. Many service providers (NGO, enterprises, individuals, etc.) are in operation everywhere in Zambia.

Examples of active NGOs widely in operation will be IDE (International Development Enterprises), CARE International, Land-o-Lakes, CRS (Catholic Relief Services), ZATAC (Zambian Agribusiness Technical Assistance Center), Africare, CLUSA (Cooperative League of the United States of America) etc. Many of them are USA origin. Many individual service providers are also available in consultants, universities, etc., mostly being multi-players. Other than private service providers, government officers based in rural areas, public institutions, and many farmers' cooperative societies also function as service providers.

### 3.4.5 Postharvest Treatment and Losses

The majority of farmers harvest their products manually, although some mechanized harvests are observed in maize, soybeans, etc. Rough handling of products in harvest and postharvest treatment, lack of proper storage facilities, etc. causes substantial losses. Percentage of losses by commodity is presumed as follows:

1) Cereals
   Maize: 5-20% / Sorghum: 5% / Millet: 5%
2) Industrial crops
   Groundnuts: 15% / Cassava: 5% / Soybeans: 5%
3) Vegetables and fruit
   Tomato: 5% / Cabbage 5%: / Onion: 5% / Banana: 5%

In addition to above, distribution losses after shipment by farmers (quality deterioration and moisture losses during transportation/ storage, etc.) are said to be over 20%. However, situation of the losses is not made clear yet. Full study needs to be done to clarify the situation and take effective actions to reduce postharvest losses.

### 3.4.6 Quality Standards and Grades

Quality Standards and Grades of domestic agricultural commodities and foods are officially specified as follows (Table 3.4.5):

Table 3.4.5 Quality Standards and Grades of domestic agricultural commodities and foods

| Commodity | Supervisory Authority | Requirement specified |
|---|---|---|
| Maize | FRA | [Specified by grade, Shown below are Grade A's requirement]<br>Color: White / Moisture content: 12.5% or less / Diseased grains: 2% or less / Broken grains: 2% or less / Foreign matters: 1% or less / Aflatoxin: 10ppm or less |
| Millet | MOH<br>MACO | [Label indicating following information shall be attached to Food (package)]<br>Name of Commodity / Content /<br>Ingredient / Sales Code /<br>Name, Address etc. of Producer /<br>Date of Sale / Preservation Method |
| Sorghum, Groundnuts, Soybeans, Cassava, Tomato, Banana | MOH<br>MACO | Pursuant to the requirement of Millet |

Source: MOH / MACO

For import of agricultural products, Quarantine Certificate, etc. need to be submitted.

As shown above in Table 3.4.2, quality standards and grades are only specified clearly in Maize. In actual dealing places between farmers and traders, quality assessment is in many cases made only by eye (for size, color, shape, etc.) and hand (for texture, weight guess, etc.), hindering fair and transparent price formation. Quality standards and grades and its assessment system need to be established and disseminated.

### 3.4.7 Market Information System

Market information (Prices) are collected and released by MACO and CSO. However, following constraints are pointed out:

(1) Target commodity

Market prices of agricultural products are regularly collected by each district's officers at nearby market. However, target markets and commodities are very limited. Target commodities for collection of price data are limited only to Cereals (maize, etc.), beans, groundnuts, maize seeds and agro-inputs (fertilizers, etc.). Vegetables and fruit are not included. Further, food balance survey conducted by MACO / CSO every year targets Cereals, Cassava and root crops, no vegetables and fruit included[7]. Lack of official data on prices and production of vegetables and fruit puts both the farmers and marketers in very difficult position in their marketing activities and future planning. Main reason why vegetables and fruit are not targeted is unclear measurement unit (e.g. bundle, heap, box, etc.) prevailing in transactions. For improvement of distribution system including measurement unit of horticultural crops, ZNFU is taking an initiative to organize "Platform" comprising wholesalers; large-scale retailers; processors; millers, etc. It is therefore expected that vegetables and fruit will be included in target commodities of MIS (MACO) and SMS Market Information Services (ZNFU) before long.

(2) Access to information

Price information collected in each area is released through radios and also at the regular meetings of cooperatives by extension officers. However, such information actually does not reach the majority of individual farmers, due to no possession of radios, missing timing to obtain information, etc.

(3) Promptness and practicality

Usually, price information collected by MACO are editorialized and sent to CSO for release, taking a number of days from collection up to release of price information. Promptness and practicality become less and its utility value decreases.

### 3.4.8 Price Data

(1) Prices by distribution stage

Prices by Area, Commodity and Distribution Stage are shown in Table 3.4.6

[7] National Food Balance Sheet 2009/2010 (MACO/CSO)

Table 3.4.6 Prices by Area, Commodity and Stage of Marketing Channels (Sales values in ZMK)

| Data collection points and Commodities | Farmers (1) | Intermediary Traders (2) | Wholesalers (3) | Retailers (4) | (4) / (1) |
|---|---|---|---|---|---|
| Copperbelt Province (Main Masala Market) | | | | | |
| Maize (50kg bag) | 45,000 | 65,000 | | 70,000 | 1.56 |
| Groundnuts (bag) | 6,607 | | 8,107 | 9,107 | 1.38 |
| Cassava (kg) | 3,441 | | 4,641 | 5,641 | 1.64 |
| Banana (kg) | 2,500 | | 3,500 | 5,000 | 2.00 |
| Tomato (box) | 15,000 | | 30,000 | 45,000 | 3.00 |
| Onion (kg) | 4,885 | | 5,885 | 6,885 | 1.41 |
| Cabbage (head) | 1,400 | | 1,900 | 2,200 | 1.57 |
| Central province (Kabwe Market) | | | | | |
| Green Maize (cob) | 800 | 1,000 | 1,500 | 1,875 | 2.34 |
| Ground nuts (25kg bag) | 25,000 | 30,000 | 35,000 | 42,000 | 1.68 |
| Banana (kg) | 1,500 | 1,800 | 2,400 | 2,688 | 1.79 |
| Orange (box) | 55,000 | 65,000 | 80,000 | 96,000 | 1.75 |
| Cabbage (head) | 800 | 1,000 | 1,500 | 1,875 | 2.34 |
| Rape (90kg bag) | 85,000 | 100,000 | 115,000 | 138,000 | 1.62 |
| Tomato (box) | 30,000 | 40,000 | 55,000 | 71,500 | 2.38 |
| Lusaka province (Sowet Market) | | | | | |
| Green Maize (cob) | 700 | 1,000 | 1,500 | 1,950 | 2.79 |
| Ground nuts (25kg bag) | 20,000 | 22,500 | 25,000 | 25,700 | 1.29 |
| Soybean (kg) | 1,250 | 1,500 | 2,500 | 3,175 | 2.54 |
| Banana (kg) | 1,300 | 1,700 | 2,200 | 2,750 | 2.12 |
| Orange (box) | 50,000 | 60,000 | 70,000 | 84,000 | 1.68 |
| Lemon (box) | 35,000 | 40,000 | 50,000 | 61,500 | 1.76 |
| Rape (90kg bag) | 90,000 | 100,000 | 115,000 | 132,250 | 1.47 |
| Tomato (box) | 40,000 | 55,000 | 65,000 | 81,250 | 2.03 |
| Cabbage (head) | 1,000 | 1,500 | 2,000 | 2,500 | 2.50 |
| Lusaka province (Kafue Market) | | | | | |
| Green Maize (cob) | 700 | 1,000 | 1,500 | 1,950 | 2.79 |
| Ground nuts (25kg bag) | 30,000 | 35,000 | 40,000 | 50,000 | 1.67 |
| Guava (90kg bag) | 40,000 | 60,000 | 85,000 | 106,250 | 2.66 |
| Mango (90kg bag) | 40,000 | 50,000 | 65,000 | 78,000 | 1.95 |
| Rape (90kg bag) | 90,000 | 100,000 | 115,000 | 132,250 | 1.47 |
| Tomato (box) | 30,000 | 35,000 | 45,000 | 53,100 | 1.77 |
| Cabbage (head) | 800 | 1,000 | 1,500 | 1,875 | 2.34 |

Notes:
1. Prices above are the results of interviews to relevant marketing stakeholders in each area / marketplace in December, 2009.
2. Blank columns show "transaction skipped stages" or "price data not available".
3. Source: Study Team (based on the results of field survey)

(2) Seasonal trend of prices

Shown below in Table 3.4.7 are the prices by area and season (sample data) for 2 districts (Southern province) and 2 commodities of vegetables:

Table 3.4.7 Seasonal Trend of Prices

| District/ Commodity | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Choma | Tomato | 60-70 | 60-70 | 40-50 | 30-35 | 30-35 | 20-30 | 20-30 | 25 | 30 | 30 | 40 | 60-70 |
| | Cabbage | 1.0-1.5 | 1.0-1.5 | 1.0-2.5 | 1.0-2.0 | 1.0-2.0 | 1.0-2.0 | 0.5-1.0 | 0.5-1.0 | 0.5-1.0 | 1.0-1.5 | 1.0-1.5 | 1.5-2.0 |
| Kalomo | Tomato | 60 | 60 | 60 | 30 | 30 | 32 | 33 | 20 | 25 | 25 | 30 | 30 |
| | Cabbage | 2.0 | 2.0 | 1.0 | 0.5-1.5 | 0.5-1.0 | 0.5-1.5 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.5 |

Notes: Wholesale Prices / Unit of Prices: Tomato 1,000ZMK/box, Cabbage 1,000ZMK/head / Year: 2008 / Area: Southern province
Source: Annual Report & Bulletin, Each DACO's Office

The wholesale prices of two crops in Soweto market show similar trend (Fig 3.4.1).

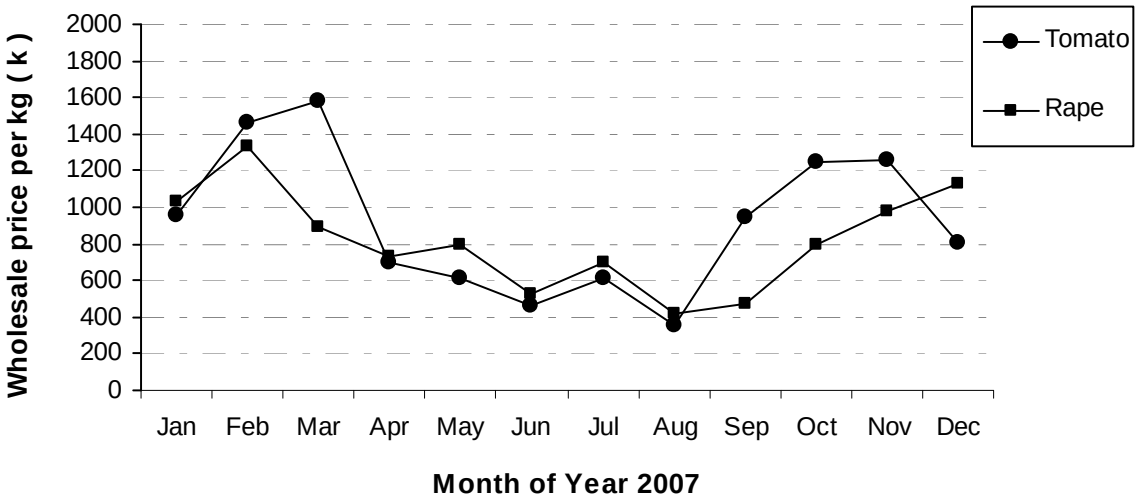



Fig. 3.4.1 Seasonal Fluctuation of Price

Notes: Wholesale Price / Area: Soweto Market
Source: JICA Study Team and Munguzwe Hichaambwe (May, 2010) *idem*

From the above data, following analyses are derived:

1) Reflecting supply/demand, prices drop to the bottom in dry season (harvest time) and reach a peak in rainy season (right before next harvest).
2) Above trend differs by area, commodity and year. It seems that marketers always try to work actively and efficiently, seeking for such information of trend and more profitable dealing. Sharp drop of prices in harvest season puts farmers in difficult position, since harvest time is usually the peak of money shortage for farmers.

Possible actions for improvement of the situation will be as follows:

1) Establish and disseminate “bridge-financing system” (e.g. “warehouse receipt system”, etc.)
2) Establish and disseminate pre-cooling facilities / cold storage

3) Establish and disseminate year-round farming and supply
4) Strengthen farmers' bargaining power by organization

These actions will be effective for making seasonal price fluctuation much less.

### 3.4.9 Categorization of Smallholders by Activation Level

From the field survey so far made, marketing operation of smallholders growing vegetables and fruit in peri-urban areas can be categorized in under-mentioned three (3) types in terms of activation level.

(1) Type 1 (most active)

Smallholders, organized in cooperatives or groups, are conducting collective shipment, contract based sale to marketers, advertisement, enlightenment of member farmers, cooperation with other groups nearby, etc., very actively and effectively. Their operational pattern is nearly equivalent to "grow to sell". However, these types of smallholders are very limited, probably one or two cooperatives in each province.

(2) Type 2 (between type 1 and type 3)

Smallholders in this type are basically conducting marketing operation individually, not as a group. Most of interviewees identified as "active groups" by district officers in the field survey belong to this type. Several features of this type can be summarized as follows:

1) Misconception of collective shipment

   Many cooperatives (or associations) have their own land, apart from individual member farmers' own land, although proportion of the former is far less than the latter. Member farmers, by rotation, take responsibility for production, harvesting and shipment of the products of cooperatives own land. Top management of cooperatives recognizes it as "collective shipment".

2) Typical pattern of operation of this type

   Chairperson or key-member of the cooperatives contacts brokers (middle-men) of relatively large scale market (old acquaintance) by cellular phone for market situation (supply/demand, prices trend, etc.) before shipment. When any agreement reached, they carry products to the market. Depending on distance to market, transportation can be "scotch cart" or hired truck. Transaction patterns and conditions are basically determined by supply/demand balance and quantity. When demand is bigger than supply, buyer often comes to farmers' place to buy. When demand is little, farmers should seek for buyer in market for direct sale, as brokers sometimes are unwilling to deal. Also, if farmers are prepared to ship more bulky quantity, then they can have bigger bargaining power. Individual member farmers, whenever they have products ready for sale, join on vehicles going to market or sell to buyers coming to farms. But, transactions are always done individually. Although their pattern is still within "grow then sell" and also market channel is limited, they seem to act with "market" in mind. Upgrading to type 1 can be expected, depending on leadership. This type of smallholders will be more or less 10 in number of cooperatives for each district.

(3) Type 3 (most inactive)

As mentioned before, majority of smallholders, not belonging to type 1 or 2, conduct production, harvest and selling of their products individually. Because of perishable products and necessity of cash, farmers are forced to sell to traders immediately after harvest. There is almost no room for farmers to select traders and negotiate prices. Individual transactions made between farmers and traders, therefore, are generally unfair and less transparent, leading to inefficient distribution. There is no marketing operation as a group and leadership is weak.

In formulating the M/P and A/P, the viewpoint of how to upgrade type 3 to type 2, and type 2 to type 1 needs to be stressed.

### 3.4.10 Partnership between Smallholders and Marketers

(1) Result of analysis

The Study Team conducted a sample survey on the possibility of the partnership between smallholders and marketers. Result of analysis is summarized in Box 3.4.1 below, and details of the survey data are shown in the following sub-section (2).

**Box 3.4.1**

**Result of Analysis of the Partnership between Smallholders and Marketers**

**1) Attitude of farmers' organizations and marketers about linkage between Them**

a) Although the linkage between farmers' organizations and marketers is limited, they have a strong interest in realization of it.

b) Both sides point out advantages by the linkage in detail. Therefore, it will be possible to disseminate it with a proper mechanism.

c) The marketers place a more importance on efficiency of transportation and cost down of distribution than quality, packaging, etc. For the marketers, one of major benefits by the linkage is to secure bulky amount. Therefore, for the farmers, it will be a prerequisite for realization of the linkage that they establish a bulky supply system by collective marketing of organized group. The marketers are generally not much interested in a small lots transaction, even though the quality is good.

d) The linkage between farmers' organization and marketers is defined as a 'vertical integration' (a link between upstream and downstream) in terms of value chain analysis. By this linkage, farmers at the upstream will be able to easily obtain the marketing information from the marketers at downstream who are closer to consumers, value addition of whole value chain being attained. On the other hand, however, the farmers may become more sensitive to a change in downstream such as supply/demand and market trend, and have a risk that farmers expelled from the value chain depending on the situation. To minimize this risk, it is crucial to establish a 'horizontal integration' (organization and strengthening) of farmers at the upstream level.

**2) Constraints of farmers' organizations and marketers**

a) There are some common constraints for farmers' organizations and marketers. For example, transportation (poor feeder road; lack of vehicles) and lack of funds (lack of proper finance system), etc. It is indispensable to improve these issues for promotion of the linkage.

b) Many farmers raise the necessity of improvement of irrigation system, in addition to marketing infrastructures.

**3) Features of Active Farmers' Organizations in Marketing**

Operation of some active farmers' groups as summarized in Boxes 3.4.3 – 3.4.5 suggests the requirement for activation of farmers' organizations as follows:

a) A strong will to realize collective marketing and the linkage with marketers

b) Proper group management (leadership, management structure of a group, sharing of outputs among group members, and transparency within the group)

c) Establishment of bulky supply system

d) Efforts for multi-sourcing of market information

e) Positive advertisement and promotion activities

**4) Linkage among farmers**

The examples of linkage among farmers (Box 3.4.6) indicate that existence of core person is very important either for farmers or marketers. The requirement of such person is a business mind and ability to organize collaborators. Nonetheless, the improvement of marketing infrastructure, lack of funds, and irrigation system should be addressed as pre-conditions, as mentioned above.

(2) Outline of the survey

1) Objective

To find the possibility of partnership (market linkages) between farmers' organizations and marketers

2) Target commodities

Vegetables and fruit

3) Target areas

Chingola District (Copperbelt Province)
Kabwe District (Central Province)
Kafue District (Lusaka Province)
Kazungula District (Southern Province)

4) Survey period

From April 21 to May 7, 2010

5) Method of survey

Group-interviews to farmers' organizations and marketers, based on Questionnaires

6) Detail of the survey data

Group-interviews have been made to 12 farmers' organizations and 4 marketers in total in 4 districts covering 4 provinces. Interviewees' responses are summarized in Box 3.4.2 (Consciousness and constraints) and Box 3.4.3- 3.4.6 (Operation of active farmers' groups).

**Box 3.4.2**
**Consciousness / constraints of farmers' groups and marketers**

A Farmers' consciousness on collective marketing and the linkage with marketers

A-1 Collective marketing

Out of 12 farmers' groups interviewed, 2 groups already conduct collective marketing, while 10 groups not. However, all of the groups answered NO had a keen interest in it. Interviewees raised following points as advantages expected by collective marketing:

(a) Strengthening farmers' bargaining power as a result of above points
(b) Cost reduction by bulk handling
(c) Saving time for marketing and sparing more time for improvement at production stage
(d) Wider choice for timing and destination of marketing
(e) Efficient utilization of standards and specifications for sorting the product
(f) Trigger for improvement of market system towards clear and efficient transactions
(g) Reduction of the product losses
(h) Value addition and brand creation of the products (Large quantity, high grade and uniform quality)

A-2 Linkage with marketers

Out of 12 farmers' groups interviewed, 2 groups already make some linkage with marketers, while 10 groups not. However, all of the groups answered NO had a keen interest in it. Interviewees raised following points as advantages expected by the linkage with marketers:

(a) Less risk in securing marketing outlet than otherwise
(b) Saving time for marketing and sparing more time for improvement at production stage
(c) Expectation of future business expansion by value addition of overall value chain
(d) Cost reduction by bulky handling
(e) Value addition and brand creation of the products, by knowing and meeting market requirements
(f) Trigger for improvement of the market system towards clear and efficient transactions

B Marketers' consciousness on the linkage with farmers' groups

Out of 4 marketers interviewed, 1 marketeer already make some linkage with farmers' groups, while 3 marketers not. However, all of the marketers answered NO had a keen interest in it. Interviewees raised following points as advantages expected by the linkage with farmers' groups:

(a) Expectation of future business expansion by value addition of overall value chain
(b) Cost reduction by bulky handling
(c) Expectation of future business expansion by increase of export
(d) Less risk in securing source than otherwise

C Constraints

Constraints raised by interviewees are as follows:

C-1 Issues raised by Farmers' Organizations interviewed

(a) Irrigation related matters

-No or incomplete irrigation system in dry season, depending only on rain

-Labor intensive manual irrigation using buckets, too cumbersome for many farmers whose average age getting higher every year. This situation burdens young men, who often feel unfair compared with elderly farmers and women.

-Lack of irrigation tools (particularly pumps)

-Insufficient irrigation capacity for increasing demand of water

(b) Transportation

-Terribly poor feeder road. This makes it difficult for farmers to access to the market, damage

perishable products such as vegetables/fruit during transportation for long distance, cause damage on vehicles, raise transportation cost, eventually lower distribution efficiency.
-No vehicle to the market. Access to the market is usually only by bicycle or wheelbarrow or public bus or by walking (using head). Truck hiring charge is getting higher for demand.

(c) Marketing related matters
-Weak linkage with marketers, no fixed permanent buyers, no guarantee for outlet, unawareness of how making linkage
-Transactions between individual farmers and traders are not transparent and fair. Prices are determined by traders. Farmers are not allowed to sell their products directly to retailers actually. Agents (middlemen) in the large markets often cheat farmers in dealing.
-No direct linkage with export market
-Lack of capital. Value addition by processing is difficult due to no or little capital for investment.
-Lack of storage (particularly cold storage for perishable products)

(d) Farm management related matters
-Farm management level is very low, resulting in low productivity, quality and income
-Lack of crop management
-Fertilizers for vegetables cost much, no subsidy provided
-Lack of adequate storage shed for chemicals
-Lack of capital

C-2 Issues raised by Marketers interviewed

(a) Lack of capital
(b) Many kinds of fees imposed in dealing burden marketers much, increasing distribution cost.
(c) Less availability of credit for marketers
(d) Inconsistent supply by farmers
(e) Seasonal concentration of same commodities leads to low prices
(f) Transportation (poor feeder road, lack of vehicle)
(g) Competition with imported products (e.g. Onion imported from Zimbabwe has better quality and lower prices than local ones)
(h) Small markets in rural areas (community owned) often cause competition with farmers, resulting in disadvantages of marketers. In such small markets, farmers and marketers coexist as retailers.
(i) Lack of coordination among donors, NGO, etc. Their activities are disjointed (visit same interviewee, asking same or similar questions in same day, etc.)

**Box 3.4.3**
**Farmers' Organization making a partnership with Marketers**

Name: Mukamaba Multi-purpose Cooperative Society
Location: Mulabalala, Kazungula district, Southern province
Established : 2005
Members: 85 (36 female, 49 male)
Main activities:
Growing and selling of Vegetables / Fruit
Vegetable drying
Poultry
Seed multiplication for groundnuts, cowpeas, sorghum and sugar beans
Grocery (small retail shop)

Organization:
85 members. No employees/staff members. The Cooperative has an Executive Committee and the following sub-committees to which all members belong:
Education committee, Membership drive committee, Credit committee, Audit committee, Entertainment committee, Disciplinary committee, Conflict resolution committee, Gender committee, HIV/AIDS committee, Garden committee and Local vegetable drying committee.

Facilities and equipment:
The cooperative has a small shed to be used for meeting and as a "Collection Centre" for commodities, the latter being main use. The cooperative is now in the process of constructing a bigger Shed which can hold 3,000 x 50kgs bags of maize. Although the cooperative has provided most of materials, they need help for roofing materials and window frames. The two solar driers for vegetables were provided each by the MACO and IDE (International Development Enterprise). The members store most of their information on a flush memory disk. Although the cooperative does not have a computer, they find it convenient to store and share information from the disk. There is also a possibility of disappearance of hard copies in the event of fire. The cooperative land of 1 hectare was given by the chief. The land is to be used for setting up infrastructure and producing vegetables. However, the individual members each own an average of 5 hectares of personal land. This is far more than the cooperative land. The cooperative bank account funds of K6million comprise K2million savings and K4million share contribution by the members. The cooperative wishes to commence extending credit services to its members.

Commodities and Collective marketing:
The cooperative mostly sells fresh green vegetables. However, they also sell some dried traditional vegetables, including pumpkin leaves, bondwe (amaranthus), black jack leaves and okra. The other fresh vegetables grown by the cooperative include green pepper, butternuts, egg plants and okra. The cooperative recently planted guavas, oranges and nutches. The garden committee manages the affairs of the vegetable garden. The garden committee has a chairman and 15 members responsible for growing a particular vegetable. The garden committee has a duty rota to ensure that all the Cooperative members participate in the management of the cooperative farm. The garden committee and the cooperative executive are responsible for selling commodities at the Collection Centre. The money realized by selling cooperative farm produce is handed over to the treasurer who in turn deposits it in the cooperative account.
It is worth noting that individual cooperative members who have vegetables to sell from their farms, bring all these commodities to the Collection Centre. These commodities are recorded in a book before selling and sold collectively with other produce at the Collection Centre. Usually, buyers come to the Collection Centre to buy the cooperative's commodities, from many places such as Choma, Livingstone, Mazabuka etc. Buyers are mostly wholesalers. Transactions are in principle, made by written contract with buyers in advance. After selling, individual cooperative members are given the proceeds from sale by cash in accordance with book records. Equally, non-cooperative members also bring their produce to the Collection Centre for sale. However, non-cooperative members are charged a commission of 10 percent for whatever commodity is sold on their behalf at the Collection Centre. The income earned from the commission is deposited in the cooperative account. Although there are few non-cooperative members participating at the Collection Centre, it is hoped that the commission they are charged will encourage them to join the cooperative.

Advertisement:
The cooperative advertises its commodities on Mosi-O-Tunya community radio station. They also place a board along the Lusaka/Livingstone main road (near the cooperative) to advertise the commodities that they have or will be having for selling. They also indicate the cooperative phone number on the board so that potential customers can call them. There is no charge for this .advertising. Many reactions came to the cooperative by this advertisement.

Market price information:
The price is based on the ruling/selling prices that are prevailing in Livingstone. The cooperative phones (using cooperative phone) trusty vegetable sellers in Livingstone who they ask what the market prices of commodities are. They also use the Zambia National Farmers Union mobile phone Market Information Centre to obtain current market prices of the commodities. Based on the Livingstone prices, the cooperative can negotiate the price of their commodities with buyers.

Constraints:
Main constraints raised by the cooperative's member are high transportation cost; crop management for improvement of quality and productivity (the cooperative sometimes fail to meet customers' requirement); insufficient irrigation capacity for increasing demand.

**Box 3.4.4**
**Farmers' Organization conducting Collective Marketing**

Name: Chinchiwabahili Cooperative
Location: Ipafu C, Chingola district, Copperbbelt province
Established : 2009
Members: 53 (37 female, 16 male)
Main activities:
Growing and selling of Vegetables
Growing and selling of Cereals
Rearing broilers and local chickens
Main Commodities of Vegetables (by number of farmers, farm area & production):
Rape, Impwa, Kalembula, Banana, Cabbage and Tomato

Collective marketing operation:
Member farmers deliver their products (various vegetables) to the cooperative after harvest. The cooperative sell same commodities collectively to nearby Chiwempala Market. Cash gained by selling products are put in the cooperative account. For each member farmer who delivered products, "shares" equivalent to selling price are given depending on delivered quantity. No cash payment is made. Farmers possessing the shares are entitled to receive dividend every year depending on cooperative's performance. For farmers' need of cash, actually, some part of products grown and harvested are individually sold. In accordance with "Cooperative Societies Act", when farmers become member of the cooperative, each farmer should buy 10 shares, although immediate payment is not compulsory. Cash equivalent to accumulated shares forms a capital of the cooperative.
According to the cooperative members interviewed, member farmers feel that between the cooperative and marketers in the market, some trusty and nearly equal relationship is established. Prices are determined by negotiation with marketers. Bulky shipment by collective marketing contributes much to it. Main advantages of collective marketing raised by interviewees are cost reduction by bulk handling; reduction of product losses; wider choice for timing and destination of marketing; and saving time for marketing and sparing more time for improvement at production stage.

**Box 3.4.5**
**Farmers' Organization active for realizing Collective Marketing**

Name: Chipapa Irrigation Scheme (Farmers' Group)
Location: Chipapa, Kafue district, Lusaka province
Established : 1990s
Members: 120 (75 female, 45 male)
Main activities:
Growing and selling of Vegetables
Growing and selling of Maize
Main Commodities of Vegetables (by number of farmers, farm area & production):

Green Beans, Rape , Tomato and Okra

History and current status of the Group:
The Chipapa Irrigation Scheme is registered with the Registrar of Societies as a farmers' group. It has 120 members, no staff or workers. The Scheme has a total land area of 10 hectares for farming. The farming activities, using furrow irrigation in the Scheme started in 1956 when the dam was built. During this period, the farmers procured agricultural inputs collectively and sold the farm products collectively. They also owned a vehicle to transport products to the market. These activities went on until 1983 when the pipe supplying water from dam got blocked. The blockage lasted nearly for 10 years and during this period no farming activities took place. When the farming activities resumed in 1991, the farmers no longer procured farm inputs and sold farm produce collectively. The main reason for this was that the farmers had money (capital) to go into farming at different times. As a result, they

had different harvest and selling times.

The members have not paid a membership or subscription fee. However, in 2009, the members commenced paying an annual water levy of K18,000 per member. The Scheme used the annual water levies for 2009 to open a bank account with an initial amount of K1,400,000. The Scheme intends to use this money to buy agricultural inputs, pay for transportation of the farm products and provide credit to members. Two (2) of current elderly members still have a fresh memory that their parents have been conducting collective marketing long ago, and recognize the advantage of such operation. This memory is now shared by all members in the Scheme.

Main advantages of collective marketing raised by the members interviewed are cost reduction by bulk handling; wider choice for timing and destination of marketing; saving time for marketing and sparing more time for improvement at production stage; trigger for improvement of market system towards clear and efficient transactions; and strengthening farmers' bargaining power. Also, constraints pointed out by the members at this moment are very poor feeder road, lack of vehicle and lack of capital.

**Box 3.4.6**
**Linkage between business-minded farmer and cooperating smallholders**
Name of Group: "D" (abbr.)
Location: Chamba Valley, Lusaka district, Lusaka province
Farming group owned and managed by one (1) business-minded farmer (male). Core members are his family. Since more or less 10 years ago, he has been aggressively making the linkage with the front of domestic and export market. The group is a member of the private firm formulated before by him. The group has 11 ha in total for growing various commodities of vegetables at the moment. The group, under the agreement, supplies its commodities to several large scale retailers and institutions in Lusaka, in cooperation with many smallholders organized by him. In order to meet a big market opportunities, the group now plans to increase number of cooperating small scale farmers on contract basis. Also, the group intends to establish "Delivery Point" within the area, to improve the situation caused by concentration to the Sowet market in Lusaka. In attaining the plan, the group's major constraints are lack of working capital; lack of appropriate means of transportation; and lack of efficient irrigation system, for which the group is seeking for support.

Large scale retailers (supermarkets) in Zambia procure fresh commodities from various sources; (a) individual farmers under contract basis, (b) import from other countries for what is unavailable in Zambia and (c) local market. For fresh vegetables and fruit, source (a) is the majority. Requirement demanded by supermarkets is quantity, delivery schedule (time & place) and quality (size/ color/ maturity, etc.). However, process to meet the requirement is left up to the suppliers' choice. In this sample case, one (1) farmer supplies commodities to supermarkets in accordance with the requirement demanded, by collecting the required commodities from a number of small scale farmers organized by him. This case shows that even one (1) smallholder can be supplier to large scale retailers (supermarkets), if he or she is business-minded enough and has ability of organizing other farmers.

### 3.4.11 Value Chain of Vegetables

Based on current situation and constraints described in previous sections 3.4.1 - 3.4.10, this section attempts a Value Chain Analysis for the commodities of Vegetables. Process of the analysis is as follows:

1) Clarification of value chain (correlation of main actors and functions)
2) Cost analysis by stage of marketing channels
3) External and internal factors analysis
4) SWOT analysis
5) Study for possible actions

(1) Value chain analysis

Clarification of value chain (Correlation of main actors and functions) and cost analysis by stage of marketing channels are summarized in Fig. 3.4.2. As described in section 3.4, main marketing channels of vegetables are “farmers - intermediary traders (rural & wide areas) - wholesalers - retailers - consumers” (Thick lines in Fig. 3.4.2). Wholesalers are usually based in marketplaces. Intermediary traders are dealing products between farmers and wholesalers. As discussed before, there are many serious challenges related to marketing infrastructures (feeder-roads, market information, marketplaces, quality standards/ grades, etc.). Under such difficult situation, however, many marketers try to work actively, making the best use of their competent ability of collection of market information, and also high mobility depending on the market situation. Retailers procure products from wholesalers for selling to consumers. Other than these main channels, many channels exist (Thin lines in Fig. 3.4.2). Also, multi-functioning actors covering several stages of the channels are also often observed.

Plenty of vegetables are exported with cross-border trade to neighbouring countries. Since COMESA has not come into effect yet for regional trade at this moment, most of transactions made in the markets are considered to be informal and dealing data are not recorded. Intermediary traders play an important role in the cross-border trade. They carry products to Kasumbalesa Market ("cross-border trade market") located near border in Chililabombwe District (Copperbelt Province), for selling it to buyers of DRC who are coming to this market crossing border. As described before, many traders procure some commodities in Lusaka, and then transport it to the north for cross-border export. Export prices are said to be generally much higher than domestic prices, reflecting big demand in neighbouring countries. Trend of regional distribution seems to be nationwide, not just in the border areas.

Large scale retailers (Foreign Supermarkets) procure vegetables and fruit from individual farmers under contract farming, in addition to import of some products. However, smallholders involved in this system are very limited, due mainly to strict requirement of retailers (quantity, quality and delivery).

Fig. 3.4.2 indicates value distribution (share of value by stage). According to these data, retail prices of 3 commodities of vegetables/ fruit are 2.0 - 2.5 times as much as farm gate prices. For comparison, in case of Japan (known as high distribution efficiency), the ratio of retail prices to farm gate prices

(average in 16 commodities of vegetables/fruit) is approx. 2.4 times[8]. Also, another survey report[9] indicates that the average ratio of retail prices to farm gate prices for tomato in Lusaka province, Zambia for the period of May 2007 to April 2008 is approx. 2.3 times.

Although information sources are limited, several smallholders growing vegetables comment that cost of agro-input (fertilizers & chemicals) occupies more or less 50% of their shipping prices. High input cost seriously burdens smallholders seriously.

Just looking at above data, marketers' margins seem to be not excessive. However, type of target smallholders for the field survey in this study needs to be taken into account for judging whether the data reflect actual situation in the market. In previous section 3.4.9, smallholders are categorized in three (3) types in terms of activation level. Target smallholders for the survey in this study were mainly very active or relatively active farmers' groups (Type 1 and 2), not the most inactive and individually scattered majority of smallholders (Type 3), in view of the study approach to raise the whole level of smallholders through dissemination of success cases of smallholders' groups. Although data are not available enough for smallholders Type 3, as described in previous sections 3.4.1-3.4.7, the fact will be that the majority of smallholders are forced to act individually in the terrible situation of high inputs cost, lack of capital and very low selling prices, leading to extreme difficult farming.

Current situation described in previous sections indicates that major constraints hindering improvement of value chain are (a) incomplete marketing infrastructures; (b) lack of partnership between farmers' organizations and marketers; (c) weak farmers' organizations; (d) high production cost; (e) substantial postharvest losses, etc. For enhancement of value of whole value chain, necessary actions need to be taken to improve these issues.

(2) SWOT analysis and study for possible actions

From the previous discussion, SWOT analysis and the study for possible actions are summarized in Table 3.4.8, where "Strength and Weakness" (Internal factors of value chain) and "Opportunity and Threat" (External factors making an impact on value chain) are analysed, and then, possible actions for improvement are studied.

[8] Survey on Food Price Formation by Distribution Stage, MAFF (Dept of Statistics) Japan, 2008
[9] Food Security Research Project (MATEP Program / USAID): Vegetable trade flows and prices database 2008

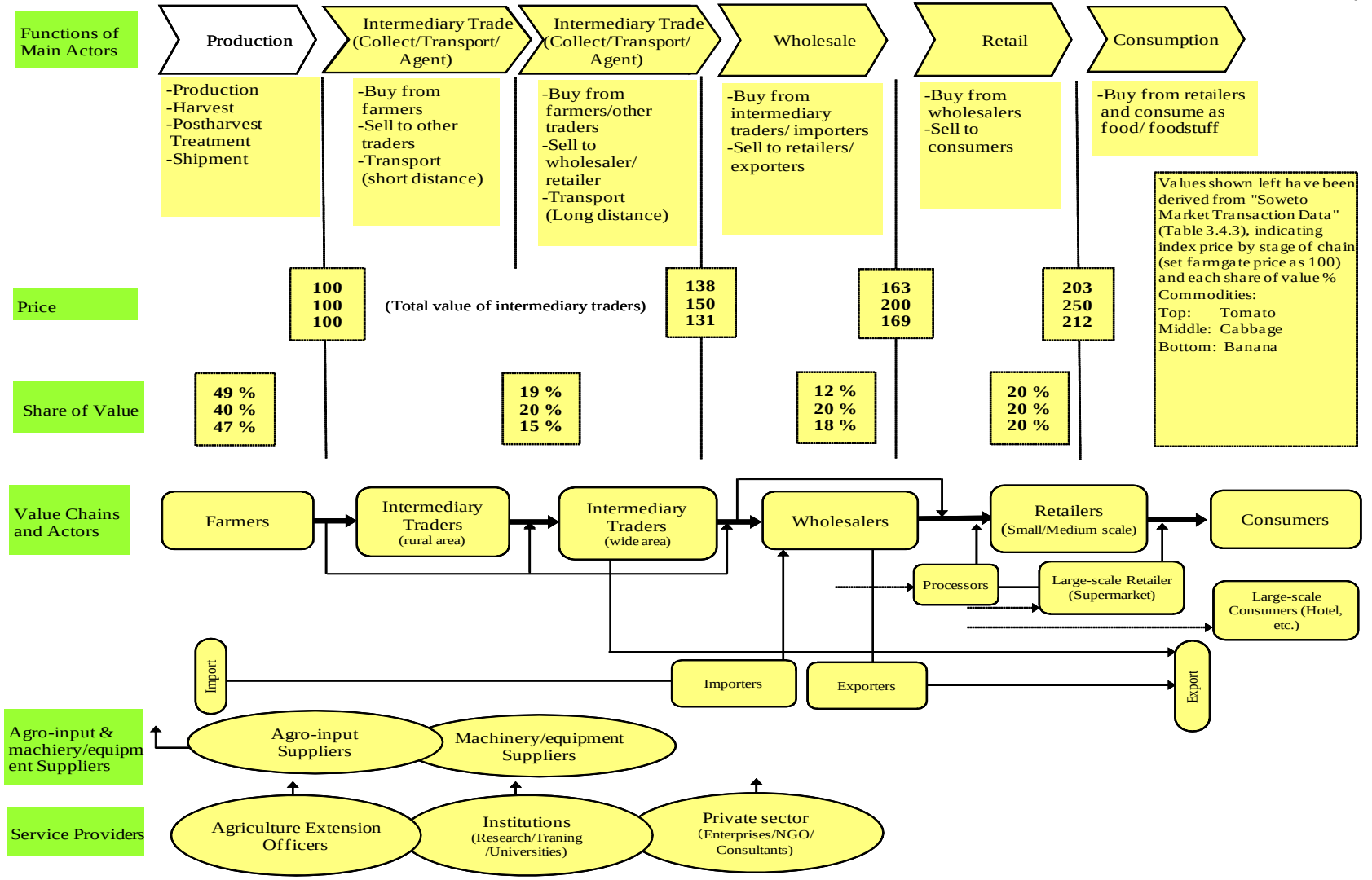



Fig. 3.4.2 Marketing Channels, Actors, Functions and Value Distribution for Vegetables and Fruit

Source: JICA Study Team

Table 3.4.8 SWOT Analysis and Possible Actions for Improvement

External Factors Analysis

| | | **Opportunity** | **Threat** |
|---|---|---|---|
| Target Commodity :<br>Vegetables & Fruit<br><br>Target Value Chain Unit:<br>*Value Chain of Major Vegetables & Fruit, comprising Smallholders (traditional farmers)*; Collectors; *Transporters*; *Wholesalers*; *Retailers*; *Consumers*; *Exporters*; *Importers*; *Agriculture Input Suppliers*, etc. | | - High potential of export by cross-border trade in Copperbelt Province, reflecting neighbour countries 'big demand<br>- Southern province has a strategic point for trade (Kazungura), adjacent to 3 countries<br>- Big demand for vegetables and fruit, particularly in urban areas<br>- Generally higher prices in export than domestic market<br>- No institutional constraints in setting up farmers' own shops in marketplaces<br>- Many service-providers are in operation in Zambia<br>- "Warehouse-Receipt System" exists in Zambia<br>- Marketers have keen interest in bulky procurement from farmers' cooperatives / groups | - Generally, domestic products are inferior to imported ones, in quality<br>- Most of feeder roads are terribly poor, leading to difficult access to market, increase of transportation cost and deterioration of products<br>- Quality standards and grades are not well established, thus fair and transparent price formation are not achieved<br>- Vegetables and fruit are not included in target commodities of market information system (prices), so no official price data are made available for these commodities, placing farmers and marketers in difficult position in their marketing activities and future planning |
| Internal Factors Analysis | **Strength** | - Degree of self-sufficiency of vegetables is high in some areas<br>- Specific original brands of vegetables and fruit are grown in some areas<br>- Marketers are in many cases competent, in collection of market information and mobility depending on supply and demand<br>- Several farmers' cooperatives and groups are conducting collective marketing and making a partnership with marketers | [Possible Actions to optimize "Opportunity" by use of "Strength"]<br><u>Short-/ Mid-term Strategy</u><br>- Promotion of growing specific original brand of vegetables and fruit in each area<br>- Establish "Market Information Exchange Spot" for more communication between farmers and marketers<br>- Promotion of partnership (market-linkage) between farmers and marketers | [Possible Actions to minimize negative impact with "Threat" by use of "Strength"]<br><u>Mid-term Strategy</u><br>- Establish and disseminate quality standards and grades, for fair and transparent price formation<br>- Promotion of growing specific original brand of vegetables in each area<br>- Promotion of partnership (market-linkage) between farmers and marketers |
| | **Weakness** | - Partnership (Market-linkage) are generally weak between farmers and marketers<br>- Lack of cold storage through value chain, particularly in farmers side, leading to less choice for timing to sell and destination of the products<br>- Majority of transactions are conducted individually between farmers and marketers, hindering fair and transparent price formation<br>- Lack of knowledge, experiences, business-mind and motivation in most of smallholders<br>- Postharvest losses are substantial | [Possible Actions to avoid missing "Opportunity" with "Weakness"]<br><u>Mid-term Strategy</u><br>- Organization of farmers<br>- Establish "Market Information Exchange Spot" for more communication between farmers and marketers<br>- Establish "Value Chain Consultative Body (Platform)" comprising farmers, marketers, supporting institutions and government, for improvement of whole value chain<br>- Promotion of setup and utilization of cold storage<br>- Supporting system to strengthen systematic activities of extension officers, service-providers, etc.<br>- Actions for reduction of postharvest losses | [Possible Actions to avoid worst cases caused by "Threat" and "Weakness"]<br><u>Mid-/ Long-term Strategy</u><br>- Organization of farmers<br>- Supporting system to strengthen systematic activities of extension officers, service-providers, etc.<br>- Promotion of farmers' market for local marketing<br>- Modernize main marketplaces<br>- Improve feeder roads<br>- Establish market information system for vegetables |

### 3.4.12 Issues on Distribution and Marketing for Small-Scale Farmers

This section organizes previous discussion comprehensively for leading to Basic Approach and Development Strategies of distribution and marketing sector.

(1) Core problems

As a result of analysis of cause-effect relationship among various problems, following 10 items have been selected, under the criteria of more frequency and weight as causes than other items. These items are considered to be the core problems that can be keys to the improvement.

1) Lack of mechanism for promotion of farmers-marketers linkage
   Although farmers and marketers have a strong interest in realization of their linkage, there is no effective promotion system at the moment, hindering market expansion, access to market information and group activities of smallholders.
2) Lack of experience, knowledge and business-mind
   This issue weakens farmers' motivation to market-oriented group activities and hinder the strengthening of farmers' organization, leading to unfair transactions.
3) Distribution by small lot
   Small lot distribution with farmers' individual shipment increases handling / transportation cost, causes much fluctuation in market prices and lower both farmers' and marketers' profitability.
4) Limited market channels and sales timing
   This issue leads to lack of transparency / fairness in price formation, unfavourable transaction and weak bargaining power.
5) High production cost
   High production cost mainly originated in high fertilizers / agrochemicals is a major factor lowering farmers' profitability.
6) Lack of quality standards
   Lack of quality standards / grades causes unclear quality assessment, lack of transparency / fairness in price formation and unfavourable transaction.
7) Inefficient marketplaces
   Congested, unhygienic, no record of transaction data, , improper practice of "brokers" and so on lead to lack of transparency / fairness in price formation and substantial postharvest losses.
8) Incomplete market information system
   Due to incomplete market information system such as exclusion of vegetables and fruit in target commodities and lack of practicality, no indicative market prices exist for vegetables and fruit and thus bring about disordered production and distribution.
9) Lack of capital
   Smallholders' lack of capital makes their marketing channels and sales timing very limited and leads to financial dependence on marketers, thus weakening bargaining power.

10) Poor feeder road

Poor feeder road, as a market infrastructure, is a major constraint related to whole value chain, causing difficulty in access to market, high distribution cost, etc.

(2) Identification of development issues to be tackled by distribution and marketing sector

Out of above 10 core problems, item 5) (High production cost) and 9) (Lack of capital) are to be covered by other sectors than marketing; item 6) (Lack of quality standards) and 8) (Incomplete market information system) are already in the process of improvement under ZNFU's initiative (cf. Chapter3-3.4.7); item 7) (Inefficient marketplaces) is fundamentally caused by a lack of legal framework (cf. Chapter3-3.4.4); item 10) (Poor feeder road) is a basic and serious constraint over the country. The GOZ needs to play a leading role in improvement of these two (2) items 7) and 10).

From above discussion, following four (4) items, after exclusion of six (6) items as above, have been identified as Development Issues to be tackled by distribution and marketing sector for the period of M/P.

1) Lack of mechanism for promotion of farmers-marketers linkage
2) Lack of experience, knowledge and business-mind
3) Distribution by small lot
4) Limited market channels and sales timing

Corresponding to four (4) Development Issues as above, Basic Approach and four (4) Sectional Development Strategies have been set, as it will be described in Chapter 5 - 5.3.2 (2).

## 3.5 Irrigation and Water management

### 3.5.1 Irrigation

(1) Inventory survey

Inventory survey for existing small scale irrigation schemes was conducted in the selected schemes including those recommended by MACO. The field survey concentrated on area, water sources and O&M, etc. The list of the small scale irrigation schemes are in Table 3.5.1 and 3.5.2. (Inventory sheets are shown in Annex C Irrigation)

Table 3.5.1 Existing Small Scale Irrigation Schemes

| No | Irrigation Scheme | Province | District | Irrigation area (ha) | Water Source | Remarks | Zone |
|---|---|---|---|---|---|---|---|
| 1 | Kafubu | Copperbelt | Ndola | 10 | River | Treadle pump | Zone 1 |
| 2 | Katuba | Central | Chibombo | 5 | Dam | Dam (Gravity) | Zone 2 |
| 3 | Mulila Kazembe | Central | Kapiri Mposhi | 8 | Dam | Dam (Gravity) | Zone 2 |
| 4 | Chunga | Lusaka | Lusaka | 8 | River | River intake (Gravity) | Zone 3 |
| 5 | Funzwe*[1] | Lusaka | Kafue | 8 | River | River (Gravity) | Zone 3 |
| 6 | Shantumbo | Lusaka | Chongwe | 15 | Dam | Dam (Gravity) | Zone 3 |
| 7 | Chipapa | Lusaka | Kafue | 7 | Dam | Dam (Gravity) | Zone 3 |
| 8 | Kanundwa | Southern | Monze | 18 | Dam | Dam (Gravity) | Zone 4 |
| 9 | Siafwa-kweda*[1] | Southern | Choma | 8 | Dam | Dam (Gravity) | Zone 4 |
| 10 | Ndondi | Southern | Choma | 11 | Dam | Dam (Gravity) | Zone 4 |
| 11 | Nkandabwe | Southern | Sinazongwe | 10 | Dam | Dam (Gravity) | Zone 4 |
| 12 | Nabuyani | Southern | Kalomo | 20 | Dam | Dam (Gravity) | Zone 5 |
| 13 | Mulabalaba | Southern | Kazungula | 6 | Dam | Dam (Gravity) | Zone 5 |

Note: *[1] Irrigation is individually carried out by buckets and treadle pumps.

Zone is the table is referred to Chapter 4

Table 3.5.2 Proposed Small Scale Irrigation Schemes

| No | Irrigation Scheme | Province | District | Irrigation area (ha) | Water Source | Remarks |
|---|---|---|---|---|---|---|
| 1 | Kakoso | Copperbelt | Chililaombwe | 26 | Spring water | Zone 1 |
| 2 | Bwafwano | Copperbelt | Kalulushi | 60 | River | Zone 1 |
| 3 | Kasamba | Central | Kapiri Mposhi | 12 | Dam | Zone 2 |
| 4 | Juda | Central | Kapiri Mposhi | 8 | Dam | Zone 2 |
| 5 | Natuseko | Central | Kabwe | 20 | River, dambo | Zone 2 |
| 6 | Waya Camp | Central | Kabwe | 5 | River | Zone 2 |
| 7 | Lifwambula | Central | Chibombo | 22 | Dam | Zone 2 |
| 8 | Munga | Central | Chibombo | 23 | Dam | Zone 3 |
| 9 | Chikupi | Lusaka | Kafue | 10 | Dambo | Zone 3 |
| 10 | Nakempa | Southern | Choma | 16 | Dam | Zone 4 |
| 11 | Siakasipa | Southern | Kazungula | 8 | Dam | Zone 5 |
| 12 | Mandia | Southern | Kazungula | - | River | Zone 5 |

In addition to the small scale irrigation schemes by gravity, small scale pump irrigation schemes were also surveyed as shown in Table 3.5.3.

Table 3.5.3 Existing Small Scale Pump Irrigation Schemes

| No | Irrigation Scheme | Province | District | Irrigation area (ha) | Water Source | Present conditions |
|---|---|---|---|---|---|---|
| 1 | Ipafu | Copperbelt | Chingola | 122 | River | Not operated |
| 2 | Chapula | Copperbelt | Kalulushi | 21 | River | Operated |
| 3 | Chibote | Copperbelt | Kalulushi | 70 | River | Not operated |
| 4 | Mukonchi | Central | Kapiri Mposhi | - | Dam | Not operated |
| 5 | Tubalange | Lusaka | Lusaka | 17 | Dam | Not operated |
| 6 | Clixby | Lusaka | Kafue | 67 | Kariba Lake | Not operated |
| 7 | Lusitu | Southern | Siavonga | 140 | Zambezi river | Operated |
| 8 | Kapululira | Southern | Siavonga | 51 | Zambezi river | Operated |
| 9 | Mubyumu | Southern | Siavonga | 12 | Kariba Lake | Operated |
| 10 | Siatwinda | Southern | Sinazongwe | 78 | Kariba Lake | Operated |
| 11 | Chiyabi | Southern | Sinazongwe | 42 | Kariba Lake | Not operated |
| 12 | Buleya Malima | Southern | Sinazongwe | 69 | Kariba Lake | Operated |

Note: *Movable engine pump

Actual situation of the irrigation facilities, water management capability of the WUA, present cropping pattern, etc. were surveyed in the inventory survey. In addition, the survey for the proposed irrigation schemes was conducted from the viewpoints of water availability, fertility of farmland, will of the farmers, farming practice as well as viability of the project implementation, such as marketability, accessibility to the market.

### 3.5.2 Water Management

Inventory survey of existing small scale irrigation systems was conducted that included the assessment of these systems from the point of view of operation and maintenance. The following observations were recorded during the initial field survey:

(1) Gravity irrigation

Gravity irrigation systems have their water source from the reservoir constructed on the water course, such as tributaries and topographically depressed sites. The WUAs and agricultural cooperatives properly distribute the irrigation water to the beneficiaries with consents between the members. In most cases, WUAs are responsible for the maintenance of the dam facilities, i.e., embankment, spillway, and the storage water itself is under the control of the Ministry of Energy and Water Development.

In case the irrigable area is located in an area higher than the water level in the reservoir, the farmers individually use treadle pump or electric/ diesel pump to lift up the water to their farmlands.

It is reported that the expertise in irrigation water management is even worse among small-scale farmers than among medium-scale and commercial farmers. Conveyance water losses are tolerated without due regard, leading to localized flooding and inefficient water application. This situation is exacerbated by the fact that most farmers over-irrigate their crops, which also is an economic loss for

them because they pay more money for pumping and get diminishing returns from their production. The main reason is due to an absence of water management regulations. Training for communities in water use and management is provided by the TSB through its provincial, district and camp officers. NGOs also put a large focus on water management and water use capacity building among small-scale farmers. The main thrust of training offered to water users is on aspects of leadership and group organization and on technical aspects of management and maintenance of infrastructure such as canals, furrows, small dams and pumps. Since most of the irrigation schemes were handed over to the farmers for operation and maintenance, the WUAs realized that they have to charge fees for pumping irrigation schemes for the sustainable use of the irrigation facilities.

(2) Pump irrigation system

The Water Users Associations (WUA) are properly operating the pump irrigation system. It is broadly observed that:

- Pumps are operated mainly in the dry season for 12 hours from 6:00 a.m. to 18:00 p.m.
- Rotational irrigation is applied in almost all the pump systems. Frequency of irrigation is about twice a week.
- Irrigation fee is duly collected by the WUA. Some systems collect irrigation fee as electric cost for the pump operation, otherwise irrigation fee includes maintenance cost for the system.
- Regulating ponds or tanks are installed to regulate the pumped up water, which is then distributed by gravity. It is reported that seepage loss through the embankment of the regulating pond is one of the constraints for the water distributing system.
- Water conveyance from the pump station to the regulating pond or tank is carried out through asbestos or flexible pipes with diameters ranging from 150mm to 250mm. Water leakages are observed mainly from the joints.
- Canal systems were constructed in the 1970s to 1980s. Most of the irrigation systems have a leakage problem through the joints of fabricated concrete panels and earth lined canals.
- Water shortage or drop of water level is constraints of some pump systems. It is recommended to install pump sump basin not only to protect the suction pipe from flowing foreign materials but to collect water even when the water level drops, especially when the water source is a river or a swampy area.

(3) Irrigation method

Rotational irrigation is dominant in the Study area. Furrow irrigation is applied in all of the systems, however farmers do not estimate the water requirement, accordingly irrigation loss cannot be disregarded even though the system operation is under the frequent guidance of the irrigation technical officers, and agricultural extension officers of MACO.

Drip irrigation covers some 5,628 ha; and coffee production accounts for 92 % of the drip irrigation systems. Drip irrigation was applied in the Ipafu Irrigation Scheme in Chingola District, Copperbelt Province. During the system design for coffee cultivation, the Zambia Coffee Board selected a drip irrigation system from the economic standpoint. The alternative plan was furrow irrigation system

through the regulating pond. It was however concluded that the drip irrigation was too advanced to sustainably be managed by the farmers. Sprinkler irrigation is also installed in the irrigable area of the "Emerging farmers". Since the emerging farmers have advanced skill and their cultivation area is slightly wider than other farmers, 2 to 3 ha pressurized irrigation system is applicable from the economic standpoint, i.e., balance of investment cost and benefit.

Furrow irrigation is observed in the farmlands located in the flat plain. It is however concluded that this type of irrigation is applied to avoid root rotting, especially in the Copperbelt Province in the wet season. Relatively sloped farmland is preferable to accelerate drainage to prevent water logging.

### 3.5.3 Dambo Use

(1) General

Small-scale irrigation covers 11 000 ha (20 % of total area) and is characterized by vegetables growing mainly on dambos and riverbanks. Shallow wells and small drains are dug where it is too wet to grow crops. Farmers use either treadle pumps or buckets tied to a rope for lifting water from these shallow wells or rivers. Extension of irrigation schemes using dambo water for smallholders is effective and contributes efficiently to the irrigation activities in the Study area. The followings are the study report for the water use in dambos:

(2) Outline of a dambo

A dambo is defined as "a wide low lying gently sloping treeless grass covered depression which is seasonally waterlogged from surrounding high ground assisted by rainfall and has water tables for most part of the year in upper 0.5 to 1.0 m of the soil profile from which they drain into stream"（The study report "Dambos in Eastern Province", Department of Agriculture (Feb. 1995))

As shown in Fig. 3.5.1, a dambo area is classified into 1) dambo margin zone, 2) Upper glass zone, 3) Transition/ seepage zone, 4) lower glass zone and 5) central zone. Rainfall is the recharge source of the dambo.

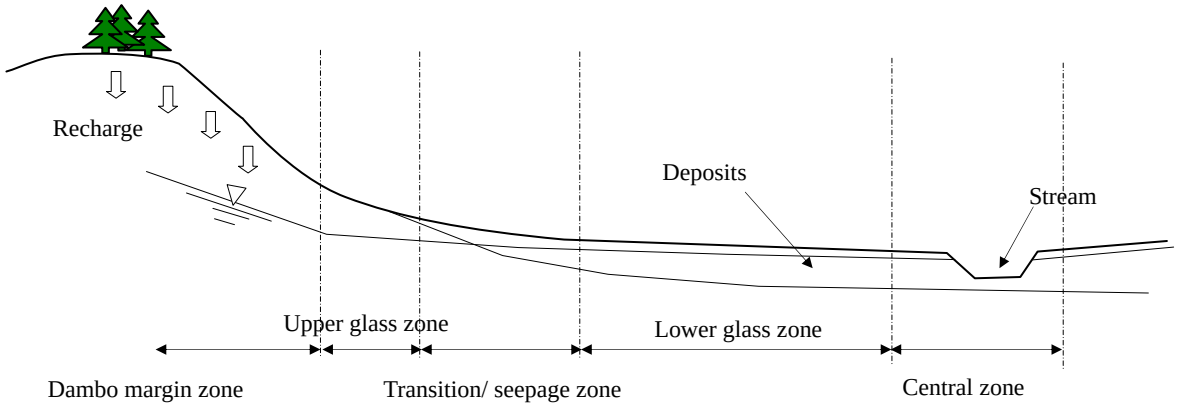



Fig. 3.5.1 Dambo Section

Apart from the dambo above, a riverbed area shows almost the same characteristics. A riverbed covered with alluvial deposits has relatively elevated groundwater surface even in the dry season. Inundated river flow raises groundwater in the riverbed and the water table does not decrease even in the dry season due to poor drainage. Thickly accumulated river deposit hinders evaporation from the

riverbed. This kind of wetland is observed along the tributaries in the most upstream stretches of Kafue River in Copperbelt Province.

(3) Dambo use

Wetlands, including dambos, which cover about 3.6 million ha or 4.8 % of the total land area, are a source of irrigation, livelihood for the majority of small-scale farmers in Zambia. Dambos are used for grazing animals in the dry season when upland vegetation is dry. They are also important for fishing, livestock-watering, collection of thatching grass and most importantly, for a dry season vegetable growing. Seepage zones and shallow wells are used as sources of water. Sometimes water storage needs for irrigation may dictate the construction of a low-cost earth dam. This type of use at small-scale does not entail the use of heavy machinery for cultivation or draining water.

Such dambos are widespread on the plateau of the Copperbelt and Central Provinces in the Study area. A remarkably advanced horticultural production system has been developed in dambos. Since dambos have been developed in the riverbed and depression of the terrain, certain undulation creates waterlogged area throughout the year and recession area during the dry season. Farmers cultivate upland crops such as maize and vegetables in higher area in the wet season, and move their cultivation area toward dambo waterside during the dry season. It is preferable to use buckets and treadle pump for irrigation by man power. It is notable that farming during the dry season contributes in improving farm income through the growing of cash crops, and such increase of income enables farmers to purchase agricultural inputs such as seeds, fertilizer and insecticide for the next cropping season. Such an interaction between dambos and upland use is promoted to accelerate dambo use.

(4) Dambo utilization area (details are shown in Annex C Irrigation)

Several dambos are located in Copperbelt Province (most upstream stretches of Kafue River) and the surrounding area of Chibombo town and the south-east area in Central Province. In the central area of Kabwe District and the left bank of Kafue River near Kafue town, widely lying aquifers composed of sandy gravel layer contain adequate groundwater that is originated by recharge of the rainfall in the wet season. These areas are also recommended to develop irrigation schemes using adequate groundwater source with minimal lifting force of 0.5 to 1.0 m below the ground surface.

### 3.5.4 Water Harvesting

Improved water management under rainfed agriculture has been advocated to guarantee adequate water supply for the crops. From the field survey and information collected from the Government, the following water harvesting methods are used:

1) Farming using micro-basins : Rain water is collected in micro-basins (0.35(L) ×0.15(W)×0.15(W) ) prepared by hand hoes.
2) Small pond (s) : Small pond using a depression of small stream is useful to collect water. It is notable that since the capacity of the small pond is above ten thousand cubic meters, a series of small ponds should be constructed to secure pond capacity for irrigation.

3) Roof water harvesting : Bore holes are commonly used for domestic water and irrigation supply for farmers. Since, water supply in some parts of the Southern Province rural areas is not adequate enough to support people livelihood, roof water harvesting is one of the methods used to supply irrigation water at household level.

There are currently an estimated 200,000 ha under conservation and/or water harvesting farming by small-scale farmers.

### 3.5.5 Donors Assistance in Irrigation Projects

Two (2) of the irrigation projects assisted by donors are briefly explained as follows:

(1) Small-scale irrigation project (SIP)

SIP stems from Government's resettlement program of the Tonga Community in Gwembe Valley, Southern Province, following the construction of Kariba dam in 1958. In order to mitigate the impact of the resettlement, the Zambian Government requested financial assistance to AfDB for a 6-year project in 1998. GRZ through MACO has established the Small Scale Irrigation Project (SIP) financed through a grant from the African Development Bank (AfDB). The objectives of the projects are to increase food security and generate income of the 1,613 households in Lusaka and Southern provinces. The projects achieved to establishing small scale irrigation schemes with a total beneficiary area of 1,890 ha.

Table 3.5.4 Project Site and Beneficial Area of SIP

| | Scheme | Province | District | Beneficial area (ha) |
|---|---|---|---|---|
| 1. | Kanakantapa | Lusaka | Chongwe | 620 |
| 2. | Nega-Nega | Southern | Mazabuka | 595 |
| 3. | Buleya Malima | Southern | Sinazongwe | 275 |
| 4. | Simumpande Village | Southern | Sinazongwe | 150 |
| 5. | Nzenga Fishing Camp | Southern | Sinazongwe | 98 |
| 6. | Chief Sinazongwa Village. | Southern | Sinazongwe | 100 |
| 7. | Kanakanpata dam | Lusaka | Chongwe | --- |

In addition to the above 6 projects, MACO intended to build an earth dam in Kanakantapa with a storage capacity of 5.0 million $m^3$ (changed later to be 25.0 million $m^3$). Project brief is as follows:

Table 3.5.5 Project Description of Small-Scale Irrigation Project

| | Scheme | Project brief |
|---|---|---|
| 1. | Kanakantapa | Youth settlement scheme was founded in 1992. Part of fund was used to develop the infrastructure, e.g. the pump station, reservoir by the grant aid program of Japan. The scheme is under the Department of Resettlement in the Office of the vice President. The total acreage of the scheme is about 1,464 ha and only 567 ha were covered by the Small Scale irrigation Project. The scheme was designed to minimize drought risk, increase production and farm income. |
| 2. | Nega-Nega | Nega-Nega scheme is located at about 103km south-west of Lusaka city and 45 km north-west of Mazabuka town where the main sugar plantations and factories exist. The scheme takes its water from the Kafue River. The main crop of the scheme is sugarcane. |
| 3. | Buleya Malima | Project site is located around Kariba lake. There was no irrigation scheme but the project embarked new irrigation scheme. |
| 4. | Simumpande Village | (The scheme was excluded from the SIP project due to lack of fund from the loan coming from the AfDB |
| 5. | Nzenga Fishing Camp | Project site is located around Kariba lake. There was no irrigation scheme but the project embarked new irrigation scheme. |
| 6. | Chief Sinazongwa Village. | n.a. |
| 7. | Kanatantapa dam | Dam site is located along the northern boundary of Kanakantapa Resettlement scheme. The dam impound sufficient water for agricultural use for the used of 620 ha of land downstream and contribute to development of small scale scheme. |

n.a.: not available
Source: Report of the Small-scale Irrigation Project

Following the Mid-term Review of 2007, the small scale irrigation schemes have remained with three main components:

1) Irrigation component

   The component aims at establishing a sustainable small scale irrigation scheme and the rehabilitation of existing schemes in a decentralized and participatory approach.

2) Rural savings and credit component

   The component aims at improving the overall access of the farmer groups (FGs) to financial resources. Activities under this component include: 1) establishment of a decentralized micro-credit delivery mechanism and 2) credit mechanism of farmers in self-management of village banks.

3) Capacity building component

   The component aims at strengthening the implementation capacity of the implementing agency and the management capacity of the target groups, i.e., training of MACO/ DAC staff, practical training of farmers, provision of technical assistance, marketing and institutional support, etc.

Beneficiaries and project cost are as follows:

Table 3.5.6 Details of Beneficiaries of SIP

| District | Project site | Command area (ha) | No. of households | No. of irrigation stations | No. of farmer groups | No. of farmers per FG |
|---|---|---|---|---|---|---|
| Sinazongwe | 1. Simupande village | 150 | 200 | 3 | 6 | 33 |
| | 2. Nzenga fishing camp | 100 | 130 | 2 | 4 | 32 |
| | 3. Sinazongwe village | 150 | 200 | 3 | 6 | 33 |
| | 4. Buleya Malima | 275 | 436 | 4 | 16 | 27 |
| Mazabuka | 5. Nega-Nega settlement | 595 | 164 | 6 | 12 | 14 |
| Chongwe | 6. Kanakantapa settlement | 620 | 483 | 2 | 20 | 24 |
| Total | | 1,890 | 1,613 | 20 | 64 | 27 |

Table 3.5.7 Project Cost of SIP

| | Amount in UA | Percentage (%) |
|---|---|---|
| African Development fund (ADF) | 5,290,000 | 65.8 |
| Technical Assistance Fund (TAF) | 760,000 | 9.5 |
| Zambian Government | 1,310,000 | 16.3 |
| Beneficiaries' contribution | 680,000 | 8.4 |
| Total project cost (in UA) | 8,040,000 | 100.0 |

Source: Report of the Small-scale Irrigation Project (UA 1 = $ 1.45949 (as of October, 2006)

(2) Irrigation development project, Zambia (at present under appraisal by the WB)

The development objective of the Irrigation Development Project (IDP) is the sustainable increase of agricultural incomes of smallholder farmers in selected high potential irrigation development sites, where "high potential" refers as much to market potential as to technical feasibility. The project will only develop irrigation schemes in sites where smallholders agree to (and will be able to) contribute on a sustainable basis to the cost of scheme operation and maintenance. The project outcome indicators include: (a) the value and volume of agricultural products marketed by beneficiaries of smallholder irrigation development sub-projects; and (b) amount of water fees collected in the smallholder irrigation development sub-projects.

The project has three components: (i) irrigation development, (ii) smallholder commercialization, and (iii) project management. The project is expected to be implemented over a seven-year period.

Potential sites for infrastructure investment within the framework of the Irrigation Development Project (IDP), identified earlier in 2008, have been short listed and ranked in order of priority base on their apparent suitability for the project and on their readiness for implementation. The objectives of the IDP are to sustainably improve the agricultural income of rural population with a high potential for irrigation development. Seven (7) sites/ projects were visited for project verification.

Table 3.5.8 Potential Smallholder Irrigation Projects

| | Scheme | District | Province | Project area*[1] (ha) |
|---|---|---|---|---|
| 1. | Kalungwish Sugar Irrigation Project | Kasama | Northern | 2,000<br>(800 ha in sugar factory) |
| 2. | Lumwana Mine Smallholder project | Solwezi | North-western | 2,000 |
| 3. | Mwomboshi Dam Project | Chibombo | Central | 1,000 |
| 4. | Mwinilunga Smallholder Pineapple Project | Mwinilunga | North-western | 400<br>(including 50 ha Ikelenge Pineapple scheme) |
| 5. | Musanje Irrigation Project | Kafue | Lusaka | 100 |
| 6. | Lusaka Peri-Urban Smallholder Irrigation Project | | | |
| 6.1 | Chipapa Dam Smallholder Project | Kafue | Lusaka | 100 |
| 6.2 | Katoba Dam Smallholder Project | Chongwe | Lusaka | 500 |

Source: Study team edited based on Interim report of IDP, FAO Investment Centre, January 2009)
*[1] Project area is potential area, thus beneficial area by the project is smaller than project area.
Kanakantapa Dam Irrigation Project was not included in Table because the project was implemented by the SIP.

The IDP is composed of the following project components:

1) Irrigation development: to develop a series of medium to large scale smallholder irrigation schemes in high potential sites and to ensure long-term sustainable operation and maintenance of these schemes (Tentatively three (3) projects are recommended for irrigation projects, namely Musakashi (Mufulira District, Copperbelt Province); Mwomboshi (Chibombo District, Central Province), and Lusitu (Siavonga District, Southern Province) are candidates.
2) Smallholder Commercialization: to ensure market access and lay the foundations for a sustainable intensification of agricultural production in the targeted smallholder irrigation schemes (Proposed sites are not specified)
3) Project Management: to manage and use resources in accordance with the project's objectives and procedures and to support the establishment of a policy and institutional framework that is favourable to up-scaling of the project (Support for Government institutional and administrative capacity)

### 3.5.6 Organization of MACO Irrigation Sector

(1) Organization of MACO

After the institutional reform of MACO in 1996, four departments were set up, i.e., (i) Field Services Department (FSD); (ii) Research and Specialist Services Department; (iii) Economics and Marketing Development Department; and (iv) Human Resources and Administration Department. The FSD was composed of three branches, the Technical Services Branch (TSB), Agricultural Extension Branch (AEB) and Fisheries Extension Branch (FEB). The TSB is in charge of the irrigation sector. The TSB is at present in charge of the planning and implementation of all irrigation projects, and is composed of three sections 1) Irrigation Engineering Section, 2) Land Husbandry Section and 3) Farm Product and Machinery Section. The Irrigation Engineering Section has three subdivisions headed each by a Principal Irrigation Engineer.

Table 3.5.9 shows the number of irrigation engineers. The Irrigation Engineering Section has the Chief Irrigation Engineer at its the head. It includes Senior Irrigation Engineers, Irrigation Engineers, Technical Officer and Junior Technical Officers.

Table 3.5.9 Irrigation Staff in MACO

| | Position | Location | Required number | Present number |
|---|---|---|---|---|
| 1 | Chief Irrigation Engineer | Headquarters | 1 | 1 |
| 2 | Principal Agronomist | Headquarters | 1 | 0 |
| 3 | Principal Engineer (Catchment Hydrology) | Headquarters | 1 | 0 |
| 4 | Principal Engineer (Hydraulics & Civil Structures) | Headquarters | 1 | 0 |
| 5 | Chief Technical Officer | Headquarters | 1 | 0 |
| | (Sub-Total) | | 5 | 4 |
| 6 | Senior Irrigation Engineer | Lusaka Province | 1 | 1 |
| 7 | Senior Irrigation Engineer | Choma Province | 1 | 1 |
| 8 | Senior Irrigation Engineer | Mongu Province | 1 | 1 |
| 9 | Senior Irrigation Engineer | (Other Provinces) | 5 | 0 |
| 10 | Senior Agricultural Research Officer | NIRS | 1 | 0 |
| | (Sub-Total) | | 9 | 3 |
| 11 | Irrigation Engineer | Province: Chipata, Central, Copperbelt, Kabwe, Kasama, Lusaka, Mansa, Solwezi<br>District: Choma (2), Chongwe, Kafue, Lusaka, Mongu, Monze, Sinazongwe | 13 | 15 |
| 12 | Principal Technical Officer | Kalomo, Mazabuka District | 4 | 2 |
| 13 | Senior Technical Officers | Chipata, Kabwe, Kafue, Luanshya, Lundazi, Sesheke, Sinazongwe, | 9 | 7 |
| 14 | Technical Officer | Central (3), Chingola, Chongwe, Copperbelt (5), North Western (3), Northern (2), Petauke, Western, Copperbelt Lufwanyama) | 18 | 17 |
| 15 | Junior Technical Officer | Lusaka (3), Central, Kalomo (2), Luapula, Mpika, Northern (2), Southern (2), Central, Copperbelt (4) | 36 | 17 |
| | | Total | 91 | 66 |
| | | Present employment / Required employment | | 73% |

Source: MACO

Small scale irrigation schemes are supervised by irrigation engineers and technicians belonging to the District Irrigation Office. Table 3.5.10 shows the number of irrigation staffs in respective provinces. About two third of the irrigation staffs is engaged in the peri urban area of the four provinces. It is noted that the number of irrigation engineers and technicians is still short in the Provincial and District offices.

Table 3.5.10 The Number of Irrigation Engineers in Four Provinces

| | | Senior Irrigation Engineer | | Irrigation Engineer | | Senior Technical Officer | | Technical Officer | | Junior Technical Officer | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Province | District | Province | District | Province | District | Province | District | Province | District |
| 1 | Copperbelt | | | 1 | | | 1 | 3 | 4 | 4 | |
| 2 | Central | | | 1 | 1 | | 1 | 3 | | 2 | |
| 3 | Lusaka | 1 | | 1 | 3 | | 1 | | 1 | | 3 |
| 4 | Southern | | | | 4 | | 3 | | | 2 | 1 |
| | Total | 1 | 0 | 3 | 8 | 0 | 6 | 6 | 5 | 8 | 4 |
| | | 1 | | 11 | | 6 | | 11 | | 12 | |
| Total | | | | | | | | | | 41 | |
| | MACO Total | 3 | | 15 | | 9 | | 17 | | 17 | |

Source: MACO

Note: Senior Technical Officers are comprised of the Principal Technical Officers and the Senior Technical Officers.

(2) Other organizations

Researches and investigations in the irrigation sector are conducted by the Zambian Agriculture Research Institute (ZARI) through the National Irrigation Research Station (NIRS) located at Mazabuka District. Presently due to the insufficient number of staffs and aging of the facilities, the NIRS is not well functioning for technical, environmental and socio-economical researches and an investigation on irrigated agriculture.

As educational institutes, the University of Zambia, School of Agriculture Sciences, the Natural Resources Development College (NRDC), Zambia College of Agriculture in Monze District and the Zambia Center for Horticulture Training (Chapla) were established for training on water resources and irrigation.

(3) Farmers' organizations

The ZNFU and the ACF are composed of several farmers' organizations, farmers' cooperatives, government agencies and private enterprises. The irrigation schemes are operated and maintained mainly by the WUAs and the agricultural cooperatives. The WUAs, the agricultural cooperatives and the water committees decide on irrigation operations such as intermittent irrigation schedule, water requirement, intake period, irrigation fee and maintenance program of the existing irrigation systems. In addition, these organizations have the duty to request MACO for rehabilitation works on dams, reservoirs and spillways, dredging of siltation in the reservoir and protection of spillway which are all beyond the technical and financial abilities of the organizations.

### 3.5.7 Issues on Irrigation and Water Management by Small-Scale Farmers

(1) Constraints of existing small scale irrigation schemes

Stable irrigation water supply is inevitable to realize stable crop production, extension of cropping period and increase of farm production. It is therefore significant to relate derivative-issues from irrigation utility or its operation to some water-use matters. Installation of intakes on existing dams and canal lining are generally proposed to increase crop production. It is notable that farmer's participation from planning is the most important factor to achieve sustainable water use for irrigation through proper operation and maintenance activities. Since few water users associations has been established, however improper water management causes low irrigation efficiency and reduction of life span of irrigation facilities including dam facilities. In this regard, participatory approach for irrigation planning as well as routine irrigation water management should be realized.

(2) Constraints of sustainable dambo use

Major constraints expressed by farmers regarding horticultural production concern vegetable pests and diseases due to water logging, low market accessibility and water shortage in the drought years. In addition some recommended farm technology improvement, e.g., rotation and mulching are not known or applied by farmers. Furthermore, the absence of improved water lifting devices to reduce high labor demand for watering was expressed as a constraint in dambo farming. In social environmental aspect, it is necessary to clarify land title and water right when dambo use is accelerated. It is found a hereditary system of land ownership in the surrounding area of dambos. As

the young generation has no land title in general, such a hereditary system of landownership hinders the wide use of dambos.

(Reference) The underlying principle of this system is that land use is held in common ownership by the community in perpetuity. Land is transferable following family/community traits. The other category of land is that held under leasehold land tenure system. Under this category, title to land is given to the applicant for a period not exceeding 99 years after which the lease has to apply for renewal of the title. The current land Act recognizes traditional land as eligible for state registration and thus people owning land under customary tenure can convert it to leasehold title. This in effect converts customary land to leasehold land.

Meanwhile, high initial cost is required for farm land preparation, especially the first cropping time. Since dambo agriculture must be labor intensive, insufficient labor input has been a problem and foist the burden onto women who have much domestic work during the dry season, hence they are involved to a lesser extent in farming.

Following are also reported as constraints of dambo use.

- Fencing cost cannot be borne by the farmers. Because of pressure on the available dambo pasture, fencing work is inevitable for farming in and around dambos.
- Since most farmers live far from dambo areas, poor road condition for the transport of agriculture input and output keep farmers away from dambo farming.

In Zambia, no policy and legislation seem to have been developed for dambo use. Although no adverse effects of farming were observed, in advance of enhancement of collective dambo use, it is urgently necessary to discuss about environmental effects. For sustainable use of dambo, clear development strategy, direction and legislation should be indicated to the farmers as they live in rural community where poor information and knowledge have been given. Proper monitoring and research system should be established to review the legal system and investigate the situation.

(3) Governmental support

When MACO conducts project operation and maintenance of the existing irrigation schemes and project implementation of the new irrigation schemes, it is essential to increase the number of irrigation engineers and technicians in the headquarter, provincial and district offices of MACO for technically supporting project planning, design, implementation, monitoring/ evaluation, construction supervision and so on. Since the farmers have poor irrigation knowledge and maintenance works, technical assistance by the irrigation engineers and technicians of MACO is indispensable to maintain firm operation and maintenance system by farmers themselves. For this purpose, capacity building of the government staff is promptly achieved.

In addition, financial assistance is needed by the Government for the construction and rehabilitation works of dams, intake weirs, irrigation canals, etc. because farmers cannot afford to bear the cost even for maintenance work. Since all irrigation facilities including dams have been handed over to the farmers' side, farmers are responsible for the operation and maintenance of the facilities. As maintenance work is beyond farmers' capability, MACO should be responsible for the work of those main facilities. Furthermore, monitoring and education systems should be established by MACO to

achieve proper maintenance works for sustainable use of the irrigation facilities. Technical and financial support for farmers' leaders training on irrigation water management skill should be continued to encourage WUS's activities, thus stable water supply is realized.

It is also recommended to strengthen cooperation with other department, e.g., Department of Agriculture and Department of Agribusiness and Marketing. Increase of farm income shall be attained to continuously secure operation and maintenance fund for irrigation facilities. For this purpose, MACO should establish a cross sectional cooperation with other department so as to improve farm production and develop higher marketability from a synthetic point view of irrigated agriculture for smallholders.

## 3.6 Rural Society and Farmers' Organization

### 3.6.1 Condition of the Agricultural Societies of the Irrigation Area

The Study Team conducted interview survey targeting the farmers of the existing irrigation schemes where PRA workshops were practiced, namely Ipafu, Chipapa, Chunga, and Nkandabwe irrigation schemes. The purpose of the survey was to correct the supplemental information regarding rural society and farmers' organization. About 30 interviewees from the irrigation scheme members were selected by the farmers in each scheme. The collected information is summarized as the following paragraphs.

(1) Family size, widow ratio, and literacy rate

Table 3.6.1 shows average family size, widow ratio, and literacy rate of family head. The average household size is not significantly different among the schemes. However, when it comes to the ratio of widows, each scheme has different aspects. The lowest widow ratio is 7.03% for Ipafu scheme followed by the second lowest 17.3% for Nkandabwe scheme, and 18% for Chunga scheme. As for the Chipapa scheme, the ratio of widow is the highest, 45%. The result reflects the characteristic of the Chipapa scheme where the majority of the scheme members are women. The number of women members is 75 which is more than that of the men's of 45. It can be said that the Chipapa scheme is functioning for not only generating agricultural production but also means of women's empowerment especially widows. However, it is seen that the higher percentage of widow rate at Chipapa somehow affects the lower literacy rate of 66% while the other schemes record 83% to 87%, which exceed the national average of 80.5%.

Table 3.6.1 Average Household Size, Widow Ratio, Literacy Rate of Household Head

| Scheme Name | No. of Interviewee | Average HH Size (person/ family) | Ratio of Widow | Literacy rate of household head |
|---|---|---|---|---|
| Ipafu | 30 | 7.63 | 7% | 87% |
| Chipapa | 29 | 7.03 | 45% | 66% |
| Chunga | 28 | 7.21 | 18% | 86% |
| Nkandabwe | 30 | 7.50 | 17% | 83% |

(2) Education level of household head

Table 3.6.2 shows education level of household head of each scheme. From the table, Ipafu scheme is seen the most favourable as nearly half of the scheme members have been educated at more than secondary grade level. It might be implied that the scheme members have awareness of importance of education because Ipafu scheme was historically developed by the settlers graduated from the Kalulushi Farm College in 1968. The second most favourable scheme is probably Chunga since the advantage of its location near of Lusaka may contributes to the opportunity of access to education. Nkandabwe does not have higher educated members but not the lowest number of educated members. 70% of the members finished primary level education. No education ratio is 24 % in Chipapa, it is the lowest percentage in the four schemes. It can be linked to the low literacy rate explained in the previous paragraph.

Table 3.6.2 Education Level of Household Head

| Scheme Name | No. of Interviewee | No Education | Primary Grade1-7 | Basic Grade1-9 | Secondary Grade8-12 | Higher |
|---|---|---|---|---|---|---|
| Ipafu | 30 | 10% | 7% | 37% | 33% | 13% |
| Chipapa | 29 | 24% | 38% | 14% | 24% | 0% |
| Chunga | 28 | 14% | 36% | 14% | 29% | 7% |
| Nkandabwe | 30 | 7% | 70% | 10% | 13% | 0% |

(3) Mode of income source

Table 3.6.3 presents the annual average income per household and Gini index. The total average income consists of the average income from agriculture, livestock, aquaculture, and non-agriculture. From the result of the interview survey, the highest total average income is MK 4817,931 in Nkandabwe scheme, followed by MK 4,089,130 in Chunga scheme, MK 3,981,931 in Ipafu scheme, and the lowest average income of MK 3,553,209 in Chipapa scheme. As of average income from agriculture, the highest is MK2,346,087 in Chunga scheme, followed by the MK2,054,621 in Ipafu scheme, MK1,824,828 in Nkandabwe scheme, and the lowest MK1,202,058 in Chipapa scheme. Agriculture is major income source in all schemes except Chipapa as non-agricultural income exceeds agricultural income.

It is observed that Nkandabwe scheme possesses well balanced income source as Figure 3.6.1 shows. It does not have significant amount of agricultural income comparing with the other schemes but does have relatively high amount income from the other income source such as livestock and non-agriculture. It is because 1)Nkandabwe scheme is located in a prosperous livestock-farming region, especially cattle, and also 2)mines located nearby provide job opportunity in addition to farming. Eventually, the total average income is mainly from the other sources.

Both Chunga and Ipafu are schemes which generate more than half of total income from agriculture while the other two schemes do not. They have nearly same amount of total average income, however the contributed income sources apart from agriculture are different from each other. Whereas Chunga scheme is likely to rely on non-agricultural income, Ipafu scheme relies on income from livestock. Also, Ipafu is the only site which practices aquaculture.

Chipapa scheme is unfortunately recorded as the lowest income generating scheme among four schemes. However, its income for non-agriculture is higher than any other schemes. It can be reasoned, as discussed in PRA workshop, that Chipapa scheme once devoted to charcoal burning to make a living in 1980s because the dam was completely blocked by silt and cultivation came to a halt. This experience still reminds villagers, especially male, seeing agriculture is not as a major income source. It is also reasoned why majorly members of Chipapa scheme are female.

In terms of equal household income distribution among the schemes, Ipafu and Nkandabwe are the most favourable schemes as both schemes' Gini index counts 0.54. They are followed by 0.59 of Chunga scheme. Chipapa scheme is seen as the worst in equality of income distribution among four schemes.

Table 3.6.3 Annual Average Income and Gini Index

| Scheme Name | No. of Interviewee | Average Income (ZK/HH/year) | | | | Total Ave. Income (ZK/HH/year) | Gini Index |
|---|---|---|---|---|---|---|---|
| | | Agriculture | Livestock | Aquaculture | No Agriculture | | |
| Ipafu | 29 | 2,054,621 | 1,608,103 | 33,000 | 286,207 | 3,981,931 | 0.54 |
| Chipapa | 26 | 1,202,058 | 941,846 | 0 | 1,409,305 | 3,553,209 | 0.69 |
| Chunga | 23 | 2,346,087 | 751,304 | 0 | 991,739 | 4,089,130 | 0.59 |
| Nkandabwe | 29 | 1,824,828 | 1,734,483 | 0 | 1,258,621 | 4,817,931 | 0.54 |

Note : Indicated income is gross amount. Self-consumption of produced crops is not considered in this figure.

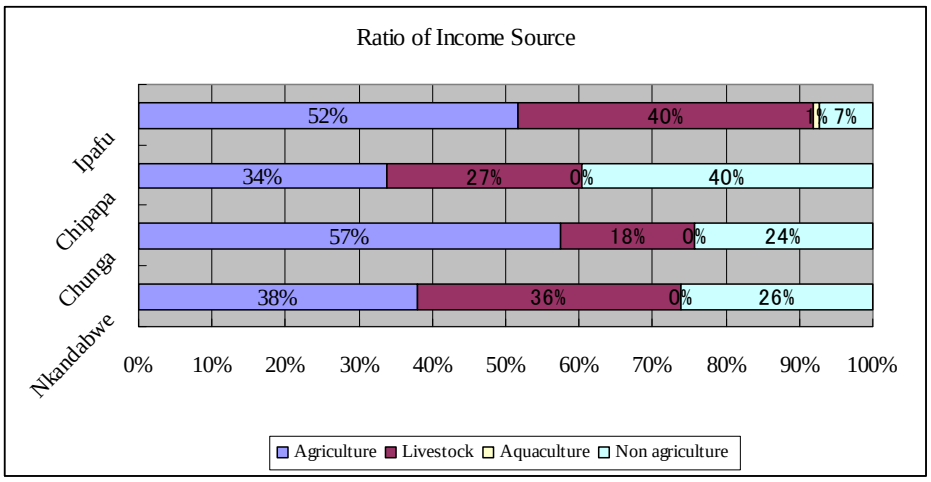



Fig. 3.6.1 Ratio of Income Source

(4) Asset holding

Figure 3.6.2 presents the percentage of interviewed farmers owning selected assets such as radio, TV, mobile phone, bicycle, and iron roof on their house. From the result of the survey, it is observed that Ipafu farmers are in better life standard than any other schemes. More than 90 percent of scheme members own radio, bicycle, and iron roof and nearly 80 percent own TV and mobile phone.

It can be said that owning radio and TV is not new in rural society as the figure presents. It is expected

that using such devices contributes to farmers receiving information in rural area. Moreover, it is remarkable that spread of mobile phone makes farmers not only receive information but also sending information timely to outside whomever they want to contact with. This advantage is expected to be used for marketing their agriculture products, especially in peri-urban area.

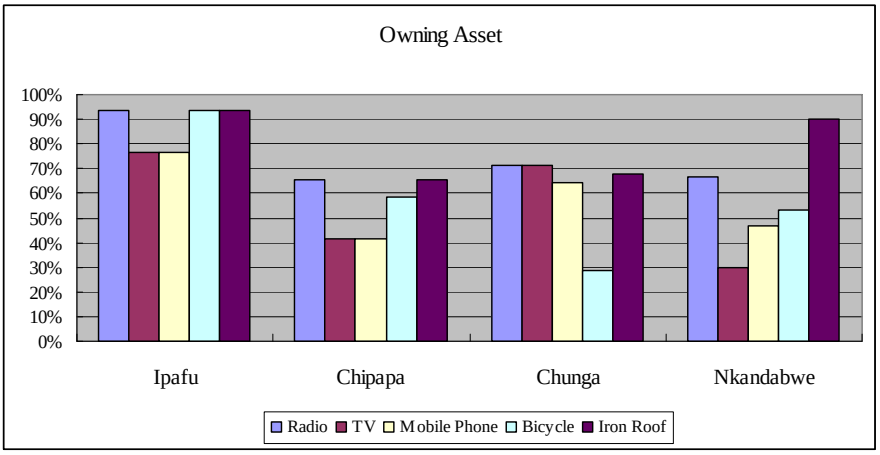



Fig. 3.6.2 Owning Asset

(5) Frequency of field extension workers' visit

Table 3.6.4 gives the result of the farmers' answers for the question about frequency of extension workers' visit to their place. According to the result, Ipafu farmers observe that the extension workers visit their place more often than any other schemes' famers. On the contrary, Chunga farmers feel the extension worker's visit to their place is almost nil.

Table 3.6.4 Frequency of Field Extension Workers' Visit

| Scheme Name | No. of Interviewee | more than once a week | more than once a month | Less than once a month | Once a haf year | None/ Seldom |
|---|---|---|---|---|---|---|
| Ipafu | 30 | 67% | 27% | 3% | 0% | 0% |
| Chipapa | 29 | 38% | 34% | 0% | 17% | 10% |
| Chunga | 28 | 0% | 0% | 0% | 4% | 93% |
| Nkandabwe | 30 | 17% | 30% | 7% | 3% | 43% |

(6) Frequency of listening to MACO radio programme

Figure 3.6.3 explains how often farmers listen to MACO radio programme. According to the result of interview, Ipafu scheme farmers are the most frequent listeners of MACO radio programme. Chunga scheme farmers are likely to be the least frequent listeners The result of Chunga scheme may be connected to the situation of extension worker's visit explained above paragraph. Considering diffusion rate of radio in rural area, it can be expected to increase the number of listeners if MACO widely promotes the programme and keep providing useful information to the villagers.

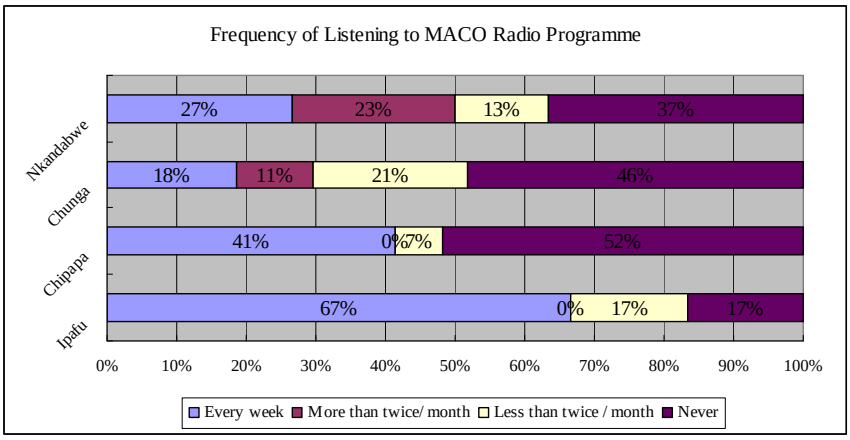



Fig. 3.6.3 Frequency of Listening to MACO Radio Programme

(7) Summary of farmers' situation in the irrigated schemes

The results of the survey reported above are summarized in the table below.

| | Ipafu | Chipapa | Chunga | Nkandabwe |
|---|---|---|---|---|
| Number of Interviewee | 30 | 29 | 28 | 30 |
| Average HH size (person/family) | 7.63 | 7.03 | 7.21 | 7.50 |
| Ratio of Widow | 7% | 45% | 18% | 17% |
| Literacy Rate of HH head | 87% | 66% | 86% | 83% |
| Education Level | None 10%<br>Primary 7%<br>Basic 37%<br>Secondary 33%<br>Higher 13% | None 24%<br>Primary 38%<br>Basic 14%<br>Secondary 24%<br>Higher 0% | None 14%<br>Primary 36%<br>Basic 14%<br>Secondary 29%<br>Higher 13% | None 7%<br>Primary 70%<br>Basic 10%<br>Secondary 13%<br>Higher 0% |
| Average Income (ZMK/HH/year) | 3,981 million<br>Agriculture 52%<br>Livestock 40%<br>Aquaculture 1%<br>Non agri. 7% | 3,553 million<br>Agriculture 34%<br>Livestock 27%<br>Aquaculture 0%<br>Non agri. 40% | 4,089 million<br>Agriculture 57%<br>Livestock 18%<br>Aquaculture 0%<br>Non agri. 24% | 4,817 million<br>Agriculture 38%<br>Livestock 36%<br>Aquaculture 0%<br>Non agri. 26% |
| Gini Index | 0.54 | 0.69 | 0.59 | 0.54 |
| Assets | TV and Radio: widely owned; Mobile phone: in a rapid expansion | | | |
| Frequency of Field Extension Workers' Visit | > 1/week 67%<br>> 1/month 27%<br>< 1/month 3%<br>1/half year 0%<br>None/seldom 0% | > 1/ week 38%<br>> 1/ month 34%<br>< 1/month 0%<br>1/half year 17%<br>None/seldom10% | > 1/week 0%<br>> 1/month 0%<br>< 1/month 0%<br>1/half year 4%<br>None/seldom93% | > 1/week 17%<br>> 1/month 30%<br>< 1/month 7%<br>1/half year 3%<br>None/seldom43% |
| Frequency of Listening to MACO Radio Programme | Every week 67%<br>> 2/month 0%<br>< 2/month 17%<br>Never 17% | Every week 41%<br>> 2/month 0%<br>< 2/month 7%<br>Never 52% | Every week 18%<br>> 2/month 11%<br>< 2/month 1%<br>Never 46% | Every week 27%<br>> 2/month 23%<br>< 2/month 13%<br>Never 37% |

- It was confirmed that the historical backgrounds of the community affect the nature of the society. For example, the Ipafu irrigation scheme, which was developed by agricultural school graduates, show a high interest in education. In the society where Chipapa irrigation scheme is located, males are prone to be indifferent about engaging in agriculture. As a result, women are the great majority in the group of this scheme. In addition, the Chipapa irrigation scheme has a high ratio of women-headed households, and the education level of the household heads in the scheme is low. These could be related to the low literacy rate of the same scheme.

- Farmers' income source sometimes is not concentrating to agriculture but diverted to livestock and no agriculture activities such as migrant works. Nkandabwe scheme records the highest average household income, even though it's agricultural average income is lower compared to the other schemes. From the point of view of promoting agriculture, rising livestock can be recommendable to disperse a risk of the short crop and have a combined effect with agricultural activities.
- Radio and TV are widely owned in the rural peri-urban area. It is expected that using such devices contributes to farmers receiving information in rural area. Moreover, it is expected that the rapid spread of mobile phone plays an important role in their activities such as marketing of their agricultural products, by allowing farmers not only to receive information but also to send out information timely to outside whomever they want to contact with.
- The frequency of filed extension workers' visits may be connected to the degree of interests in listening to the MACO radio program in the rural area. It can be expected to use the program as an extension tool of agricultural techniques and other useful information, by increasing the number of listeners through more frequent visits to the villages by the extension workers.

### 3.6.2 PRA Workshops in selected irrigation schemes

During the first field survey, a series of PRA workshops was conducted in order to clarify characteristics of social structure and organization mechanism in rural community. PRA workshop is conducted in four selected irrigation schemes, namely Ipafu, Chunga, Chipapa, and Nkandabwe. The main activities in workshop include 1) History Hiring, 2) Success Story Hiring, 3) Rich and Poor Profiling, and 4) Problem Analysis. The data information not shown in this section is summarized in Annex E 1. The summary of the Problem Analysis of each irrigation scheme is explained in following paragraph. The other records of PRA workshop are attached in Appendix. The schedule of the PRA workshop and list of the target Irrigation Scheme is presented bellow.

Table 3.6.5 Schedule of PRA Workshops

| Date | Scheme Name | District | Major Market | Irr. Area (ha) | Irr. Type | Num. of Attendants | Num. of Total Members |
|---|---|---|---|---|---|---|---|
| 01Dec to 02Dec'09 | Chunga | Lusaka | Lusaka | 15 | Gravity | 20 (M17/F3) | 25 (M20/ F 5) |
| 01Dec to 02Dec'09 | Chipapa | Kafue | Lusaka, Kafue | 10 | Gravity | 44 (M10/ F34) | 115 (M40/ F75) |
| 09Dec to 10Dec'09 | Ipafu | Chingola | Chingola, Cross boarder trading with Congo | 38 | Pump | 31 (M27/ F4) | 44 (M34/ F10) |
| 11Dec'09 | Nkandabwe | Sinazongwe | Choma, Batoka | 10 | Gravity | 44 (M20/ F24) | 84 (M59/ F25) |

(1) Chunga irrigation scheme

1) Background of the scheme

Chunga Irrigation Scheme was constructed along Chunga stream on which a weir diverts water into

the distribution canal upland. The total land under Chunga scheme is approximately 11 ha. The irrigation is still functional and extensively used by the farmers. Main activities in the scheme have been growing of maize, vegetable, sugarcane as plot boundaries. No livestock activities are identified in the scheme. The irrigation scheme benefits 34 farm families who grow their various crops including sugarcane and horticultural crops.

Despite having a functional scheme, there is little control by the cooperative management with regard to water distribution, canal and dam management as well as marketing of produce. Farmers are free to open their water outlets blocked by mud into their gardens and pay nothing to the cooperative. There has been no attempt to improve the weir and the canal. Though the cooperative set the price on seasonal basis, each individual farmer sells their produce individually resulting in price negotiations downwards by buyers.

2) Problem analysis

The attendant farmers were asked about the reason why they are having difficulties to be commercialized on their farming activities. Thus, the Problem Analysis was conducted to investigate the problem which is “Why Chunga Irrigation scheme may not commercialize”. As an output of the activity of the workshop, the following Problem Tree was made by attendant farmers.

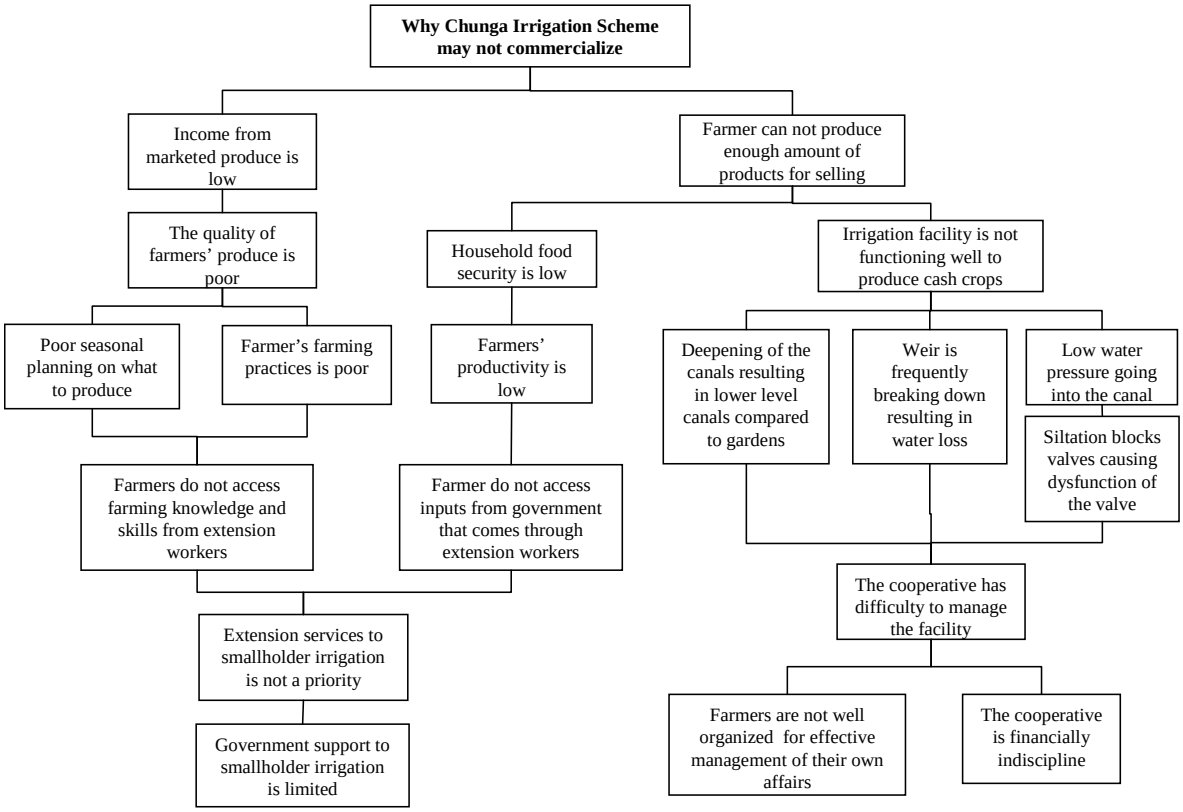



Fig. 3.6.4 Problem Tree of Chunga Irrigation Scheme

(2) Chipapa irrigation scheme

1) Background of the scheme

Chipapa irrigation scheme was built in 1952 by assistance from the Northern Rhodesian Government.

The main purpose of the dam was to support cattle rearing and gardening, including domestic use. During the early 1960's farmers were farming well in terms of production. This allowed and encouraged them to open a bank account. Subsequently, the money they saved up enabled them to purchase a vehicle. This enabled farmers to transport their produce to Chilanga, Lusaka, as well as Kafue. However, in 1982, the dam was blocked due to silting. This led to less water for irrigation and eventually, farming at the scheme stopped. This led to the complete shift of economic activity from farming to charcoal burning in an effort to raise an income. The problem continued for ten years after which Danish International Development Assistance (DANIDA) and Council Church in Zambia (CCZ) assisted farmers to unblock the dam.

Currently, Chipapa irrigation scheme has 115 member farmers and 10 ha irrigation area. Almost two third of member farmers are female. Organized irrigation activity is being practiced such as rotation water supply by date. A farmer is allowed a maximum of 12 beds averaging 10x15meters in size. Farmers pay a compulsory water/bed levy which is deposited in the scheme account. This is an annual charge of K3000 per bed. The scheme is constitutionally headed by an executive committee that is voted into office by members of the scheme. The executive makes the rules to guide the scheme, and may impose an emergency levy to be used for maintenance. As regards levies at the scheme, defaulting farmers´ beds are not watered, as a punishment.

2) Problem analysis

The attendant farmers were asked about the reason why they are having difficulties to be commercialized on their farming activities. Thus, the Problem Analysis was conducted to investigate the problem which is "Why Chipapa Irrigation scheme may not commercialize". As an output of the activity of the workshop, the following Problem Tree was made by attendant farmers.

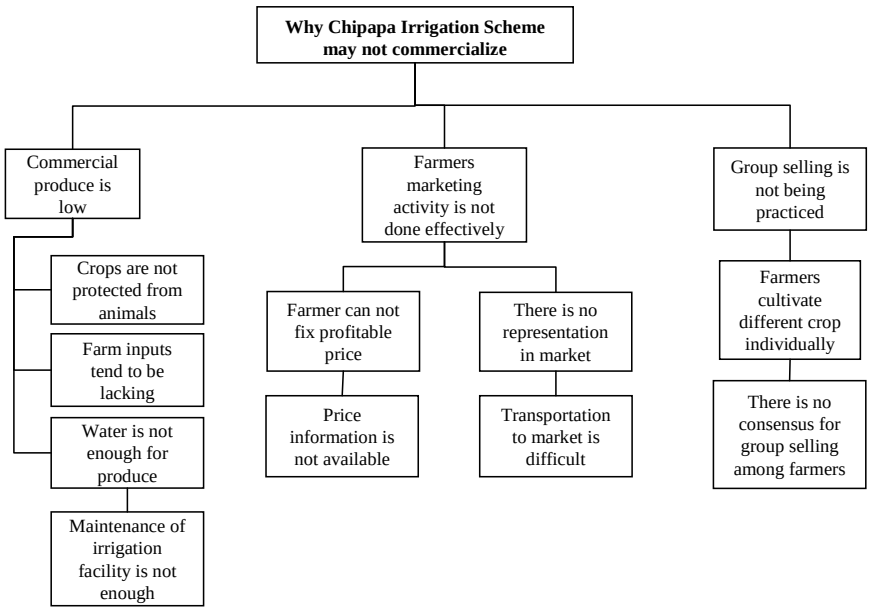



Fig. 3.6.5 Problem Tree of Chipapa Irrigation Scheme

(3) Ipafu irrigation scheme

1) Background of the scheme

Ipafu Irrigation Scheme was started to practice from construction of the reservoir in 1970 by Mindolo

Ecumenical Foundation under contract with help from government. Since then, Ipafu Irrigation Scheme has received tremendous support from government and other stakeholders. The cooperative also started in 1982. There was a pump provided by government to carry water to reservoir. However, there is a period of no operation of irrigation from 1984 to 2000 due to failure of procurement of fuel for pump. In 2003, the Coffee Board and MACO introduced drip irrigation in-stead of utilizing the reservoir and provided irrigation equipment. In partnership with the Coffee Board, MACO introduced a drip irrigation system into the scheme benefiting 25 farmers from 2003. However, the drip irrigation stopped function after ZESCO cut off power from electric pump house due to unpaid bills by farmers amounting to about ZMK 21,000,000 in 2008.

Despite the non-functional state of the irrigation scheme, the cooperative is generally active with financial controls, active membership and have continued mobilizing resources. For example, the cooperative have finished constructing a warehouse for keeping their agricultural products. They have also completed constructing a house for their warehouse manager to be employed. The cooperative has also active women and youth representation. Within their means, the cooperative members have continued farming and applying their irrigation skills in the wetlands along Ipafu River.

2) Problem analysis

The attendant farmers were asked about the reason why they are having difficulties to be commercialized on their farming activities. Thus, the Problem Analysis was conducted to investigate the problem which is “Why Ipafu Irrigation scheme may not commercialize”. As an output of the activity of the workshop, the following Problem Tree was made by attendant farmers.

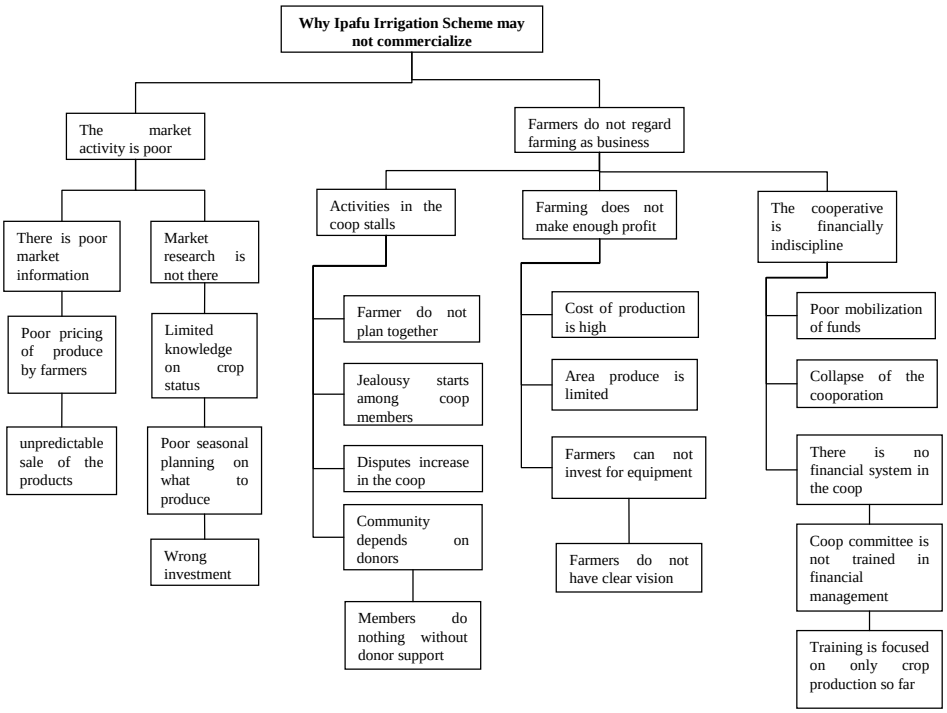



Fig. 3.6.6 Problem Tree of Ipafu Irrigation Scheme

(4) Nkandabwe irrigation scheme

1) Background of the scheme

Nkandabwe irrigation scheme is a community irrigation initiative of the people of Nkandabwe area of

Sinazongwe district, in Southern Zambia, and has existed for the last half century, being conceived sometime in 1958. The scheme originally utilized Nkandabwe Dam as a source of water for irrigation. However, the whole dam has been completely filled by sands. Hence scheme members currently utilize a flooded open pit coal mine as a source of water for irrigation. This pit is capable of supplying water throughout the year. Livestock, especially cattle and goats, is traditionally kept, and almost all members are rearing some livestock animals.

Agriculture has been the mainstay of the people. Maize is the staple food grown almost by every household. The Scheme is registered as a cooperative in 2006. Scheme members, besides maize grow other market crops, such as tomatoes, onions beans cabbage, rape green maize and other irrigable crops. The scheme does receive some ready customers from Choma and Batoka once or twice a week to buy some produce and they admit they do make a considerable profit.

However, the scheme faces insufficient water supply to all members under 10 ha irrigation area due to water losses by old intake valve and non-bricked earth canals. Therefore, the scheme considers that since there is electricity, the only solution would be to install a water pump at the water source to supply enough water and even expand their irrigation plot.

2) Problem Analysis

The attendant farmers were asked about the reason why they are having difficulties to commercialize their farming activities. Thus, the Problem Analysis was conducted to investigate the problem which is “Why Nkandabwe Irrigation scheme may not commercialize”. As an output of the activity of the workshop, the following Problem Tree was made by attendant farmers.

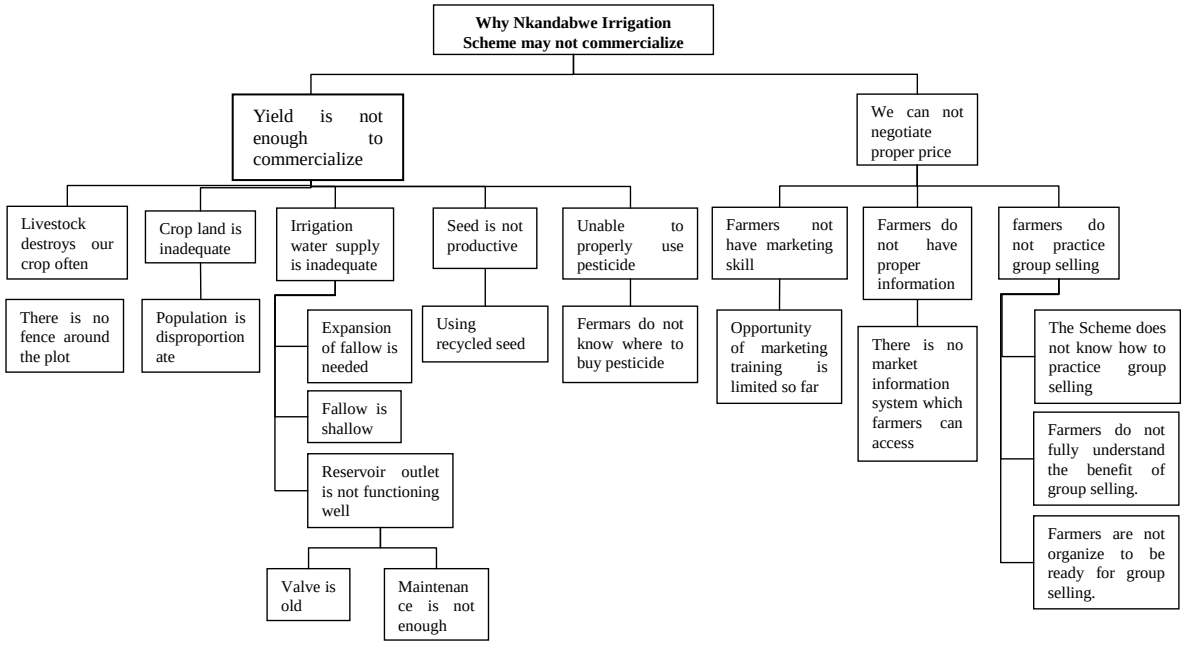
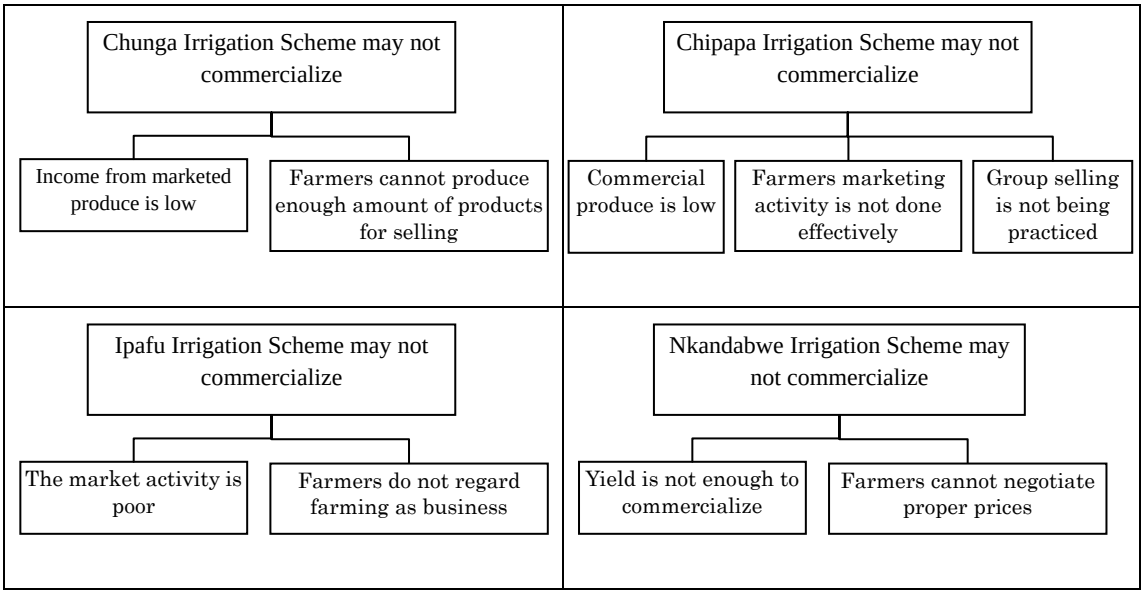


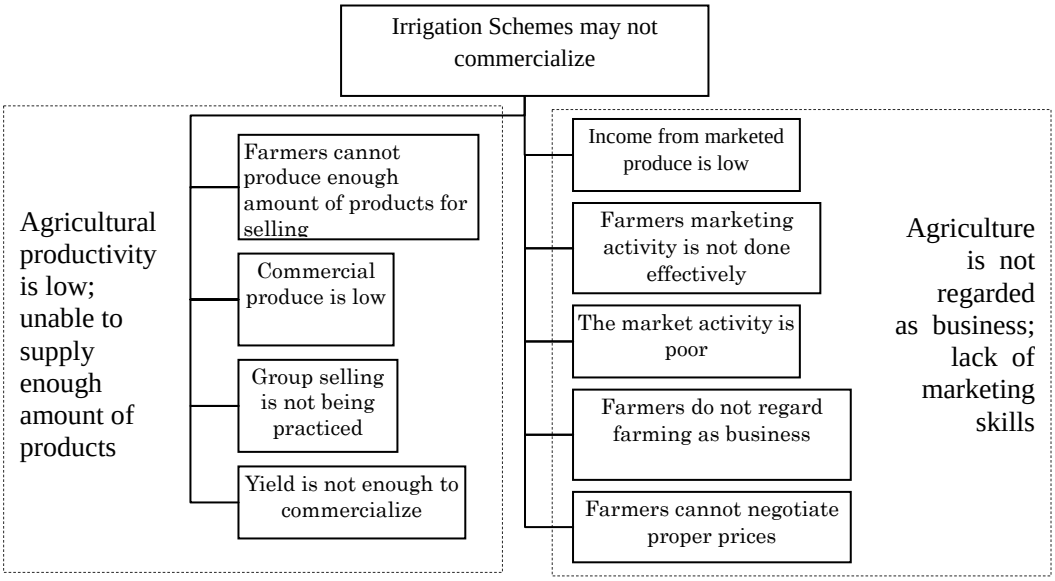

Fig. 3.6.7 Problem Tree of Nkandabwe Irrigation Scheme

(5) Summary of the problems analyses of the four irrigation schemes

The direct causes of the core problem in each scheme are presented below.




These direct causes are rearranged in the figure below. The reasons that "the Irrigation Schemes may not commercialize" by farmers cooperatives can be categorized into two main factors: 1) productivity of each member of the cooperatives is low, which leads that they cannot supply enough amount of products; and 2) as they do not regard agriculture as business, they lack marketing skills.




### 3.6.3 SWOT Analyses of Selected Successful Farmers' Organizations

As one of the outputs of the PRA workshop in Chunga, Chipapa, Ipafu, Nkandabwe during the first field work, SWOT analysis on each scheme was conducted to examine extent of rural society and farmers' organization. The SWOT analysis here was posed by the information and assumption collected in PRA workshop and farmers' interview. The further research and analysis will be done in those irrigation schemes and also other irrigation schemes in different locations to carry out realistic and practical formulation of the Master Plan and Action Plan.

(1) Chunga irrigation scheme

| Strength | Opportunity |
|---|---|
| - The cooperative is composed of farmers who have great interest in the irrigated farming at family level. Each family member has equal access to the land through the family succession arrangement.<br>- Apart from government recognition, the scheme is supported by traditional leaders in preservation of land ownership and dispute resolution<br>- The cooperative does not restrict its members on production ventures, allowing for diversified activities in cash crops and horticultural production.<br>- Women are well empowered and taking part in the activities at equal footing with men. Most success farmers in the scheme include women.<br>- Youths participate freely in the scheme activities at family level, thus ensuring continuity and sustainable development.<br>- All members of the cooperative have usufruct right to their land. This ensures unhindered investment on the land<br>- Chunga Irrigation Scheme follows family membership instead of individual membership. This ensures that all benefits go to the entire family rather than one individual.<br>- Chunga Irrigation Scheme always ensures an all year round production, building confidence in their clients. As a result, the scheme has managed to attract buyers from Lusaka townships. | - The scheme is located near from centre of Lusaka city. It makes middleman and other buyer easily access the scheme to purchase farm products.<br>- Government prioritizes Chunga scheme in the promotion of small scale agriculture, so far the MACO has facilitated extension services and provision of inputs under the FSP though to few farmers.<br>- Chunga Irrigation Scheme is legal entity and registered with the Registrar of Cooperatives. This legal status provides opportunities for access to various government and other donor support initiatives |
| Weakness | Threat |
| - The marketing of produce especially fresh maize and vegetables is big challenge. Though farmers fix prices for the scheme at the beginning of the marketing season, each individual farmer sells individually, reducing their bargaining power against the more organized traders.<br>- The Chunga Irrigation Scheme is lacking a comprehensive plan of development.<br>- The leadership has limited financial knowledge to a point that mobilization of financial resources has been very limited and the little mobilized is utilized on the many demands of the cooperative. At the current moment, the cooperative has no account and whatever is available is kept by the treasurer. There is need for financial management systems and training.<br>- Ownership is the biggest question for the scheme. The leadership and indeed members have limited skill to maintain the weir or repair the earthed canal with full knowledge of engineering aspects. | - The scheme is supported by Kabangwe agriculture camp. However, services from the extension officers from Kabangwe camp are erratic.<br>- Even though, the scheme is located close to Lusaka, the poor road infrastructure compromises the market potential of the area. |

(2) Chipapa irrigation scheme

| Strength | Opportunity |
|---|---|
| - The scheme already has existing infrastructure necessary for irrigation i.e. the dam, the valve, the canal and feeder canals.<br>- Scheme members are organized and the scheme is registered with the Registrar of societies.<br>- The scheme has a bank account with K1, 400,000 in savings. | - The scheme has a history of supplying vegetables to Lusaka and Kafue. Therefore, there is ready market for the products.<br>- The land under irrigation is very fertile.<br>- MACO has attached an extension officer to the community for extension services. |

| | |
|---|---|
| - There is cheap labour within the scheme.<br>- Most scheme members have cattle for ploughing and manure which can be utilized for organic farming.<br>- Scheme members are hard working and self-motivated. | - The scheme is well known among government ministries and the donor Community.<br>- The scheme is well connected to all mobile phone networks, radio and television channels thereby making communication and information easily accessible. |
| Weakness | Threat |
| - The dam is heavily silted thereby affecting the flow of water into the canal.<br>- The scheme does not practice group planting and selling, sometimes due to individual pursuit of profit.<br>- Some scheme members are ignorant about plant diseases and pests.<br>- Scheme members lack entrepreneurial skills.<br>- The scheme does not have title deeds therefore cannot borrow from lending institutions.<br>- The 10 ha for the scheme is insufficient for 120 members to commercialize.<br>- Inability of the members to diversify other irrigable options like fruit trees inter- cropped with vegetables.<br>- Lack of youth participation: only 18 youths out of 120 members.<br>- Owing to low literacy levels and general ignorance, most scheme members lack foresight and creativity.<br>- Due to ignorance, scheme members are unable to access financial markets and market linkages, and business development services. | - Prices for their farm produce are fixed by middlemen and not by scheme members.<br>- Major losses occur in event of droughts.<br>- Rampant thefts of barbed wire from the fences by intruders and cattle stray into the fields and graze vegetables owing to inadequate fences.<br>- The road leading to the market becomes impassable during the rainy season and is only repaired after some farmers have made losses due to poor prices obtained at the scheme. |

(3) Ipafu irrigation scheme

| Strength | Opportunity |
|---|---|
| - The cooperative is composed of former trainees of Kalulushi Farm College, a college that teaches mixed farming with strong bias to irrigated agriculture. Since all members are knowledgeable, Ipafu Irrigation Scheme has continued its pursuit for new innovations, skills and information.<br>- The cooperative frequently holds meetings and annual assemblies, changing leadership whenever necessary and are in accordance to their constitution.<br>- The cooperative is registered as Multi-purpose Cooperative, ensuring diversified farming and facilitated marketing. The cooperative has diversified into banana, fish farming, maize production, coffee production on top of horticultural production.<br>- Women are well empowered and taking part in the activities at equal footing with men. The cooperative has provided 30% position to women in the cooperative as a constitutional matter.<br>- Youths participate freely in the scheme activities, thus ensuring continuity and sustainable development.<br>- All members of the cooperative have legal title to their land. This ensures unhindered investment on the land. | - The scheme houses Ipafu Agriculture Camp managed by three extension officers. These officers consistently provide practical training to farmers, holding demonstrations and exposure visits. The area has been used as a pilot for Participatory Extension Approach (PEA) by the District Ministry office.<br>- The scheme has the potential market in Chingola and also cross border trading with the Democratic Republic of Congo.<br>- The community is close to Chingola town that offers excellent market to horticultural produce. The seasonally maintained road allows for easy passage into town and both male and female farmers.<br>- Government prioritizes Ipafu scheme in the promotion of small scale agriculture, so far MACO has facilitated linkages between the farmers' cooperative with Coffee Board in the provision of drip irrigation and also procurement of water pump using the Rural Investment Fund (RIF)<br>- Apart from government, Ipafu Irrigation Scheme works with KADENE that supported the community in the construction of fish ponds. KADENE also facilitated training in community mobilization and farming systems.<br>- Through the Fertilizer Support Programme (FSP), the Ministry of Agriculture has supported the |

| | |
|---|---|
| | communities in accessing fertilizer. This signifies the government's recognition of Ipafu Irrigation Scheme as a legal entity. |
| Weakness | Threat |
| - The community of Ipafu especially members of the cooperative have very high dependence on external support. For example, The ZESCO bill outstanding for over five years now if paid could restart the irrigation operations in Ipafu but farmers still see payment of this debt another institution's responsibility.<br>- Ipafu Irrigation Scheme lacks vision and long-term plans. There is no strategic plan in place to show how the organization desire to operate in future. As a result, the priorities of the community are highly misplaced. For example, the community has concentrated in building the warehouse and the manager's house without ensuring production of produce to be stored in the warehouse. Something happened with coffee production, whereby no plans were in place for the marketing of coffee to a point that farmers are still stack with the coffee being produced and many have abandoned their fields.<br>- Ipafu Irrigation Scheme leadership has limited financial knowledge to a point that mobilization of financial resources has been very limited and the little mobilized is utilized on the many demands of the cooperative. At the current moment, the cooperative has utilized all shares of its members, posing danger of bankruptcy. There is need for financial management systems and training.<br>- Ownership is the biggest question for Ipafu Irrigation Scheme. Sentiments from the community indicate that all materials and equipment belong to the supplier rather than the community. | - So far Ipafu Irrigation Scheme has been supported by three key institutions including government (construction of the furrow irrigation scheme), LITNCO (provision of cotton and coffee seedlings) and Coffee Board (provision of drip irrigation system). In all cases, the exit from the partnership has been unplanned. Government withdrew staff, transport, grader etc at the time when the community needed their services. Coffee Board just disappeared without proper handover of debts and liabilities to the community. These points to the fact that the "project delivery or supply approach" has been taken as opposed to "developmental approach". |

(4) Nkandabwe irrigation scheme

| Strength | Opportunity |
|---|---|
| - The scheme has an existing irrigation infrastructure i.e. furrows, source of Water etc.<br>- Group procurement of farm inputs is effectively working.<br>- There is leadership which is committed and willing.<br>- The scheme is registered with the registrar of cooperatives and therefore it is a formal organization.<br>- Conflict resolution and decision making is done democratically<br>- Members are self-motivated. | - The road is passable throughout the year. Transport to and from the scheme is not a challenge to the members.<br>- The scheme is connected to radio and television. It also has access to all the mobile phone service providers.<br>- The scheme has a camp officer and an extension officer from MACO.<br>- The scheme can diversify into nonagricultural activities such as quarrying and small scale coal mining. |
| Weakness | Threat |
| - The 10 ha of land is too small for commercialization of 84 households.<br>- The main furrow is too narrow and the feeder furrows leak thereby reducing the amount of water that finally reaches the crops.<br>- Cattle often stray into the fields and graze the crops because of poor fencing.<br>- Scheme members do not practice group growing and selling of crops. | - The FSP inputs are not meant for vegetable growing per se. therefore the members find it difficult to use FSP fertilizer for vegetable growing.<br>- The dam is completely covered by sand and there is no water. Scheme members rely on the flooded open pit coal mine for irrigation.<br>- There is insufficient water in times of droughts. |

5) Summary of SWOT Analyses of the Four Irrigation Schemes

The above presented SWOT analyses can be summarized as follows: first, as Strength, 1) cooperative members have a high willingness to participate in agriculture and actively cultivate diverse crops, 2) they have leaders with leadership, 3) group purchase is practiced, and 4) cooperatives are appropriately operated; second, as Opportunity, 1) the Schemes are located close to the market, 2) cooperatives can receive supports since they are registered, 3) the areas are well covered by media and mobile phone networks, and 4) cooperative members can receive agricultural extension services; third, as Weakness, 1) cooperative members lack knowledge about accounting, 2) regarding the irrigation facilities, they do not have enough sense of ownership and knowledge about maintenance, 3) they rely on supports from outside, and 4) they do not have a plan for future; and finally, as Threat, 1) CEO visits to the Irrigation Schemes are irregular and cooperative members cannot obtain appropriate agricultural support services, 2) the road conditions during rainy seasons are bad, and 3) selling prices of the farm produce are fixed by middlemen.

| Strength | Opportunity |
|---|---|
| - Cooperative members, including young people and women, have a high willingness to participate in agriculture.<br>- Cooperative members know much about agriculture and actively try cultivating diverse crops.<br>- Cooperatives are officially registered.<br>- Cooperative members have leaders with leadership.<br>- Group purchase is practiced.<br>- Cooperatives are appropriately operated, including account management.<br>- Cooperative members have usufruct right to their land. | - The Schemes are located close to the market.<br>- Cooperatives can receive supports since they are registered<br>- The areas are well covered by TV, radio, and mobile phone networks.<br>- Cooperative members can receive agricultural extension services provided by CEO. |
| **Weakness** | **Threat** |
| - Cooperative members lack knowledge about finance and accounting.<br>- Cooperative members do not have enough sense of ownership for and therefore do not appropriately maintain irrigation facilities.<br>- Cooperative members lack knowledge about maintenance.<br>- The function of irrigation facilities is deteriorating.<br>- Group purchase is not practiced.<br>- Cooperative members heavily rely on supports from outside.<br>- Cooperatives do not have a plan for future. | - CEO visits to the Irrigation Schemes are irregular and cooperative members cannot obtain appropriate agricultural support services.<br>- Although the schemes are close to the market, the road conditions during rainy seasons are bad.<br>- Selling prices of the farm produce are fixed by middlemen.<br>- Due to decrease in the function of irrigation facilities, there is a risk of water shortage during drought. |

### 3.6.4 Issues on Farmers' Organization in the Peri-Urban Area

Regarding the survey of farmers' organization and rural society, the Study Team, so far, conducted PRA workshop and interview survey with farmers in existing irrigation schemes, and also SWOT analysis workshop with MACO, PACO and DACO officers in Lusaka Province. From the result of these surveys, farmers' organization toward to commercial agriculture can be analyzed as following aspects.

- It is generally observed that farmers of the existing irrigation schemes where the Study Team

surveyed are likely to depend on physical or financial support from outside such as donor agencies and NGOs. It prevents farmers from a motive for self-help initiatives to improve their society since they tend to wait until support come from outside.

- Although, some farmers organize themselves to practice joint procurements of farm inputs such as seed and fertilizer, and also to manage micro credit within the irrigation schemes. However, awareness of organizing themselves has not reached to the level of conducting a joint marketing yet.
- Similarly, cooperative is not regarded as a business entity by farmers, rather than a mean of fetching outside support such as fertilizer through Farmer Input Support Programme (FISP). In such a situation, providing business training such as book keeping might not be effective since farmers do not have an opportunity to use it in their actual activities as a cooperative.
- Historical background of the community sometime significantly affects the nature of the society. For example, in the society where Chipapa irrigation scheme is located, males are prone to be indifferent about engaging in agriculture. As a result, Chipapa irrigation scheme, which is the only scheme not registered as a cooperative among four existing irrigation scheme the Study Team surveyed, is female
- Farmers' income source sometimes is not concentrating to agriculture but diverted to livestock and no agriculture activities such as migrant works. Nkandabwe scheme records the highest average household income, even though it's agricultural average income is ranked at third place among four sites where the Study Team conducted PRA workshop. From the point of view of promoting agriculture, rising livestock can be recommendable to disperse a risk of the short crop and have a combined effect with agricultural activities.

## 3.7 Consideration on Each Actor's Approach to Promote Irrigated Agriculture

The government, with MACO in its core, is the main actor in the plan for promoting irrigated agriculture among small scale farmers. This is also clear from the direction of the government in its agricultural policies, as reported in Section 2.2.2. Since the donors supporting the government have been shifting to aids focusing on the general value chain and commercial agriculture, as reported in Section 2.4, it can be expected that these donors keep their cooperation in line with the government policies. Moreover, in recent years, they have been trying to promote this through the framework of PPP.

The role of the main marketing actors, named in Section 3.4.4 (farmers, marketers, marketplaces, private service providers), in the promotion of irrigated agriculture is considered as follows: first, since farmers are constrained by individual sales, they need replace such habits by taking organizational approaches such as a) shipping in a large quantity, b) increase in their bargaining power, c) quality improvement, and d) group purchase. Second, marketers are supposed to utilize their high capacity for collecting information and mobility to actively provide information to farmers and supply good products to consumers at the appropriate time. Third, marketplaces are supposed to contribute through a) increase in the market space, b) maintenance and increase of storage facilities, and c) develop the data recording system and publish collected data. Finally, private service providers can

promote irrigated agriculture through collaboration between the government and public sectors and private sectors in the fields of expertise of each provider, within the framework of PPP.

The figure below presents the relation among these actors, followed by tables summarizing each actor's function, current situation, achievement, and plan for promoting irrigated agriculture among small scale farmers.

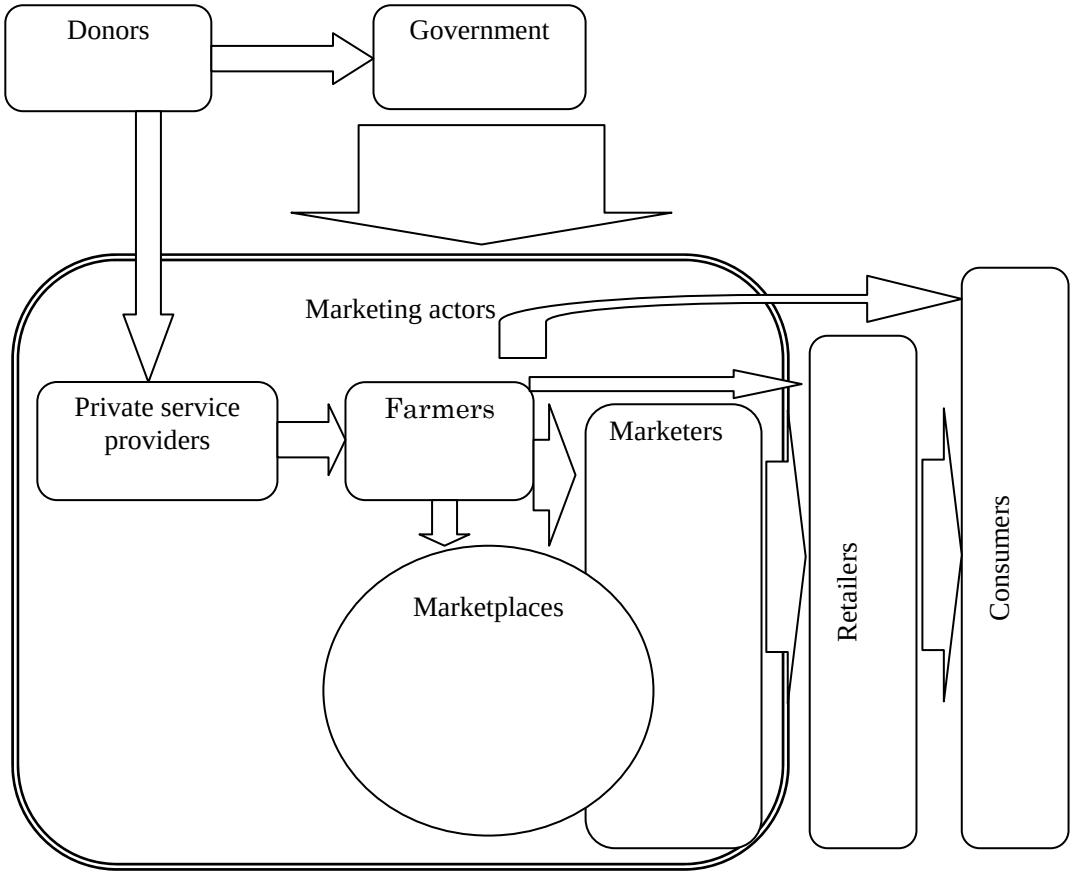



Fig. 3.7.1 Relation of Each Actor in Promotion of Irrigated Agriculture among Small Scale Farmers

Table 3.7.1 Each Actor's Function, Current Situation, Achievement, and Countermeasures for Promoting Irrigated Agriculture among Small Scale Farmers

| Actor | Function | Current Situation and Achievement | Countermeasures for Promoting Irrigated Agriculture among Small Scale Farmers |
|---|---|---|---|
| Government | Formulation and implementation of agricultural policies<br>Provision of service | Agricultural policies<br>- NAP<br>- AMDP<br>- NIP<br>- NCDP | Inclusively intervene marketing actors, based on different agriculture related policies |

| | Actor | Function | Current Situation and Achievement | Countermeasures for Promoting Irrigated Agriculture among Small Scale Farmers |
|---|---|---|---|---|
| | Donors | Financial assistance<br>Technical assistance | Assistance for agricultural and rural development<br>- Emphasis on commercialization and access to the market, assistance to small scale farmers<br>- Increase in production, quality improvement up to the level appropriate for exporting<br>- Assistance to the whole value chain, further assistance to traders of inputs and commercial agriculture | Assistance to the government, focusing on the whole value chain and commercial agriculture<br>Promotion of small scale irrigated agriculture in the framework of PPP |
| Marketing Actors | Farmers | Agricultural production | - Individually produce, harvest, and sell agricultural products<br>- Sell small lots of raw products to middlemen<br>- Go to close markets on foot, by bicycle, or by public bus<br>- Have almost no choice of buyers or price negotiation<br>- Individual transactions between farmers and middlemen lack fairness and transparency<br>- Active exchange of information and system of collaboration are missing between farmers and marketers, processors, and exporters<br>- Qualitative and quantitative losses are significant in the production procedures. Problems are the high production cost and low productivity.<br>- The number of input suppliers are limited, and high input costs are heavy burdens for farmers. | Switch from individual transactions to organizational approaches aiming:<br>- Shipping in a large quantity<br>- Increase in their bargaining power<br>- Quality improvement<br>- Group purchase |
| | Marketers | Purchase from farmers<br>Supply chain including rural traders, wide-area traders, and wholesalers | Challenges<br>1) Poor feeder-road<br>2) Incomplete market information system<br>3) Inefficient marketplaces<br>4) Incomplete quality standards and grades<br>5) Substantial postharvest losses<br><br>Under such a difficult situation, however, marketers work actively making best use of their competent ability of timely collection of market information and high mobility depending on the market situation | Provide information to farmers and their groups to hold right quality and quantity of products and supply good products to consumers |
| | Marketplaces | Core facility for agricultural products marketing | 1) Management of marketplaces: large/medium scale markets are owned by local governments and exclusively managed by "Committees," wholesalers, and retailers. There is no farmers' shop. Small scale traditional marketplaces in rural areas are established and operated by local residents, where traders and farmers coexist and competition between them can be observed.<br>2) Efficiency and hygienic environment: current available spaces do not meet the increasing number of traders. They are congested and not kept hygienic enough. Qualitative and quantitative losses are significant. The quantity in stock is not enough. Cold storages are not sufficiently used.<br>3) Transaction record: daily transaction data are not recorded by the marketplace.<br>4) Legal framework: relevant laws are missing. | - Increase in the market space<br>- Maintenance and increase of storage facilities<br>- Development of the data recording system and publication of collected data |
| | Private Service Providers | Consulting Advice<br>Technical assistance | Governmental and official: agricultural extension officer research institute, training facilities, publication stores, universities, and others.<br>Private: enterprises, individuals, NGOs, private groups collaborating with international aid organizations in the framework of PPP<br>USA origin NGOs are widely active. | Collaboration between the government and public sectors and private sectors in the fields of expertise of each provider, within the framework of PPP |

## 3.8 Environmental and Social Considerations

### 3.8.1 Results of Strategic Environmental Assessment in Irrigation Schemes

(1) Results of the scoping exercise in the schemes: adverse environmental impacts and mitigation measures

The scoping exercise carried out in the field helped identify adverse environmental impacts actually observed in each scheme and specific mitigation measures proposed for each scheme. These impacts and mitigation measures were confirmed during the stakeholders meeting held in Lusaka at the end of April (Please refer to Annex F1: Impacts and Mitigation Measures proposed in each Scheme), which are summarized in Table F1 of Annex F. Furthermore, Table F2 of Annex F shows impacts and mitigation measures for the study areas at different phases of project implementation.

(2) Reference environmental objectives and their justification

Reference environmental objectives for the Master Plan were selected based on the results of the scoping and the current environmental situation. The selected issues are those which will most likely have negative consequences on the environment and human health and well-being when implementing the main directions of the Master Plan. These objectives are as follows:

1) Reducing air pollution
2) Reducing water pollution
3) Preventing deforestation and destruction of fauna and flora
4) Reducing negative impact on land and soil
5) Reducing negative impacts on human health (Malaria)
6) Reducing conflicts related to resettlement
7) Mitigating biodiversity risks (human-animal conflict)

The justification of each of these objectives is detailed in Annex F2.

(3) Indicators of reference environmental objectives

Indicators illustrating the state of the environment of the study area (including health), have been selected to assess the environmental impact from the implementation of the Irrigated Agriculture Master Plan.

In the Irrigated Agriculture Master Plan SEA report indicators are used to:

- Develop a monitoring plan for observing impacts to the study area environment, including health, likely resulting from implementation of the Master Plan and planned activities;
- Propose additional measures aimed at meeting reference environmental objectives.
- Serve as a basis for strategic environmental assessment or environmental impact assessment of the activities stemming from the Master Plan.

The selected indicators of reference environmental objectives are given in the Table F3 (Annex F).

(4) Possible environmental consequences without implementation of Master Plan (Zero alternative)

The Irrigated Agriculture Master Plan has the goal to contribute to poverty reduction through the

implementation of a number of measures aimed at implementing priority courses of actions, as follows.

- Rehabilitation of the existing irrigation facilities;
- Development of new irrigation facilities;
- Improvement of agricultural productivity;
- Upgrading of farm income of smallholders;
- Restoring and enhancing sustainability of the natural complex, mitigating environmental risks for human health; and
- Protecting historical and cultural heritage (national and international)

Without implementation of these measures, the ecological pressure in the study area would be worsened and the human health risks increased. Thus in the situation of a zero alternative:

There would be no irrigation development in the study area to allow farmers to produce in high season of needs. This will worsen their situation, increasing poverty.

Furthermore, failure to take any action to mitigate the potential environmental threats caused by surface water pollution as seen in the water samples taken in the schemes will pose serious dangers to public health as high concentration of faecal coli forms may penetrate the vegetable crops.

Failure to carry out activities aimed at cleaning of heavily polluted areas and excluding the contaminated agricultural lands from the land balance will cause serious danger to public health, as significant concentrations of heavy metals persist in agricultural products.

Also, failure to carry measures on restoration of green areas and retaining the existing conditions, the negative impact on environment will be increased including degraded microclimate, reduction of air pollutant sinks and an increase of noise level. In particular, in not restoring several degraded forests in the study area the concentration of dust in the atmosphere will remain high, mainly due to generation of dust in areas deprived of tree cover.

(5) Possible environmental impact as a result of implementation of the Master Plan

The possible environmental impacts from implementing the Master Plan are assessed by taking into consideration the linkages of the main directions of the Plan with the reference environmental objectives and the possible impacts resulting from implementing the said main directions, which are portrayed at Tables F4 and F5, in Annex F, respectively.

The results of assessments given in the above mentioned tables illustrate that the implementation of the main directions of the Master Plan will have positive or no impact on achieving the reference environmental objectives. Exceptions include the following:

- *The objective of reduction of deforestation and destruction of flora and fauna* will probably be difficult to achieve as new development of irrigation facilities may be accompanied by increased number of tree felling and removal of vegetation to develop plots; a phenomenon common to the development of irrigation.

(6) Recommendations

It is anticipated that the Master Plan is not going to promote the construction of big reservoirs or dams when implementing new developments of irrigation facilities. However when the construction of a big

reservoir or dam is found to be preferred development alternative, the environmental objectives of reducing negative impacts on human health and those related to reducing conflicts due to resettlement will be difficult to reach. In such a case, it is recommended for the objectives related to human health to propose additional measures to mitigate the impacts. Namely, the location of the reservoir should be far away from dwellings to prevent mosquitos' attacks on people. Furthermore, the Master Plan should propose buffer zones in which animal could be kept to divert the route of mosquitoes away from houses.

When dam is considered, and namely if it involves resettlement, or when they inundate burial and cultural sites, a historical dear to riparian communities, a long term study of other potential impacts is recommended. Mitigation and resettlement planning should also recognize potential impacts on host populations and include their needs in development planning.

As one of the main direction of the master plan is *the protection of historical and cultural heritage*, development actions in districts such as Sinanzongwe, Siavonge and Mazabuka where are located a large portion of protected ecosystems, national parks, game areas and places of international importance, in the country should be carefully planned to lower the biodiversity risks. It is recommended to identify sites of high risk of impacts and take precautionary measures well in advance of development.

(7) Program of monitoring of environmental impacts of implementation of the Master Plan

It is necessary to develop and implement an environmental monitoring program. This will assist in preventing or mitigating negative impacts upon the environment and human health, through periodic observations and relevant measures.

The suggested monitoring program is based on the indicators developed for reference environmental objectives. It is suggested that monitoring to the extent of meeting environmental objectives are analyzed based on the indicators of impacts.

In addition, it is recommended that all the relevant programs and projects stemming from the Master Plan undergo another level of strategic environmental assessment or environmental impact assessment.

### 3.8.2 Results of Public Consultations

The first consultations were held for scoping of the SEA in the 8 schemes visited in December. Invitations were delivered to farmers' representatives in the schemes, district agricultural staffs and coordinators of small scale irrigation projects. Impacts and mitigation measures related to these small scale projects were discussed and recorded. A sample minute of meetings of one of these consultations is added in Annex F3.

The second consultation was devoted to the confirmation of the scoping results of the first consultations carried out in the schemes. Invitation was delivered to 35 organisations with notification on the discussion; its contents, purpose as well as place and time (Please refer to Agenda attached in Annex F4 (a). This meeting was held on the last day of the month of April in Lusaka. It gathered 29 participants, including members of MACO at the central level, participants from ECZ and Department of Water Affairs along with participants from the different districts concerned (Please see list of

attendants in Annex F4(b). The persons concerned were invited to participate in the discussion and submit their opinions and recommendations.

Based on the main environmental issues raised during the presentation, which included among others the resettlement problem, the conflict between animals destroying some schemes and humans, the high electric bills to be paid by some schemes that stopped operations, several useful comments were made not only on environmental issues but also on socio-economic, issues related to marketing, farmers organizations and management issues. The discussions were very useful and ways to improve the SEA results were proposed. The meeting facilitated interaction with all interested and affected parties, and ensured a free flow of information.

Farmers were advised not to wait for government to solve their problems. They should be more business minded and get more organized, hiring salaried managers for the administration of their schemes as a whole. Some suggested that the schemes should all get water and land rights to become more sustainable. Others suggested promoting Dambos sustainable use to alleviate high electricity bills. It was informed that using international water does not require water rights, which is valuable information.

Another suggestion to lower high electrical bills was a mitigation by group working to connect a 200 $m^3$ water tank to pipes taking water to plots so that farmers can drip irrigate or flood irrigate , i.e. pump into tank, when full switch off pump, and farmers use water in the tank. This way pump shall work for 2.5 hours/day instead of 10 hours/ day.

As policy consideration, some suggested that farming along slopes should even be punishable. Collective marketing is suggested as a way to reach sustainability as farmers want only to get together when tasks such as land preparation are concerned, but never when market is the issue.

Farmers to farmers training was suggested as a technique that has led fruits in some schemes; probably introducing farmers exchange visits would be a good strategy.

The detail of these comments is portrayed in Annex F4(c).

### 3.8.3 Lesson Learnt from SEA

The merits of applying SEA approaches in a pre-project situation is very important because outputs of such assessments have the benefits of delivering information necessary to facilitate decision making by ruling out certain kinds of predetermined choices for a proposed development (e.g., project locations, technological options) and thereby reducing the need for an EIA. The SEA outputs proved useful in reducing time and costs and also the burden of conducting EIA. At the plan and programme level, this approach is useful in providing view of environmental and social issues for a broad based assessment of the cumulative impacts of a proposed project before its implementation.

The SEA has highlighted the potential negative impacts of developments that could be considered in the Master Plan. It has established that the use of electric pumps in irrigation schemes should only be promoted if it can be demonstrated that there is no other alternatives given the high cost of electricity. It is observed that many projects in the study area have stopped operation due to unsustainably high electric bills. Therefore other alternatives such as gravity irrigation, exploitation of dry dambos, which are not classified as wetlands, should be promoted instead.

When maintaining the option of electric pumping, the plan should give an indication of the kind of additional policies to be implemented to make electricity affordable. Some are cited in the public consultation report.

Furthermore the SEA has established that rehabilitation is preferable to the option of new development, the latter having shown that environmental objectives to reduce deforestation and destruction of fauna and flora would be difficult to reach.

It has also shown that the difficulties to reach environmental objectives reducing conflicts related to resettlement or those mitigating biodiversity risks would be higher when new developments promoting the construction of dams or large reservoirs are implemented.

At the same time, it has demonstrated that the main proposed environmental directions of the Master Plan consisting of: 1) *Restoring and enhancing sustainability of the natural complex, mitigating environmental risks for human health; and 2) Protecting historical and cultural heritage (national and international)* would promote sustainable or environmentally friendly development.

# Chapter 4 Development Constraints and Potentials for Commercial Small-scale Irrigated Agriculture in the Peri-Urban Area

## Preamble: Introduction to Chapter 4

First, in this chapter, development constraints of commercial small-scale irrigated agriculture were drawn from a problem tree. The problem tree was developed based on the result of by-sector-analysis on current status and issues involved in the existing irrigation schemes in the peri-urban area (described in Chapter 3). Relevant factors found in farming by the Study Team were also integrated into particular issues raised by farmers / farmers' group upon their own reviews over farming, water management, marketing and community activities.

Second, from the above mentioned development constraints, certain factors were extracted considering that they could be mitigated by farmers / farmers' group themselves through their own activities. With this concept, potentials and direction for development were summarized for given constraint factors. Potentials here take into account natural resource and social economical affairs etc.

The potentials related to farmers / farmers' group, namely considered as the main actors for the implementation of the Master Plan and Action Plan, were also discussed preliminarily through the outcomes of "the best practice example of farmers' group" and "experimental *business matching-meeting* between farmers and marketers."

Furthermore, agricultural activities by smallholders involve diverse characteristics as the study area covers a wide area even though the target area is the peri-urban area. From this viewpoint, the study area was zoned based on similarity of potentials for marketing and irrigation and/or natural water resources. This made it possible to indicate direction of development for small-scale irrigated agriculture over the study area.

Lastly, in Chapter 4, irrigation potentials for target sites; i.e., candidate schemes were discussed.

## 4.1 Problem Analysis of the Existing Small-scale Irrigation Schemes

Problem tree was developed for small-scale irrigated agriculture based on the issues derived from the PRA workshops carried out over four existing irrigation schemes. Additional analytical points were also integrated into the tree by the Study Team to draw development constraints for small-scale irrigated agriculture in the peri-urban area.

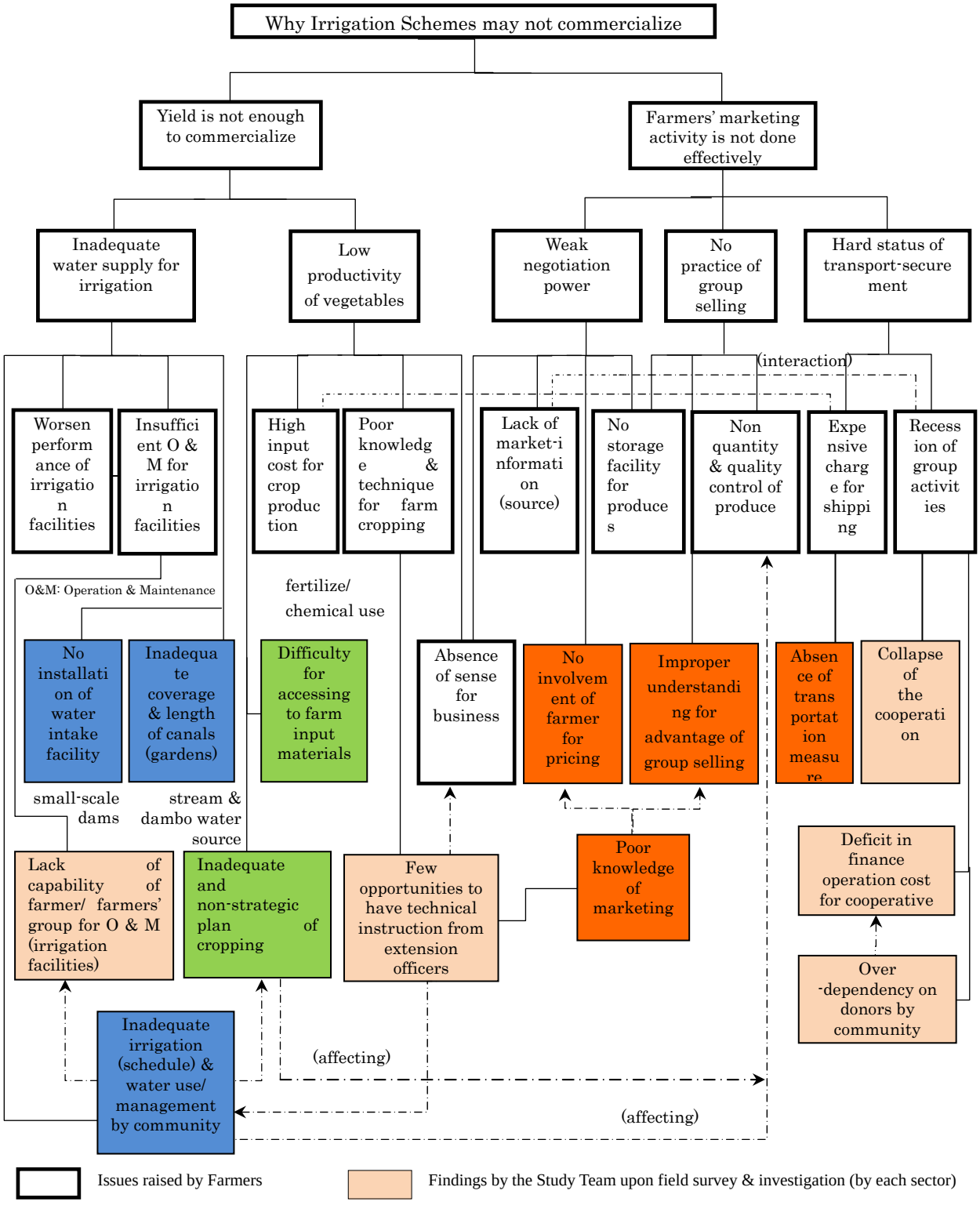



Fig.4.1.1 Problem Tree of Small-scale Irrigated Agriculture in the Peri-urban Area

## 4.2 Development Constraints

### 4.2.1 Lack of Marketing Ability

Lack of experience, knowledge, business-mind, and incentive of smallholders in the marketing of their products has been the key factors to be tackled at their level. Besides, the majority of farmers deal with their marketing on an individual basis rather than collectively. Consequently, these individual smallholders often fail to meet the large scale buyers' requirement who seek constant vegetable supply and delivery in a bulk scale. On the other hand, farmers' organizations, either cooperatives or groups, are mostly inactive for collective marketing or making such a linkage with marketers. This is to say, farmers are most likely to be restricted due to prevailing individual dealing.

The problem does not only occur at farmer level; the markets may also be a constraint for the marketing of smallholders. For example, in a large market in Lusaka, transactions are not transparent and fair. Farmers are usually not allowed to directly sell their products to retailers, and prices are often determined by the traders. Moreover, agents (middlemen) often cheat farmers in dealing by unilaterally fixing the price in order to sell the products with a much higher price than that of the transaction. Besides, the producers have no fixed permanent buyers, no guarantee for outlet, and are unaware of how to make linkages with marketers. Therefore, there is no room of control over the price by the producers. In addition, value addition by processing has been difficult due to no or little capital for investment.

### 4.2.2 High Input Cost

Needless to say, a profit will be made when the total cost of the production is inferior to that of output prices, and if the gap between the two is widened, producers will be able to make more profits from them. However, in the most of cases in Zambia, this ideal situation seems to be far from reality. For example, the input costs dominate in the tomato cultivation at farm level, consisting of fertilizers, agricultural chemicals, and labour costs, which are at a very high percentage point. As a result, producers can only obtain very little profits from this. This is merely a case, but the tomato cultivation is widespread in Zambia and prevails among smallholders; therefore, this high input cost can be seen with almost all of the smallholders. Therefore, this must be considered as one of the development constraints.

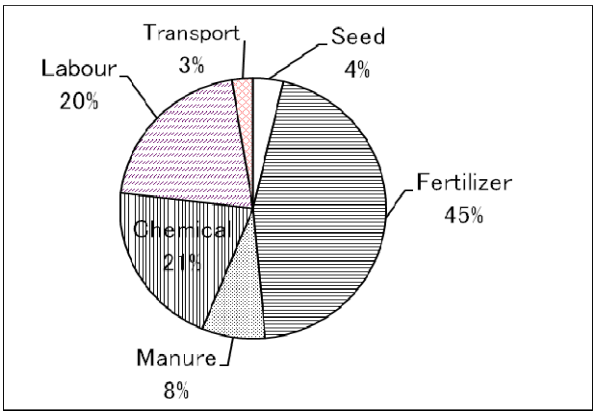



Fig. 4.2.1 Farm Level Costs for Smallholder Tomato Production in Kabwe City.
Source: JICA Study Team (2010)

### 4.2.3 Inadequate Extension Services

According to MACO[1], the camps and blocks have generally insufficient capacity to deliver proper and enough extension and training services to farmers in Zambia. Besides, camps and blocks are harshly

[1] MACO (2009), 'Assistance to Development of an Agriculture Programme, Zambia 2009-2012, Ref No:2008-001258, Support Programme for Farming as a Business for Small Scale Farmers,' MACO

understaffed with roughly 30 per cent of the posts being unoccupied, although it depends on location. In addition, despite assignment of staff, operational funds are scarce to deliver any meaningful services with which farmers will be able to develop their agriculture into successful business.

The problem of understaffing is connected to the recruitment process to a degree, because it takes place at headquarters in Lusaka. Due to this, newly graduated young men and women are assigned to places outside their original district, where they are not familiar with people they are supposed to work with, and with specific socio-economic conditions. The problem of lack of funds causes very poor conditions of staff houses or even no houses at their duty place. This problem is directly connected to the failure of implementing any meaningful activities and insufficient transportation means to assist the large geographical area that a camp consists of. As a result, the newly employed staffs lose any motivation and the problem causes serious problem with staff maintenance.

To sum up, it is found that lack of governmental funds for extension is a major constraint for development. Because of this, camps and blocks are severely understaffed and extension officers are not able to carry out meaningful activities. In addition, proper means of transportation and/or fuel tend not to be provided. The de-motivation of staff is also one of the problems that extension services are facing.

### 4.2.4 Lack of Ability of Maintenance and Management of the Irrigation Schemes

According to the World Bank, 'F*ollowing the economic reforms of the early 1990s, the Government reduced its role and budget for agriculture, which led to significant changes in Zambia's agriculture sector*[2].' As a result, the state run irrigation schemes have been expected to be managed by their users. However, the users who have not been used to the scheme which were entirely managed by the government are not skillful at managing them. Therefore, it is very difficult to find a well maintained scheme run by its users. Besides, it is also difficult to find a well-organized water users association in particularly the Peri-urban area. Consequently, the water available for producers may not be effectively utilized.

To summarize, maintenance and management of schemes by theirs users are currently not well done because these users are not well trained on them. Moreover, the water usage may not be effective due to the lack of an adequate water users association.

## 4.3 Development Opportunities

### 4.3.1 High Market Potential

Comparing to farmers of the rest of Zambia, there is advantage in marketing for farmers of the Peri-urban area; there are potential of market opportunities of central markets, regional markets, cross border trading and seasonal niche markets.

There are, so-called, "cross-border markets" near borders with neighbouring countries in Zambia. For example, various commodities are daily exported from Copperbelt Province to a neighbouring country

[2] The World Bank (2007), 'Zambia smallholder Agricultural Commercialization Strategy,' the World Bank.

crossing the border, reflecting the neighbour country's big demand. Besides, Southern Province has a strategic point for cross-border trading adjacent to 3 countries in Kazungura District. This market will be expanded with the activation of COMESA.

In addition, despite limited number, collective marketing has been successfully conducted by several farmers' organizations (cooperatives or groups). This can be a development opportunity as well. Therefore, these farmers groups can be focused as mode groups and introduced to the other farmers' groups by conducting study tours.

Moreover, according to the Study Team's field survey, it is found that the majority of farmers are strongly interested in making partnership with marketers for securing market outlet and sparing more time for improving products quality at production stage. On the other hand, marketers also have a keen interest in bulky procurement from farmers' cooperatives / groups in general. Most marketers have competent ability of timely collecting market information and also high mobility depending on the market situation. There seems to be high probability of linkage between both parties. Accordingly, the partnership between farmers' groups and marketers should be promoted as a development opportunity.

### 4.3.2 Rich Communication Network

The Peri-urban area has a good coverage of communication network unlike other areas. The network of mobile phone, radio, and TV is well established in this area. This makes communication and information to be easily accessible; especially, mobile phones give buyers a lot of possibilities to communicate for marketing their agricultural products. For instance, Mukamba multipurpose cooperative informs buyers to promote their products, telling the unit price and quantity. As a result, this cooperative has successfully brought them to their village, and they can negotiate the price higher than in the past when they brought their products to Livingstone and sold at unexpectedly lower price. Therefore, there is a development opportunity where there is a well-established communication network.

### 4.3.3 Potential of Farmer to Farmer Extension

Farmers may not expect many things from the governmental extension services due to the problems cited above. For them to develop their ability and create agri-business opportunities, it is important to enhance existing skills acquired by farmers themselves. In this regard, it is essential that the PEA be introduced as the principle extension strategy in Zambia, because this participatory approach considers the farmers as the centre of development, and then it encourages them to find solutions and make decisions by themselves, instead of always expecting external supports in any respect.

Moreover, it is recognized that farmers can play a role of extension workers. This is particularly important because if they are able to transfer what they know or their innovation, it can be a solution to the understaffing of extension workers. By working together with governmental extension workers though, such farmers who accept to disseminate agricultural innovation can tell such technologies to their neighbours who may seldom have contact with extension workers. Besides, such innovation is likely to be local environment friendly technology because it is site specific; therefore, other farmers may easily accept this.

On the other hand, farmers can visit demonstration plots adjacent to their residence which would be installed by 'farmer diffuser' with governmental service branch. There is such a demonstration plot of Conservation Farming (CF) in Kitwe District in Copperbelt Province. According to MACO, this exercise has been being implemented as Conservation Farming Farmers Training Groups (CFFTG). The exercise has been done in a form of on-farm demonstration plots which are established by farmers together with the department of agriculture staffs. Farmer training is given in the field; therefore, there are no classroom lessons for them. At the end of each season, farmer field days will be organized so that the CFFTG share information and technologies with farmers from other parts of the district. The demonstration plots are not ones off-project; however these are designed as learning and research centres for a long period. These plots will last as long as the plants will remain. Furthermore, annual field days will be continued as a tool for agricultural information sharing and dissemination through the farmer to farmer knowledge transfer basis.

Government support activities such as "demonstration farm" and "field day" etc. are invaluable though the fact that the number of available extension officers is limited; these activities as a participatory extension measure at field level facilitate technology acquisition and information sharing for smallholder farmers. It would be significant to apply these systems to irrigated agriculture and its development.

This is to say, using farmers own ability and their innovation can be a development opportunity under deadlocked situation of extension services in Zambia. As long as the government maintains its extension policies, this will be promoted and remained as a development opportunity.

### 4.3.4 Existing Water Bodies

Officially, there are 100,000 ha of irrigated area in Zambia as of the mid-2000., and there have been several estimates of irrigated acreage[3]. For example, less than 40,000 hectares (or 9 per cent) is currently irrigated, mostly by commercial farmers[4]. Nonetheless, the informal and traditional irrigation areas by smallholders are not included in those estimates. If those were included, it would be about 100,000 ha under informal irrigation, in 1992, according to the Food and Agriculture Organization of the United Nations[5]. Those areas are mostly consisted of dambos and wetlands where smallholders grow vegetables, rice, and fruit. This is a great development opportunity for smallholders for the promotion of irrigated agriculture together with the development of market access.

[3] Kodamaya S. (undated) 'Recent Changes in Small-scale Irrigation in Zambia: the Case of a Village in Chibombo District,' Graduate School of Social Science, Hitotsubashi University.
[4] Republic of Zambia (2002), 'Poverty Reduction Strategy Paper 2002-2004,' Republic of Zambia.
[5] FAO, cited in Kodamaya S. (undated) 'Recent Changes in Small-scale Irrigation in Zambia: the Case of a Village in Chibombo District,' Graduate School of Social Science, Hitotsubashi University.

## 4.4 Preliminary Study on Potential for Farmers / Farmers' Groups

### 4.4.1 Objective

The Study's target area of the M/P includes 23 districts in 4 provinces where about 46% (454 million) of Zambian population, 30 % of land, and 30 % of farmers are concentrated. In addition, there are about 500 camps and over 3,000 villages in the area. According to the Study Team's experience of the last year, it is difficult to obtain broad information for a vast area such as the target area of the Study. From this perspective, case-study analysis on actual activities of farmers' organization is particularly effective for grasping the potential of farmers / farmers' groups. In concrete the best practice examples were investigated for several farmers' groups to find out their potential and utilize this to formulate and improve the effectiveness of the M/P as well as the A/P.

(1) Method and outputs

1) Study process

The preliminary study was conducted by listening to opinions of district level officers, camp extension officers, farmers and farmers' organizations, and buyers through the field survey so that the information recorded can be reflected to the situation analysis. However, although small scale farmers and buyers will be involved at the planning stage, it may be difficult to engage them due to time restriction. Therefore, this study is conducted prior to the study of A/Ps.

2) Study method

In order for the Study Team to formulate the M/P in a short period and several A/Ps in different areas, it is important to learn from good practices, and conduct case study analysis on existing organizations in order to make the best of utilization of knowledge from district officers, extension officers, and buyers.

The preliminary study, therefore, is conducted to examine how well farmers and farmers' organizations react to the market oriented approach such as 'producing to sell' instead of 'selling after production', and point out issues and measures including the relationship between them and district officers, extension officers, and buyers.

3) Target area

The target area of the preliminary study was selected where there are particular activities and/or existing potential groups, because this study is also related to the selection of the A/P formulation districts.

4) Matching meeting

According to JICA's Smallholder Horticultural Empowerment Project in Kenya (SHEP), producers, buyers, and wholesalers held a 'matching meeting' in order to exchange their opinions, and organized exchange visit to advanced areas to support farmers' activities. As a result, it is reported that farmers' group increased their profits by 68% on average, and farmers increased their profits by 107%. A similar activity was organized as a preliminary study to examine whether a matching meeting can be effective or not.

### 4.4.2 Case-Study Analysis on the Best-Practice Farmers' Groups.

(1) Field study in the districts

As mentioned above, it is important to learn from existing good experiences so that the Study Team will be able to effectively reflect them to the formulation of the M/P and A/Ps. Therefore, a field study was conducted to find such good practices in the target districts, namely Kalulushi, Mufulira, Kabwe, Lusaka, Kafue, Sinazongwe, and Kazungura. Before conducting this field survey, however, the Study Team held kickoff workshops with relevant district officers at their Provincial Agriculture Coordination Office (Copperbelt, Central, Lusaka, and Southern provinces). After those meetings, the Study Team selected several groups to visit; nonetheless, the Study Team eventually decided the visiting places according to recommendation by officers. The groups visited are listed in the following tables.

Table 4.4.1 Groups Visited and Their General Information

| Name | District | Type of organization | Members | | | Regis-tration | Est. year | Main Activities | Types of irrigation | Book keeping | External supports experience | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Male | Fe-male | | | | | | | |
| Mitengo Women's Association | Lusaka | Association | >100 | - | >100 | Yes | 2002 | Vegetable, processing, | Pump | Yes | ASNAP, University of Zambia | Business oriented Mushroom |
| Chibote Farmers' Cooperative | Kalulushi | Cooperative | 74 | 44 | 30 | Yes | 1995 | Banana | Electric pump | Yes | ZATAC, (Care int.) | Business oriented |
| Chinsungwe Women's Group | Kafue | Group | 20 | - | 20 | Yes | 1999 | Vegetable, goat, fish culture, sewing | Buckets, treadle pump | Yes | FAO Telefood fund | |
| Chipapa Dam Garden Committee | Kafue | Group | 120 | 45 | 75 | Yes | 2008 | Vegetable, water distribution | Canal | Yes | Danish Embassy | |
| Chilobwe Cooperative | Kalulushi | Cooperative | 109 | 63 | 33 | Yes | 2005 | Crop | Buckets | Yes | MACO | |
| Tubalange Group | Kabwe | Group | 33 | 23 | 10 | No | 2007 | Vegetable, crop | Buckets | Yes | | Conservation farming demonstration |
| Shakumbila Cooperative | Kabwe | Cooperative | 87 | 56 | 31 | Yes | 2007 | Vegetable, crop | Treadle pump | Yes | Agriculture Support Program | |
| Motomoto Cooperative | Kabwe | Cooperative | 35 | 15 | 20 | Yes | 1996 | Vegetable | Buckets, treadle pump | Yes | IDE | |
| Nkandabwe Agriculture Cooperative | Sinazongwe | Cooperative | 82 | 50 | 32 | Yes | 2006 | Coop shop, water distribution, agric input | Canal | Yes | Zambezi River Authority, C-FAARM | Business oriented Coop shop |
| Katondo Women's Club | Sinazongwe | Association | 25 | - | 25 | Yes | 2000 | Vegetable, crop, processing, sewing, catering, goat, dancing, sports | Buckets | Yes | | Social development |
| Mukamba Multi Purpose Cooperative | Kazungura | Cooperative | 85 | 49 | 36 | Yes | 2005 | Vegetable, chicken, orchard, collection centre | Buckets | Yes | IDE, Care int., Land-O'Lakes , CRS (C-FAARM) | Business oriented Collective shipment |

| Name | District | Type of organization | Members | | | Regis-tration | Est. year | Main Activities | Types of irrigation | Book keeping | External supports experience | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total | Male | Fe-male | | | | | | | |
| Kazungura Agriculutre Cooperative | Kazungura | Cooperative | 83 | 56 | 27 | Yes | 2000 | Dairy, vegetable, chicken, milmil | Buckets | Yes | Care Int., ZATAC, Land O'Lakes, MACO (Japanese aid) | Business oriented Milling machine Chicken yard |
| MACOS Cooperative | Mufulira | Cooperative | 36 | 18 | 18 | Yes | 2001 | Vegetable, crop | Buckets, fuel pump | Yes | | |
| Murundu Women's Cooperative | Mufulira | Cooperative | 36 | 2 | 34 | Yes | 2005 | Vegetable, crop, internal credit | Buckets, treadle pump | Yes | MACO | |
| Horasho Multi Purpose Cooperative | Mufulira | Cooperative | 90 | 65 | 25 | Yes | 2007 | Vegetable, crop | Buckets | Yes | | |

(2) General remarks

Many cooperatives' members state that the benefit from organizing a cooperative is receiving agriculture inputs such as fertilizer, seeds, and subsidy from the government. Besides, they realize that they can be trained and receive extension services as a cooperative' member. Therefore, the major motivation of organizing a cooperative is to receive agricultural inputs and external supports. This is not only for cooperatives, but also for associations and groups; many members of the latter also say that they organize their group because they expect to receive external supports. It can be said that establishing any type of group is rather to expect receiving external supports than to work together and create benefits from it.

Among these groups, some have experienced the collective shipment of vegetables; however, the sales are based on individual basis. This means that the members of a group raise money to hire a truck so that they can transport their vegetables to the markets. Moreover, it is found that the area of land possessed by individual members is larger than that of the group. Therefore, the importance of such a group on vegetable production and sales might be relatively less than that of individual.

On the other hand, the Study Team found that all groups visited record expenditure and income in a book keeping, which is a strong point. However, almost all of them practice this just for the record.

1) Types of organization

The Study Team visited cooperatives, associations, and groups of farmers. One of the differences between cooperative and association is registration; the former is registered at MACO while the latter is registered at the Ministry of Home Affairs. Nonetheless, there are some obligations on cooperative; payment of registration fee and submission of annual and audit report to MACO. In addition, some groups are registered at the district council level together with the Land Committee of their area. Other than that, there also are groups which are not registered yet.

The registration is crucial because registered groups are able to officially carry out their activities and receive external supports, for example treadle pumps and access to a loan.

2) Establishment year

Needless to say, each group has its own establishment year. However, it seems that many cooperatives were established during the year 2001 and 2002. This may be because of the introduction of the Fertilizer Support Program (FSP). The FSP is a program where a farmer receives 8 sacks of fertilizer of 50 kg and 20 kg of maize seed with subsidy since 2002/2003 agricultural season[6]. To receive those inputs farmers must be members of a cooperative. As a result, many cooperatives were established just to receive those inputs. In other words, receiving inputs was a main concern to establish a cooperative. In fact, 7 cooperatives out of 10 stated that one of the profits to be a cooperative was to receive inputs.

3) Reasons of establishment

In general, members of all types of groups seem to recognize the benefits of organization such

[6] Report on Proposed Reforms for the Zambian Fertilizer Support Program (2009).

as having access to a loan and training opportunities. Besides, some state that they organized a group because they can share knowledge and ideas together. For example, when a member knows the utilization of pesticide, he/she can share that knowledge with other members of the group.

On the other hand, a group of farmers is efficient to disseminate information and as a group more than one person can be taught at once by extension officers. This benefit is particularly recognized in Kabwe District where extension officers have been working with farmers to create a group in order to effectively disseminate information. In addition, no matter there is a group of farmers or not, extension officers can work with farmers; however if there is such a group, they can save time to support more farmers, according to an officer at Kabwe,

4) Main activities

As the Study Team targets farmers' groups, all groups visited carry out agricultural activities such as vegetable and crop production. In addition to those activities, some groups have other activities as well; for example, processing, chicken and goat rearing, dairy, sewing, and fish culture. Besides, some particular cooperatives run a business oriented activity, a coop-shop, a product collection centre or a bulking centre, and banana production.

5) Types of irrigation

Many groups that produce vegetables in dambo areas use buckets to irrigate. In addition, the Study Team found that farmers in Mutundu dambo in Mufulira District dug a reservoir to impound water from a natural spring. Then, they dug earth canals downward from the reservoir to irrigate arable land, because that reservoir locates upward. It is obviously effortless to irrigate. Besides, where there were supports, members of groups received treadle pumps. Therefore, people who have a treadle pump irrigate by combination of buckets and treadle pump.

On the contrary, a few run electrical or fuel pump, and it may be difficult to maintain the pump. For instance, Chibote farmers' cooperative used to use electrical water pump for banana plantation. However, due to several technical problems, the pump consumed a huge amount of electricity to pump up the water. As a result, they received an un-payable electrical bill and they can no longer use the pump unless they pay the bill.

6) Book keeping

All the groups practice book keeping; however, some fail to practice it in a proper way. For instance, a group showed its book, but it was difficult to easily distinguish between expenditure and income, because the group member recorded them in the same book. Generally speaking, the book of expenditure and income should be separated; furthermore, expenditure, for example, should classify more detailed items to be recorded. As some groups record expenditure and income in a book, it may be quite difficult to know actual cash flow. As a result, they may have difficulty when they make a budget for the following fiscal year based on past year's expenditure and income.

7) External supports experience

Many groups have experienced external supports. Organizations that support groups are governmental service branches, donors, NGOs, UN organizations, and private institutions.

It seems that there are intensive agricultural supports in Southern province by C-FAARM which is funded by USAID. It might be due to this support that the Study Team found that there are many active cooperatives and associations in Southern Province. For example, Nkandabwe agriculture cooperative runs its own shop in order to expand business activities. Moreover, Mkumba multi-purpose cooperative manages collection centre where buyers come to buy their vegetable. These activities may be particular to Southern Province where the cooperatives have been supported by C-FAARM.

(3) Lessons learnt

1) Mitengo Women's Association

This association is recognized as a very active association by the senior cooperative officer of Lusaka Province. The location of the association is in Lusaka District. Its members actively carry out agricultural activities; for example mushroom cultivation, banana production on a contract basis, and jam and moringa powder processing. As the association locates adjacent to Lusaka, where there is a huge market for agricultural products, it may have relative advantage on transportation, although it does not have a motorized means of transportation. According to a member of the association, the market information is provided by the camp extension officer, and members of association know that there are vegetarians; therefore, they produce mushroom to sell.

The information readily available for members plays an important role to what they produce to sell. Furthermore, the location where they can transport their products at a relatively low cost may encourage them to continue agricultural activities. Therefore, market information and location are important factors to promote irrigated agriculture in the peri-urban area.

2) Mukanba Multi-Purpose Cooperative

Mukamba multi-purpose cooperative in Kazungula District has successfully brought buyers to their village. Before this, each producer brought its vegetables to Livingstone. However, the market of Livingstone was saturated by vegetables, which other producers brought at the same time. Therefore, the price was low; for instance, a box of tomatoes was around 30,000 ZMK/box. Besides, they had to spend several days to sell their vegetables. As a result, they had also to spend money on food and accommodation. According to a woman, men bought and consumed alcohol on what they sold. The transportation fee was also high.

Now, they call buyers to their collection centre located in their village. As they do not carry their products for a long distance, vegetables keep better quality. In addition, the producers can negotiate price because there is less competition, and the producers all together sell their vegetables in a bulk scale. Furthermore, they have been able to save the transportation fee, food and accommodation fee, and money for alcohol. To expand their activities, the members of the cooperative plan to create a bulking centre with the support of CARE International.

From this cooperative's experience, a collective centre or bulking centre is vital for them to collect their products and sell in a bulk scale. Not only this, but also it is important that members collectively sell from the centre, otherwise it will not make any sense if members sell on an individual basis.

3) Kazungura Agriculture Cooperative

Kazungura Agriculture Cooperative was established as dairy cooperative. Unfortunately, cows in the region had experienced disease, and therefore, many cows died due to this. As a result, the quantity of milk collection drastically decreased from 300 ~ 400 l/day to 50 l/day. To recover the situation, then, the members of the cooperative decided to expand their activities such as vegetable production, installation of mill and sales of maize and millet flour (milmil), and run chicken yard.

It seems that this cooperative is highly business oriented. Moreover, what is important is that they have been experienced an external audit, which is required as a must by the Cooperative law. This can imply that their organizational management has been highly developed. There is still a room to develop their financial management; nonetheless, the Study Team found that this particular cooperative can be a good example of organizational management. Besides, the cooperative inspector of Kazungura says that this cooperative is one of the best 10 cooperatives in the district.

4) Katondo Women's Association

Although it is very difficult to evaluate solidarity of a group, Katondo Women's Association might be such a highly united group. This association is known as one of the best groups in the Sinazeze camp, according to a CEO. This association was established to provide care for less privileged people in their village, particularly children and aged people. To pursuit its objective, members grow vegetables and crops to sell in order to make money for the activities. They cultivate maize on their field which they borrowed from a land owner and sell it to FRA. Other activities of the association are catering, processing, cultural activities, and spots.

They are stimulated to work together not only to realize the objective, but also to enjoy themselves. For instance, they play the net ball because it is very enjoyable when they beat others. This can be result in reinforcing their solidarity. The more they enjoy activities of the association, the more members are attracted to work as a group.

Furthermore, they are recognized as a cultural group; therefore, they are usually invited to show their dance at an official event such as the opening of field day. In addition, they were awarded a prize at the block show last year.

The solidarity of a group is a key to success. The case of this association may show that the joyfulness is important to unify members.

5) Nkandabwe Agriculture Cooperative

This cooperative is also recognized as one of the best cooperatives in Sinazongwe District. According to a member of the cooperative, members love the cooperative because they

realize benefits from being a member. For instance, a member has been able to make the money necessary to send his children to school and assure food security from the profits of the cooperative. One of the resources of the cooperative's profit comes from its own shop. The cooperative buy agriculture inputs from Choma for its members. In addition, it sells flour of maize and other commodities for members and other people. It seems that this has been running well, because the cooperative plans to build a new building for the shop to expand its commercial activity.

The Study Team found that provision of profit is crucial to attract members to be actively involved in any kind of groups. Nkandabwe Agriculture Cooperative has been successfully providing profit by business, and members are very active; for example, 76 members out of 82 members have paid full share of the cooperative. Moreover, according to the same member who said that members love the cooperative, a successful group depends on the leadership, which is true.

### 4.4.3 Matching Meeting between Producers and Marketers

In order for the producers to produce their vegetables by a market-driven way, consumers' needs are fundamental for all key marketing decisions[7]. A classic approach to this customer-focused marketing is known as 4Ps (Product, Price, Placement, and Promotion) supply side model of marketing management (idem). '*If any of the 4Ps had a problem or were not there in the marketing factor of the business, the business could be in trouble and so other companies may appear in the surroundings of the company, so the consumer demand on its products will become less(idem).*' Since one of the objectives of the Study is to find out the small scale farmers to produce to sell, it is vital to examine whether this approach runs well or not in the Study area.

As a preliminary study, a sort of 'matching meeting' between producers and markets was organized. The objective of this meeting is to examine whether a successful JICA project in Kenya, as the first cycle of the 4Ps, can be repeated or not. Nonetheless, a preparation meeting with producers had been organized prior to that meeting, where producers analysed the causes why producers cannot produce their products for sale.

(1) Preparation meeting

As mentioned above, a preparation meeting was held in the conference room of DACO Lusaka on 21 April, 2010.

1) Aim of the meeting

The aim of this meeting was to undertake a problem analysis on the theme "why farmers produce what they cannot sell?" in readiness for the matching meeting.

2) Brainstorming of the theme

After the brief introduction of the Study, the theme was introduced and each participant was requested to write at least one cause on a piece of paper. The following reasons were outlined responses to this theme:

[7] Wikipedia (2010), 'Marketing,' http://en.wikipedia.org/wiki/Marketing (as of 2010/5/19).

| | | |
|---|---|---|
| Long distances to markets | Poor road network | Lack of transport |
| Insufficient logistical support for extension staff | Farmers produce for family consumption | Insufficient capital |
| Too many farmers selling the same produce at the same place | Limited market centres | Certain crops are easy to grow |
| Unplanned farming | Farming as a tradition | Lack of market information and research |
| Lack of farm management and business skills | Lack of processing to add value to products | Poor quality of products |
| Lack of networking among stakeholders | Insufficient extension outreach programs and training | Low literacy levels and failure to keep records |
| Lack of infrastructure | Selling depending on their pressure of the problems | |

3) Development of problem analysis Tree

The participants together with staffs of PACO Lusaka, DACO Lusaka, and DACO Kafue developed a problem analysis tree by arranging the causes outlined in the previous section in regard to cause and effect relation as shown in Figure 4.2.1. According to this tree, the direct major causes to the theme are; 1) lack of market information and research, 2) unplanned farming, and 3) practicing the farming as tradition.

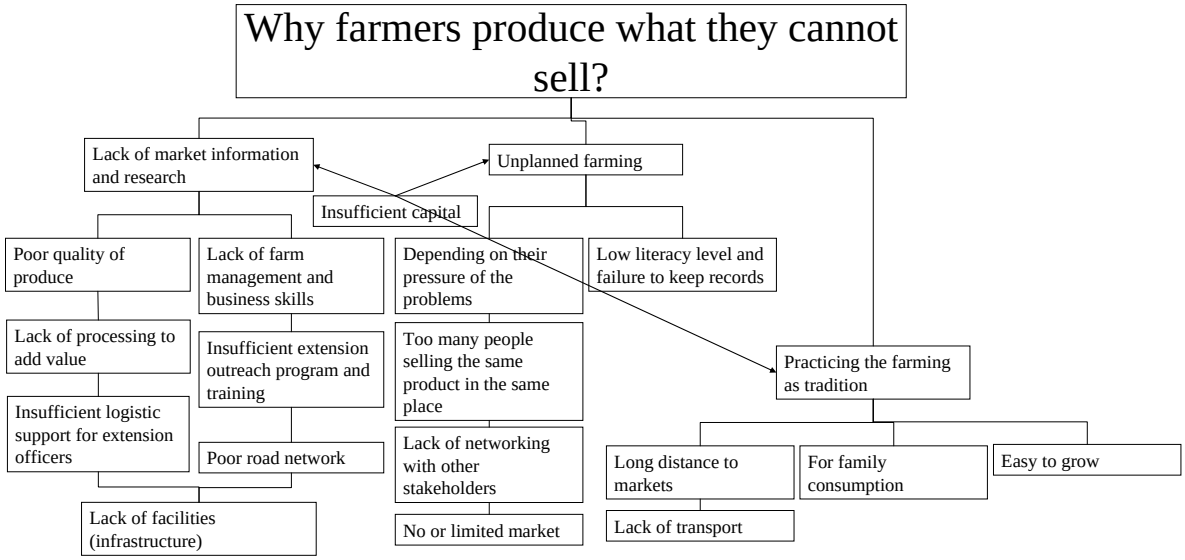



Fig. 4.4.1 The Problem Analysis Tree Developed by the Participants

(2) Matching meeting between producers and marketers

1) Outline of the matching meeting

During the field survey, the Study Team arranged matching meeting between farmers' group and marketers in order to exchange their opinion in terms of marketing agricultural products. In the meeting, the participants discussed about their situation and needs for selling and buying products, exchanged their contact address, and established trial linkage for future business activities. The matching meeting was held in four districts where there is marketing activity or market potential among the A/P candidate areas, namely, Kabwe District, Kalulushi District, Livingstone District, and Lusaka Province. The detail of the participants in each meeting will be shown below.

Table 4.2.2 Participants of the Matching Meeting (year 2010)

| Location (District) | Date | Farmers' Group (number of farmers) | Market Traders | Government Officers | Study Team (incl. Local Staffs) |
|---|---|---|---|---|---|
| Kabwe District | 18th, June | 4 groups (15) | 10 | 5 | 6 |
| Kalulushi District | 25th, June | 4 groups (14) | 10 | 11 | 6 |
| Livingstone District | 2nd, July | 3 groups(14) | 12 | 1 | 6 |
| Lusaka Province | 9th, July | 7groups (16) | 17 | 9 | 9 |

2) Gaps between farmers group and market traders

During the matching meeting, Participants discussed about needs of farmers group and market stakeholders when they want to sell and buy the agricultural products from the view of the concept of 4P, that is to say, 1) Product, 2) Price, 3) Place, and 4) Promotion. The discussion tried to figure out the gaps of perception between farmers and marketers in terms of their marketing activities. The following Table shows general identified gaps existing between farmers and marketers.

Table 4.4.3 Major Gaps between Farmers and Marketers

| | Major gaps |
|---|---|
| Product | - The understanding about quality of agricultural products is different among farmers and marketers. Farmers consider the products which have no disease and bugs as high quality. On the other hand, marketers tend to consider freshness as high quality.<br>- Variation of condition of agricultural products often arises when farmers sell them to market. It was pointed out that farmers sometime hide products of bad condition in the sack. This kind of cheating prevents to establish mutual trust between farmers and marketers.<br>- Trader of Supermarket regards frequency of supply of vegetables as important. However, current farmers' capacity of production cannot meet those demands since group farming with certain production plan is not practiced at this moment. |
| Price | - Farmers want to fix their selling price based on the cost of their farm inputs, however, marketers want buying price according to the market situation of demand and supply. It is usual that farmers are not satisfied with the selling price of their products. |
| Place | - Farmers, who are not practicing group selling, bring their products to the market to sell individually. There is usually no coordination with other farmers about the timing and the selling price of the products. This creates irregular supply to the market and losing marketing opportunity to farmers, and also indirectly to marketers.<br>- The environment of the market is not favourable for fresh vegetables. The selling price of unsold vegetables easily gives advantages to marketers. |
| Promotion | - Farmers and marketers usually do not have a regular business partner. So, their marketing activities are practiced without a plan, for example, farmers just bring their products to the market then seek someone who buys them. This opportunistic trading caused by the lack of information on the business partner constitutes a loss for both farmers and marketers.<br>- Since, information sharing between farmers and marketers is lacking, planned farming based on demands of the market is not practiced.<br>- The channel of selling the products for farmers is limited. It makes farmers lose their bargaining power to marketers. |

3) Trial business matching

Trial business matching was conducted during the matching meeting. Since, information of farmers' production and traders' market activities are shared, farmers' groups and marketers became partners if they are interested in each other as future business partners. It is not a formal contract but it makes appointment between farmers' groups and marketers to meet and negotiate about trading agricultural products when it becomes ready to sell. After the meeting, the Study Team followed up the trial.

(3) Following up after the trial business matching

The following up items are highlighted on 1) whether the business matching has been continued, 2) how the parties involved in the matching meeting have been feeling about the advantage of the matching meeting, and 3) what they want to do in the future. The results of interview by phone are summarized in Table 4.4.4 and 4.4.5.

1) Farmers' groups

First, many of both farmers' groups and marketers have continued to communicate with each other to determine the price, quantity, and delivery date.

Before the meeting, farmers' groups were uncertain about the selling price and sales performance because they had not intended to know the price and quantity that the market required, which resulted in bad sales performance. However, after meeting marketers and starting to communicate with each other, the farmers' groups have been able to agree on price and quantity with marketers. As a result, they have lessened the uncertainty of the sales. It is to say that there is an advantage on the stability of sales price and the necessary quantity to bring to the market.

2) Marketers

The business matching has been seen helpful to marketers as well. Because they can confirm on what farmers' groups cultivate, and they can buy what they want by communicating with them. In addition, a marketer said that she told the farmers' groups what she would buy, and shared information about when particular vegetables would be high price. This information may not only benefit farmers' groups, but also benefit her because she can buy vegetables when she can sell them at high price season. In this case, both parties will benefit.

Generally speaking, some marketers visit farmers' groups in order to look for good vegetables. Before the meeting, however, they tended to move from one place to another until they could find what they wanted to buy, and it took long time and they had to move a long distance. Since they have been able to identify which farmers' groups produce which vegetables after the meeting, they have been able to reduce this burden as they know where and when they can get them. Moreover, some of them emphasize that they can look for qualified vegetables with relatively cheaper price. Therefore, the marketers could increase their benefit by the trial business matching.

3) Needs for further contacts

Additionally, both parties stress to expand the contacts in the future, because the contacts which they currently possess are limited. For this, a marketer had the idea to expand such contacts by being introduced to other farmers' groups by the one he used to contact. In fact, another marketer has been

introduced to a farmers' group by the group which he deals with. In order to increase their contacts, a periodical matching meeting would be a good opportunity.

4) Administration

The department of marketing development in MACO is the most related department to this trial. According to an officer of this department, officers can continue to contact focal points of both farmers' groups and marketers, which would be identified in advance, in order to follow up when they go to collect the market information every Monday. In addition, he says that it is possible to hold a quarterly review meeting with both parties in terms of monitoring.

Though the department can plan and budget this meeting, the fund from the government will be another issue. For example, if the budget was allocated, appropriate distribution of that might not always be sure. Moreover, when the distribution is not properly carried out in time, the meeting would not be in place.

However, the amount of the budget will not be a big scale because there will only be expenses on communication costs and 50,000 ZMK of transportation fee for participants in a single uniform way. Therefore, it is possible to hold a periodical matching meeting to a certain extent.

Table 4.4.4 Follow-up of the Trial Business Matching for Farmers' Group (Farmers' Groups)

| Farmers' group | Action | | Remarks |
|---|---|---|---|
| Kalulushi | | | |
| Bulimi Cooperative | Yes | They have contacted the buyers before taking the produce to the market. | The meeting helped them because marketing system has improved.<br>They have planted Okra. |
| Muchinshi Women and Youth | Yes | They will take onions to Chisokone market when it is ready. | Buyers from green market in Chisokone called them when they needed some Cabbage. |
| Tiwonge | Yes | They have communicated with the buyers before taking their produce. | |
| Kanchule Cooperative | Yes | They have contacted the buyers before taking the produce to Chisokone market. | |
| Kabwe | | | |
| Buyantanshi Farmer Group | No | Some farmers have not done anything because there are no farming activities. | Luck of communication between farmers and buyers.<br>There are false buyers who pretend to be agent at Kasanda Market. |
| Moto Moto Gardening Group | Yes | They had a meeting with other members.<br>They have sensitized the other farmers.<br>They have linked with marketers at Kasanda market (Communicate with buyers before taking the produce to the market).<br>They take the sample to the market to show buyers the type of produce they have. | People are doing farming this time, September. At the end of month sale of produce will be taken place.<br>Cabbage production and preparing tomatoes. |
| Kamakuti Central Cooperative | Yes | Communication is taking place. | Manly supplies cabbages and carrots.<br>They sale in Kgs<br>They have problems with watering system because they use buckets. |
| Tubalange Irrigation | Yes | Each farmer has his/her marketer to whom they contact.<br>Farmers keep contacting with the buyers. | Members of Tubalange were asked to supply to the green market.<br>Buyers also visit the farmers if their items have finished and they urgently need them. |

| Farmers' group | Action | | Remarks |
|---|---|---|---|
| Lusaka | | | |
| Tweebele Irrigation Cooperative | No | | |
| Soweto Cooperative | Yes | Sensitized middle men at Soweto market.<br>Talked to marketers. | Famers have not yet communicated. |
| Muunega Multi-Purpose Cooperative Society | Yes | Onion will be ready but farmers have to communicate before taking their produce. | |
| Chisungwe | Yes | They have communicated with the buyers before taking their produce. | They have vegetables at the moment. |
| Kabeleka Mult-purpose community society | Yes | They contact the buyers. | Tomatoes will be ready in two weeks from now. |
| Livingstone | | | |
| Simuwida Multi-Purpose | Yes | They have convinced the farmers to contact people before taking the produce to the market. | They have stopped the old method they used to use before the meeting. |
| Mabula Cooperative | Yes | They contact the buyers before taking their products. | Vegetables are cheap this period.<br>They sale vegetables locally at times.<br>Famers are still selling maize. |
| Makamba Mult-purpose Cooperative | Yes | They contact buyers before taking the produce.<br>They sale to Mbita market and Mo- business. | They have planted and produced tomatoes and onions.<br>They have improved sales because they are selling in Kg. |

Table 4.4.5 Follow-up of the Trial Business Matching for Farmers' Group (Marketers)

| Marketers | Action | | Remarks |
|---|---|---|---|
| Kalulushi | | | |
| Ms. Kelda Naluyela (Luato Market) | Yes | Farmers call them to inform when they will be taking the produce.<br>Farmers contact them before taking their produce.<br>Some farmers visit and/or call them to inform about types of produce they can supply and when they can bring for them. | |
| Kabwe | | | |
| Ms. Mary Warichupa (Green Market) | Yes | They went to Mulungushi University to ask if they can supply cabbages and tomatoes and the university agreed upon. | |
| Ms. Charity Kalale (Green Market) | No | Nothing has been done, but farmer promised that they will bring tomatoes, carrots, green paper and pumpkin leaves. | They buy green vegetables from the green market. |
| Mr. Kabwe Chewe (New Kasanda Market) | Yes | She communicates.<br>Farmers have been taking tomatoes and onions. | The meeting helped them so much. |
| Lusaka | | | |
| Mr. Fenniter Sichinu (Soweto Market) | Yes | She communicates before going. | She is doing business with farmers from Kafue.<br>She goes to Kafue to buy lemons twice a week.<br>The meeting was helpful and they are looking forward to attend to the next one. |
| Mr. Albert Phiri (Lusaka New Soweto) | Yes | They have been sensitizing the marketers.<br>They are planning to accommodate the farmers. | They have prepared a speech to be presented at the official opening of new Soweto.<br>Farmers go to Soweto because that is the centre place were all famers take their merchandise. |
| Mr. Jrakes (Fresh Pikt) | Yes | They made some contacts with farmers. | The meeting was helpful.<br>Marketers and farmers are now aware of how to achieve certain business ethics. |
| Ms. Ageriness (Bauleni) | Yes | They communicate with farmers.<br>Farmers follow them and at times they follow farmers at Soweto market.<br>They negotiate with farmers if they have used their transport money.<br>They contribute some money to move from one place to another. | Kafue had supplied them with Cabbages, Farmers take samples to buyers. |
| Livingstone | | | |
| Ms. D. Phiri (Maramaba Market) | Yes | Farmers call them before bringing their produce. | Farmers sell vegetables in boxes. |

## 4.5 Consideration of Potentials by Zone

### 4.5.1 Zoning of the Study Area based on the Farming Systems by Smallholders

This sub-section describes the characteristics of the farming systems in the four provinces covered by the Study in 3.2.1. Figure 4.5.1 is a graphical representation of those characteristics in 23 districts in the Study area, based on the study findings.

(1) Copperbelt Province

In the target districts of this province, ex-miners and part-time farmers use a peri-urban farming system, while many smallholders in Masaiti District have a system that emphasizes the wet season cash crops. Few districts in this Province have small-scale irrigation schemes while there are many perennial streams over the Province.

(2) Central Province

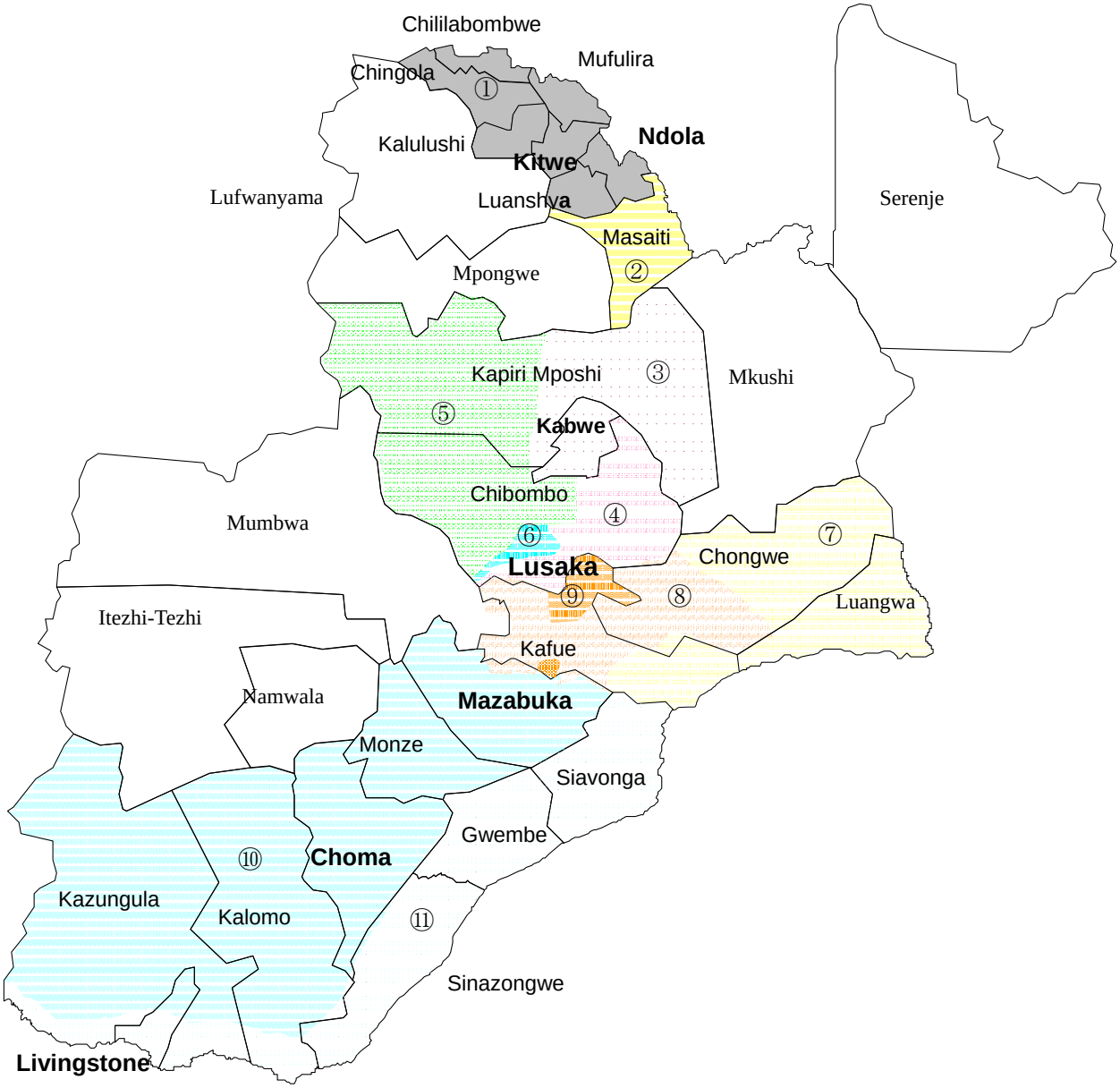
This province is a region of abundant agricultural productivity, and its farming systems can be divided into three categories, 1) emerging farmers on the outskirts of Kabwe city use dambos and small streams for vegetable production, 2) smallholders around the capital of Kapiri Mposhi District use waged labor as their main income source, while growing crops in the wet season and 3) smallholders in Chilibombo District, which is adjacent to Kabwe District, include many emerging farmers with high skill levels.

(3) Lusaka Province

The farming systems used by smallholders in target districts of Lusaka Province are divided into three categories, and in each of them, agriculture has advanced into commercialization with factors such as the presence of more emerging farmers than in other provinces.

(4) Southern Province

The farming systems used by smallholders in the target districts of Southern Province can be broadly divided into two groups. One is the farming system used in areas along the railway line where smallholders exist alongside large commercial farmers. This farming system for smallholders in these areas puts emphasis on cash crops, such as F1 corn, cotton and sunflower in the wet season. The other system is applied around Lake Kariba and along Zambezi River, where the climate is semi-arid. This system cultivates drought-resistant sorghum and cotton etc., in the wet season.




Legend

| | |
|---|---|
| ① Retired miners and part-time farmers are engaged in farming. | ⑦ Low fertility soils. Animal draught is difficult due to Tse Tse flies. |
| ② Maize, sorghum are mixed with other crops. Soybeans, cotton and coffee are cash crops. | ⑧ Maize and cash crops (vegetables, cotton, and sunflower) are major farming but small scale. |
| ③ Sorghum and finger millet are important. Millet beer, labor wage and charcoal are also important. | ⑨ There are semi-commercial farmers who have larger scale than smallholders around the area. |
| ④ Many emerging farmers exist. Farmers around Kabwe City area are small but high technology level. | ⑩ Commercial farmers are along the railway. About 60 % are smallholders who cultivate maize F1, sunflower and cotton as cash crops. |
| ⑤ Southeast area is close to the above ④system and north is similar to ③. | ⑪ Semi-arid areas. Irrigation is indispensable for continuous agriculture. |
| ⑥ The emerging farmers are scattered around the city. | |

Fig. 4.5.1 Characteristics of Main Farming Systems for Smallholders in the Study Area

### 4.5.2 Characterization of Marketing and Production by District Officers

The kickoff workshops for the second study phase took place between March 23rd and April 2nd, 2010. These workshops explained the study content to related MACO staffs in the four provinces and 23 districts to be studied, facilitated exchanges of opinions with them, and worked to collate the characteristics of agricultural produce sales channels, marketing potential, crop cultivation, etc.

(1) Distribution of produces in District

For most of the districts, fresh vegetables produced by smallholders are distributed from the farm areas to the major markets through local market centres. Overall, geographical condition; i.e., distance to the major market (s) characterizes the distribution flows of agro-produces over district.

(2) Irrigated crops

A large majority of the smallholders in the study areas currently focus on cultivation in the wet season. In the peri-urban areas there are smallholders who cultivate crops such as tomatoes and cabbages for market during the wet-season period. Besides some of these common crops, the workshops identified the following characteristics of some cash crops.

Irish potato

The four provinces included in this study cover almost all of the Irish potato production in Zambia, with most of this production coming from large commercial farms. However, information from DACO staff indicates that smallholders in Chilirabombwe District, those in Mazabuka District, and elsewhere are growing Irish potatoes on small areas.

Baby corn

There are two districts, Lusaka and Chongwe Districts, where baby corn is an important irrigated crop.

Green bean

These crops are cultivated as irrigated crops in the areas situated around cities. Chipapa area (Kafue District) is one example of these areas.

Chinese cabbage

Chinese cabbage has been indicated as one important irrigated crop in Chingola District, and in Kabwe District.

Okra

Okra is an important crop in Choma, Siavonga and Sinazongwe Districts, which are remote areas.

Rice

According to agricultural statistics, there is very little rice production in the four studied provinces, but some rice is grown by smallholders in Central and Copperbelt Provinces. DACO staff from

Kalulushi District also named rice as one irrigated crop there. Although the area of planting is confined to small-scale (annual planting area 0.5 ha approximately), there is some active smallholders having started rice cropping in Kanakantapa, Chongwe District. Moreover, some smallholders are trying out rice cropping in waterlogged fields in Kalomo District. Overall, the lack of rice cropping experience and post-harvest facilities / equipment makes it difficult for smallholders to adopt and to manage it sustainably.

Water melon

Water melon is an important irrigated crop in Chibombo District.

### 4.5.3 Characterization of Vegetable Distribution and Zones over the Study Area

Distribution of fresh vegetables and related characteristics of zones across Copperbelt, Central, Lusaka and Southern Provinces were summarized below. The common feature over the four provinces is that fresh produces by smallholders are transferred from the farm sites to the major markets in urban areas by way of the regional local markets.

(1) Copperbelt

Generally, fresh vegetables produced within the province have no direct distribution to Lusaka and are distributed within the district or exported to DR Congo and to the neighbouring province such as North-Western.

(2) Central

The province does not have much consumer-population comparing to Copperbelt or Lusaka districts; and therefore, the produces are mainly distributed to the markets in Lusaka and Ndola or Kitwe cities.

(3) Lusaka

The province is already in highly superior zone with accessibility to Lusaka. Whereas, in the area close to Lusaka urban area, the produces extensively flow into the urban area.

(4) Southern

The main course of agro-produces distribution in the province can be divided into two routes; the staple and principle crop products are dominantly distributed to the large consummative markets of Lusaka, while most of the fresh vegetables are distributed to Livingstone. The province holds an important border settlement, Kazungura, a gateway to three countries namely Zimbabwe, Botswana and Namibia. In this regard the area is highly advanced for the boarder-trade.

### 4.5.4 Market Zones for Smallholders in the Study Area

The study area has a long north-south extent, from Livingston in the south to Chililabombwe district in Copperbelt Province in the north. The farming systems used in this extensive area are diverse; however, they can be categorized, and there are tendencies in the sale destinations of the vegetables and fruits grown by smallholders and hence the following zoning is possible.

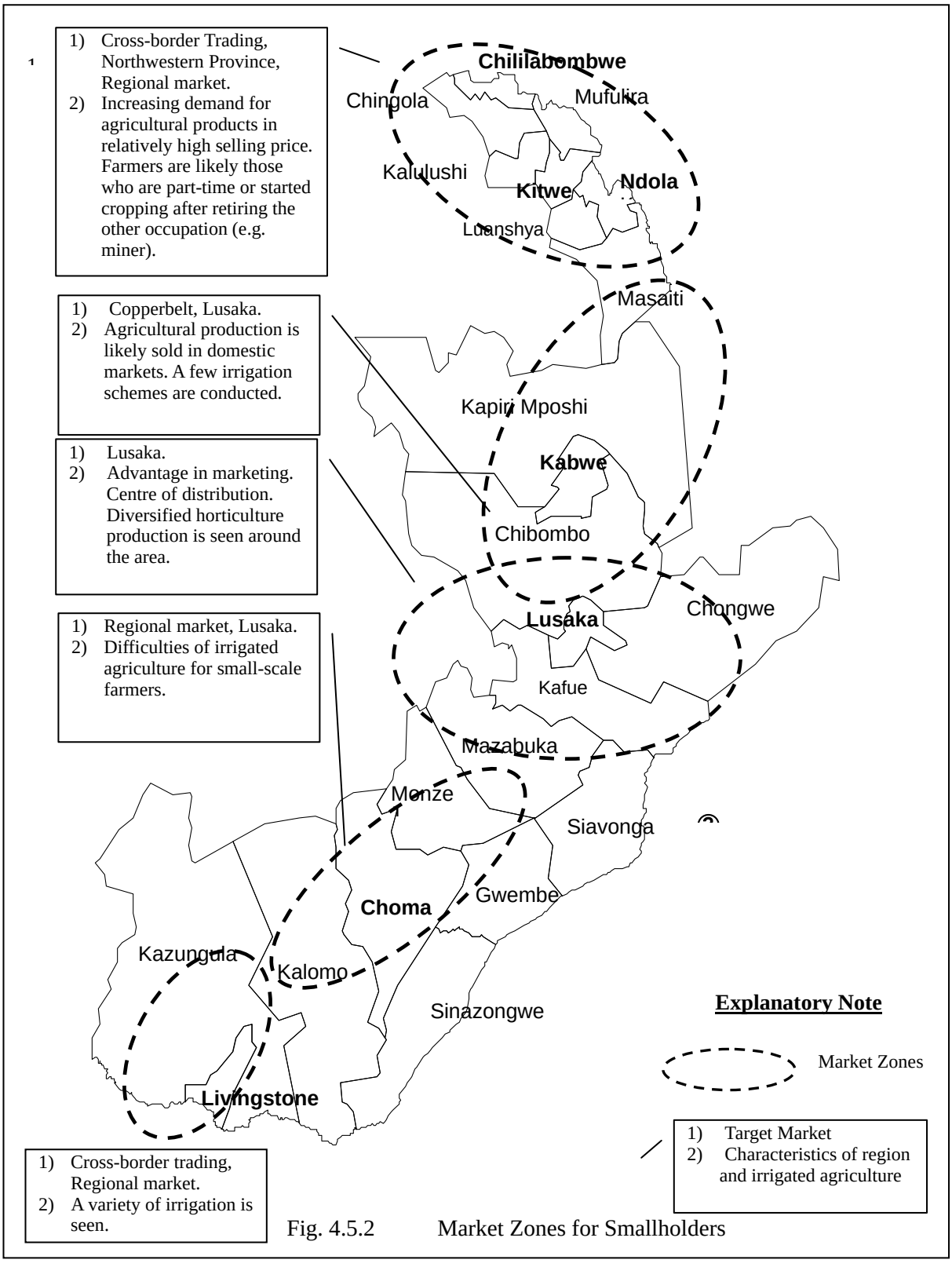



Fig. 4.5.2 Market Zones for Smallholders

### 4.5.5 Potentials for Small-scale Irrigated Agriculture in Zone 1-5

Current situation in overview, related issues and potentials for irrigated agriculture development are described for Zone 1 to 5.

| Zone | Current Situation・Issues・Potentials |
|---|---|
| **Zone 1**<br>**Copperbelt Zone** | （Overview）<br>Zone is classified as the agro-ecological region III with annual mean precipitation of 1,000mm to 1,400mm. Retired employees of the regional copper-industries or those who manage subsidiary-business are the main actors in agricultural industry in the zone. Potentials of irrigated agriculture and its future development are high for abundant water resource and high demands of agro-products within the zone as well as substantial in-flow of the products from surrounding regions.<br>More than 80 % of the total population of the province present in urban area and each of the major five cities has population more than 100,000. This provides the province favoured marketing environment. It is, however, competition between smallholders and large-scale commercialized farmers is probable as it is seen for such crops of wheat or potato although these are main production for the large-scale farmers of the zone. The zone holds approximately 136,000 famers and the 53% of the entire population cultivate their land with fresh vegetables[8]. Moreover about 30 % of the total farmer populations sell their produce; this brings the rate of the total sell by vegetables to the total income of the household to approximately 11.7%[9].<br><br>（Marketing and Distribution of Agro-products）<br>Cross-border trading, various marketing channels and shortage of intraregional production of vegetables well characterize the zone. Huge amount of agro-products are exported to DR. Congo via local markets in the north region of the province for its high demand. Ndola and Kitwe, major cities with large number of consumers, as well as the adjoining province North-Western province, currently regarded as emergent mine industry area, generate demands of agro-products. These high demands, however, bring unbalanced demand-supply relation (excess demand) and hence require further importing of the products from other provinces or countries for making up the insufficiency of supplying.<br>In overall view the Zone has promised high marketing potential for its mega market-area where demands from in-province and out of the province co-exist. The imported agro-products distributed abundantly over the in-province or the border-side markets are generally seen as high-graded products whereas the agro-produce of the country need to be improved in terms of quality to establish the favoured marketing-activity. In this regard, countermeasure activities will involve; structuring of system for promoting collective shipment by smallholder farmers' group (construction of simple facility for collection, distribution of the products and partnership with marketers), practical sales-activity with an indirect support. Quality control for agro-products is also indispensable to compete with the imported products.<br><br>（Irrigation）<br>The zone features higher amount of annual precipitation than other zones especially given the fact that the zone located on upmost, initializing point of Kafue river (basin) and thus high irrigation potential with readily available perennial stream water. On the other hand, small tributaries exist within the upmost Kafue river basin and these areas show shallow ground water level throughout a year. Formation of irrigation area by constructing simple diversion-weir and strengthening farmers' organization is suggestible. It is also necessary to prevent soil loss form fields of inclined areas under high-intensity rainfall during wet season. Appropriate field design accounting for both wet and dry seasons is important to establish irrigated agricultural land with high productivity. |
| **Zone 2**<br>**Kabwe Zone** | （Overview）<br>Zone is classified as the agro-ecological region II with annual mean precipitation of 800mm to 1,000mm. The zone is located on plateau area, around 1,000m in altitude, and is one of the major agricultural production areas in the country. Animal husbandry is major industry in the zone and a partnership between the cattle/ dairy farmers and the arable farmers are expected to utilize high potential of sustainable agricultural production (circulation of organic-by-products) via manure/ compost productions or animal-power use. Commercial agriculture by smallholders are also noticeable in Chibombo area. These smallholders are advanced in their farm management techniques. In the suburb of Kabwe city area, emerging farmers produce vegetables utilizing dambos and small streams. The zone holds about 75,000 |

[8] Agricultural Analytical Report, CSO/MACO, 2000.
[9] Zambian Horticultural Rapid Appraisal, Food Security Research Project (FSRP), 2006.

| Zone | Current Situation・Issues・Potentials |
|---|---|
| | farmers, and 51 % of the farmers are engaged in vegetable production[8]. Approximately 20 % of the total farmers in Central province sell fresh vegetables and its sales amount occupy 4.0 % of their total incomes[9].<br><br>（Marketing and Distribution of Agro-products）<br>High self-sufficiency rate and several local town markets characterize the zone. Central province, including Kabwe district, alone has the high self-sufficiency rate in agricultural production and therefore is regarded as major production base for agriculture in the study area. Many of the farm produces are shipped to the three local markets in Kabwe township. Excess portion of the produces over the district will be redistributed toward other provinces. As Kabwe market area is located in between the two large consumption areas; Copperbelt and Lusaka, north part of the zone is more connected to Ndola and Kitwe markets in terms of marketing while south part of the zone is connected directly to Lusaka large market. In fact, watermelon is well known as local specialty of Chibombo area.<br>Securement of marketing channels outward of the core province (Kabwe) as well as the zone is key issue. Basic approaches for this zone are promotion of farmers' collective shipment and support for practical sales-activity by farmers as shared by all other zones; moreover, establishment of linkage among farmers' groups and large-scale retailers/ processors is an important themes in this zone.<br><br>（Irrigation）<br>In the area where sand-gravel layer exists beneath surface clay-layer, there are several points where percolated rainwater during wet season under the ground move along confined aquifer towards lower topographic-position. These hydrological characteristics are common for the hilly area in central part of Chibombo district, Kabwe region and its surrounding areas. Ground water level in these areas is shallow even for dry season and existing 0.5 to 1.0 m zone under the ground. This enable the regional smallholder farmers to access water source for irrigation using treadle pump and/or buckets. These areas remain potential for irrigation development. Gravity irrigation is also widely available for the areas where irrigation dams exist. Good accessibility to Kabwe market and rainfed cropping during wet season, and cash-crop productions in dambos or dam sites for dry season are positive factors to increase farmers' income.<br>Though it holds true for intensive use of dambos in future, it would be quite important to investigate probable impacts by development on regional environment as no public law exists for dambo-use in Zambia. Clear basis for the development, strategy and establishment of related law are necessary for sustainable utilization of dambos as most of rural settlers do not have sufficient knowledge for environmental load in relation to regional eco-system. |
| **<u>Zone 3</u>**<br>**Lusaka Zone** | （Overview）<br>Zone is classified into two different agro-ecological region; the east and the south parts are classified as Ⅰ (annual mean precipitation ≤800mm) whereas the north and the west parts belong to Ⅱ (annual mean precipitation 800 to 1,000mm). Large-scale, medium-scale (emerging farmers) and small-scale farmers produce vegetables in the suburbs to supply Lusaka markets. No less than 10 large-scale commercialized farms are located within the zone. The zone holds about 57,000 farmers, and 56 % of the farmers are engaged in vegetable production[8]. Approximately 36 % of the total farmers in Lusaka province sell fresh vegetables and its sales amount occupy 8.6 % of their total incomes[9].<br><br>（Marketing and Distribution of Agro-products）<br>The largest market-size and distribution centre (Soweto Market) in Zambia characterize the zone. Wholesale dealers, middleman, general retailers, as well as large-scale retailers (chain stores), processing companies, fertilizer/ chemical supplier and agro-machine manufacture secure their bases in the region as main actors of the distribution. Public offices and public service institutes are gathered and concentrated in the region. It is hence the zone provides smallholder farmers a huge marketing potential for mega-market-area, various marketing channels and all sort of support systems. Large-scale wholesale chain-markets and processing companies, much more upgraded than the case in other zones, their presence well encourage smallholders to expand their marketing activities.<br>Under this situation, some farmers' groups appear to be active in production and marketing while the majority of smallholders remain individual marketing activities. Basic approaches for this zone are promotion of farmers' collective shipment and support for practical sales-activity by farmers as shared by all other zones. In this zone, sorting (size and maturity etc.) of agro-products by type of buyers and/ or timing of sale would be an important process to meet with needs and various marketing outlets.<br><br>（Irrigation）<br>Unlike other areas where most of dams have no water-intake facility equipped, existing small-scale dams and its reserved water are efficiently utilized in Kafue district of Lusaka |

| Zone | Current Situation・Issues・Potentials |
|---|---|
| | province and surrounding regions. On the other hand, more effective use of reserved-water is necessary for communities under the pressure of potential water deficit event upon the evidence; three times of drought-year after yr 2000. Irrigation canals (open channel) has been constructed after yr 2000, however, the maintenance rate is still low to completion. Findings from the presenting study revealed yet the high irrigation potential for effective use of the small-scale dams associated with maintenance of the irrigation canals (extension of canal length). |
| **Zone 4 Southern Province/ along the Railroad Zone** | （Overview） Zone is classified as the agro-ecosystem zone Ⅱ with annual mean precipitation of 800mm to 1,000mm. Altitude over this zone ranges 1,000 to 1,400 mm. Several large-scale farms exist along the railroad. Soils are relatively fertile and suitable for crop production though it needs water securement for irrigation. The zone holds about 68,000 farmers, and 54 % of the farmers are engaged in vegetable production[8]. Approximately 23 % of the total farmers in Southern province sell fresh vegetables and its sales amount occupy3.4 % of their total incomes[9].<br><br>（Marketing and Distribution of Agro-products） The zone is well characterized by decentred domestic markets. These markets include Lusaka, Livingstone and local markets located in other districts over Southern province. Some certain areas (Choma and Kalomo districts) are recognized as major production areas of Southern province. Basic approaches for this zone are promotion of farmers' collective shipment and support for practical sales-activity by farmers as shared by all other zones.<br>The zone covers the provinces, which are located on middle point of two large markets; namely Lusaka and Livingstone, and yields relatively huge amount of crop production. These features of the zone are slightly similar to the case of the Zone 2 (Kabwe). It is therefore, as in the Zone 2, establishment of linkage among farmers' groups and large-scale retailers/ processors is an important challenge for this zone.<br><br>（Irrigation）<br>Characteristics refer to the Zone 5 as described below for similarity between two zones. |
| **Zone 5 Kazungula/ Livingstone Zone** | （Overview） Lowland area along the coastal side of Zambezi river is classified as agro-ecological region Ⅰ, while the plateau dominant area over lest of the par belongs to agro-ecological region Ⅱ with higher precipitation level. Large consumption area, a number of tourist facilities (tourist hotels and lodges) and cross-border trade are factors of the high marketing potential and well characterize the zone with a large number of small-scale dams over the province. The zone holds about 39,000 farmers, and 57 % of the farmers are engaged in vegetable production[8].<br><br>（Marketing and Distribution of Agro-products） Large market (Livingstone) and export-potential are remarkable for the zone. Production of fresh vegetables and fruits are small in comparison with other zones and intraregional demand cannot be covered by the zone alone. Provincial capital, Kazungura is located 60 km away in west-direction from the city area of Livingston and is also adjoining with Western province. Moreover, Kazungura is as key junction of cross-border trade among contiguous three countries (Namibia, Botswana and Zimbabwe). As demands arising from the contiguous countries become high, the market of Zambia is expected to extend to meet with market-mechanism of the COMESA (Common Market for Eastern and Southern Africa).<br>What is particularly notable in this zone is the presence of farmers' groups (Kazungura district), which is active as well as challenging for multi-purpose marketing activities. These farmers' groups are identified as potential model-group. It is, however, majority of smallholder farmers remain as individual sales activities as in other zones. Basic approaches for this zone are promotion of farmers' collective shipment and support for practical sales-activity by farmers as shared by all other zones. Large market area and export-potential, as it is closely seen in Zone 1 (Copperbelt), these factors require it ensuring of quality and therefore competiveness of agro-products.<br><br>（Irrigation）<br>A large number of small-scale dams have been constructed from 1990 to 2000; however, many of these dams have not been equipped with water-intake facilities since the construction projects were originally planned for supplying water for livestock animals and domestic use by communities. Those dams constructed later than yr 2000 have been equipped with sluiceway at bottom for water-intake; while the older dams had been designed as siphon-type for water intake. Overall the maintenance rate (i.e., degree of achievement) of irrigation-facility is still at low level though the fact that construction of open-canals have begun after yr 2000. It is highly expected to improve an implementation structure for maintaining intake-facilities of dams and/ or irrigation canals, and eventually to expend beneficial field areas under irrigation. |

## 4.6 Identification of Irrigated Agricultural Potential by Field Survey

Result from field surveys on irrigation potential areas and existing small-scale irrigation schemes in the targeted area is described below.

(1) Observation by the field surveys

1) Existing small-scale irrigation schemes

Through discussions with the MACO, 13 gravity irrigation schemes and 12 pump irrigation schemes were selected amongst tens of existing irrigation schemes from due points of operation and maintenance condition, activities of farmers' organizations, farming skill, market viability, etc. These schemes are listed in Tables 4.6.1, 4.6.2.

Table 4.6.1 Existing Irrigation Schemes

| No | Schemes | Province | District | Irrigation area (ha) | Irrigation method | Systems |
|---|---|---|---|---|---|---|
| 1 | Kafubu | Copperbelt | Ndola | 10 | Furrow irrigation | Treadle pump |
| 2 | Katuba | Central | Chibombo | 10 | Furrow irrigation | Dam, canal |
| 3 | Mulila Kazembe | Central | Kapiri Mposhi | — | Furrow irrigation | Dam, canal |
| 4 | Chunga | Lusaka | Lusaka | 15 | Furrow irrigation | Intake weir, canal |
| 5 | Funzwe | Lusaka | Kafue | 5 | Furrow irrigation | Treadle pump |
| 6 | Shantumbo | Lusaka | Chongwe | 15 | Furrow irrigation | Dam, canal |
| 7 | Chipapa | Lusaka | Kafue | 10 | Furrow irrigation | Dam, canal |
| 8 | Kanundwa | Southren | Monze | | Furrow irrigation | Dam, canal |
| 9 | Siafwa-kweda | Southern | Choma | 4 | Furrow irrigation | Dam |
| 10 | Ndondi | Southern | Choma | | Furrow irrigation | Dam, canal |
| 11 | Nkandabwe | Southern | Sinazongwe | 10 | Furrow irrigation | Dam, canal |
| 12 | Nabuyani | Southern | Kalomo | | Furrow irrigation | Dam, canal |
| 13 | Mulabalaba | Southern | Kazungula | 15 | Furrow irrigation | Dam, canal |

See Annex C for more detailed information of the irrigation schemes.

Table 4.6.2 Summary of the Small Scale Irrigation Schemes (Pump Irrigation)

| | Small scale irrigation schemes | Province | District | Irrigation area (ha) | Irrigation method | Systems |
|---|---|---|---|---|---|---|
| 1 | Ipafu | Copperbelt | Chingola | 80 | Drip, sprinkler | 2 pumps (not operated) |
| 2 | Chapula | Copperbelt | Kalulushi | 20 | Furrow | 2 pumps (operated) |
| 3 | Chibote | Copperbelt | Kalulushi | - | Furrow | |
| 4 | Mukonchi | Central | Kapiri Mposhi | 0 | Furrow | 1 pumps (not operated) |
| 5 | Tubalange | Lusaka | Lusaka | 5 | Furrow | Dam, pump (not operated) |
| 6 | Clixby | Lusaka | Kafue | 40 | Sprinkler | 1 pumps (not operated) |
| 7 | Lusitu | Southern | Siavonga | 28 | Furrow | 2 pumps (operated) |
| 8 | Kapululira | Southern | Siavonga | 70 | Furrow | 2 pumps (operated) |
| 9 | Mubyumu | Southern | Siavonga | 10 | Furrow | Movable engine pump |
| 10 | Siatwinda | Southern | Sinazongwe | 30 | Furrow | 1 pumps (operated) |
| 11 | Chiyabi | Southern | Sinazongwe | 0 | Furrow | no facility |
| 12 | Buleya Malima | Southern | Sinazongwe | 60 | Furrow | 2 pumps (operated) |

See Annex C for more detailed information of the irrigation schemes

2) Irrigation potential area

To determine the irrigation potential area in the targeted area, the Study Team held kick-off workshops in four provinces together with SAOs and irrigation officers of 23 districts at the beginning of the field study of the second year. Through these workshops, more than a hundred irrigation potential areas were listed by DACO staff. Based on this information, the

Study Team selected about 12 sites which were scored comparatively higher points by DACO staff. Then the Study Team conducted field investigations in each district with irrigation officers. The result of the investigation is shown in Table 4.6.3. Because of the fact that the pump irrigation schemes have not been well operated due to poor maintenance skill of the beneficiaries, selection was made focusing on gravity irrigation scheme.

Table 4.6.3 Potential Irrigation Schemes

| | Potential schemes | Province | District | Irrigable area (ha) | Water source | Remarks |
|---|---|---|---|---|---|---|
| 1 | Kakoso | Copperbelt | Chililaombwe | 20 | Spring | Spring water is used. |
| 2 | Bwafwano | Copperbelt | Kalulushi | 10 | Stream | Discharge from mining dam is used. |
| 3 | Kasamba | Central | Kapiri Mposhi | 100 | Dam, stream | Intake is not installed on dam |
| 4 | Juda | Central | Kapiri Mposhi | 13 | Dam, stream | Intake is not installed on dam |
| 5 | Natuseko | Central | Kabwe | 15 | Stream, dambo | Treadle pump is used. |
| 6 | Waya Camp | Central | Kabwe | 20 | Stream, dambo | Treadle pump is used. |
| 7 | Lifwambula | Central | Chibombo | - | Dam, stream | Intake is not installed on dam |
| 8 | Munga | Central | Chibombo | 10 | Dam, stream | Intake is not installed on dam |
| 9 | Chikupi | Lusaka | Kafue | - | Dambo | Treadle pump is used. |
| 10 | Nakempa | Southern | Choma | - | Dam, stream | Intake is not installed on dam |
| 11 | Siakasipa | Southern | Kazungula | - | Dam | Intake is not installed on dam |
| 12 | Mandia | Southern | Kazungula | - | Stream | Planning is on-going |

Note: Irrigable area is roughly estimated by the MACO

3) Findings of the field study

Through the result of investigation, the irrigation potential areas and small-scale irrigation schemes have following characteristics.

a) Small-scale irrigation schemes with motorized pumping systems funded by donors are inclined to be out of operation due to lack of maintenance skills or high payment of electricity. (Ipafu, Chibote, Mukonchi, Tubalange, Clixby, Chiyabi)

b) Many dams were constructed to store water for irrigation since 1970s, but some of them have no intake works and irrigation canals. Hence, beneficial areas are limited in surrounding areas to the water body. Besides, beneficiaries must use bucket, treadle pump or movable diesel pump for irrigation. (Siafwa Kweda, Kasamba, Juda, Mung, Lifambora, Nakempa, Siakasipa)

c) There are some dams which have siphon pipes creeping across over embankments as intake works. These facilities were recently installed by MACO together with irrigation canal system for improving the utilization of dams (2000's). As a result, beneficiaries have been able to irrigate by gravity and practice rotation irrigation for efficient water use. Above mentioned dams in b) could be improved with this method. (Katuba, Kanundwa, Ndondi, Nabuyani, Mulabalaba)

d) There are some dams with intake works with intake gate/valve. Generally, in such irrigation schemes, WUA has been managing and maintaining the systems, and rotation irrigation has been practiced as well. (Chipapa, Mulila Kazembe, Nkandabwe, Shantumbu)

e) In some areas, farmers are individually utilizing water from dambos, streams or shallow wells with bucket, treadle pump or movable diesel pump. (Kakosa, Ipafu, Bwafwano, Waya, Natuseko)

f) It is remarkable that properly maintained and operated small scale irrigation schemes have been developed not only with assurance of sufficient water source but with governmental reliability in terms of long-term land tenancy and water utilization. It is thus recommended to proceed with this kind of small scale irrigation development under the government support.

# Chapter 5 Irrigated Agriculture Development for Smallholders in the Peri-Urban

## 5.1 Outline of the Master Plan

The development plan (Master Plan) consists of the following flow (Fig.5.1.1 and Fig.5.1.2). In order to exploit the color of each area, a pilot project was applied by integrating individual countermeasures derived from the site specific features of sub sectors. The plan further suggests in implementing a model extension to similar zones with the lessons learnt from the pilot-projects.

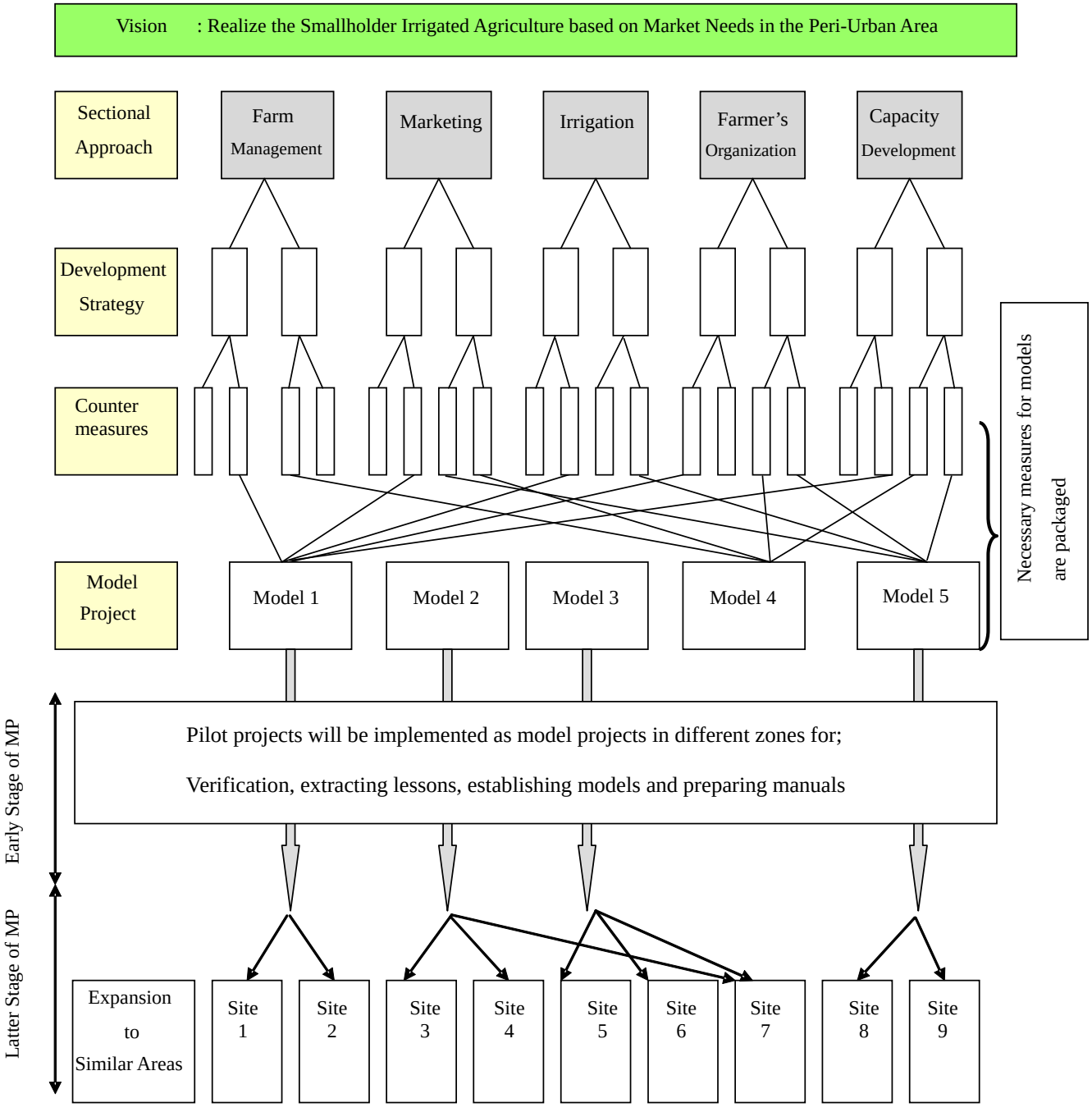



Fig.5.1.1 Image of Vision, Approach, Strategy, Countermeasures, Model Projects and Expansion

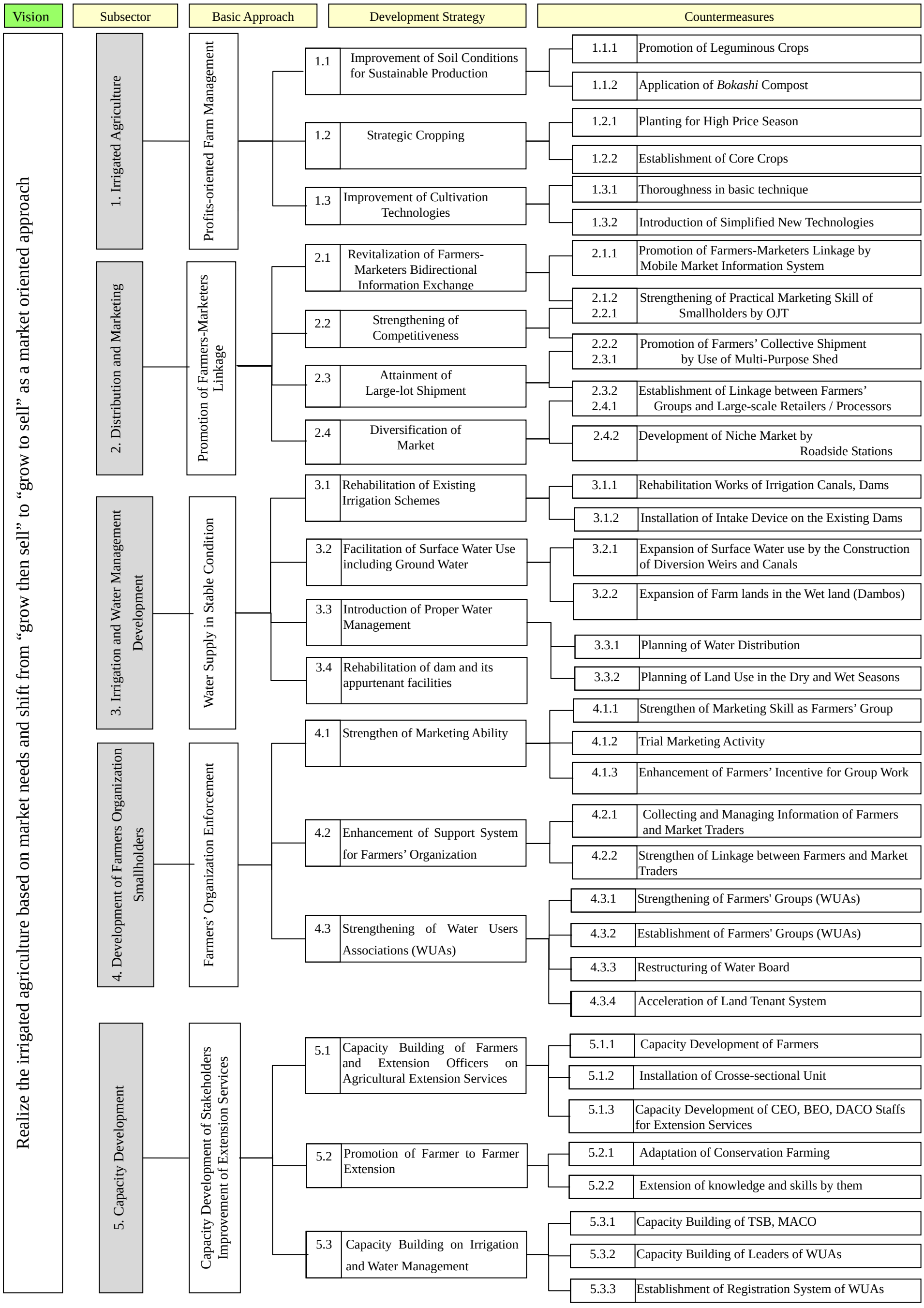



Fig. 5.1.2 Development Framework of Master Plan

## 5.2 Basic Concept of Master Plan

### 5.2.1 Vision of Irrigated Agriculture for Smallholders in the Peri-urban Area

The vision of the M/P is, for smallholders in the peri-urban area to improve the agricultural productivity, by exploiting the advantageous environmental condition of a good accessibility to markets and thus by developing sustainable and commercial small scale irrigated agriculture. In order to do so, the smallholders are required to promote irrigated agriculture based on market information, and to switch from the current approach of “grow then sell” to the market oriented approach of “grow to sell”.

### 5.2.2 Objectives and Targets of the Master Plan

(1) Objectives

The M/P presents a model for the smallholders (mainly with cultivated area of <5ha) living in the peri-urban area to attain and develop a sustainable irrigated agriculture. The aim is to improve agricultural productivity and also to reduce poverty among the smallholders by promoting commercial irrigated agriculture.

(2) Targets area

The M/P targets the existing small scale irrigation schemes found in the peri-urban area near the Zambian railway line comprised of 23 districts with 130 thousand km2; the areas with high potentials in marketing and irrigation are better preferred. The target markets include the central markets such as Lusaka, Kitwe and Ndola, the local markets, the markets for cross-border trades (Copperbelt and Southern Provinces), and the markets in Northwestern Province. As for irrigation potential, all of the 24 sites (13 existing schemes and 11 new schemes) were selected. It is further described in Chapter 5.5 “Selection of irrigation area”.

(3) Plan period

This master plan consists of the showing of direction of development of "Master Plan 2012-2020", and early implementation programs of "Action Plan 2012-2015"

### 5.2.3 Relationship between Master Plan and Action Plan

The entire M/P lasts nine years, from 2012 to 2020. An initial stage of the M/P is four years (2012-2015), which is the Action Plan (A/P) phase for conducting pilot projects. The pilot project with its established elements aims to be practically developed into better promotion of the M/P, through a technical package composed of experiences and lessons learnt from the A/P. The last year of the A/P is set at 2015. At this point, final evaluation of the pilot project will be performed and the consistency of the future M/P and the agricultural policies of the Sixth National Development Plan (SNDP) which lasts five years starting in 2016 will be re-examined.

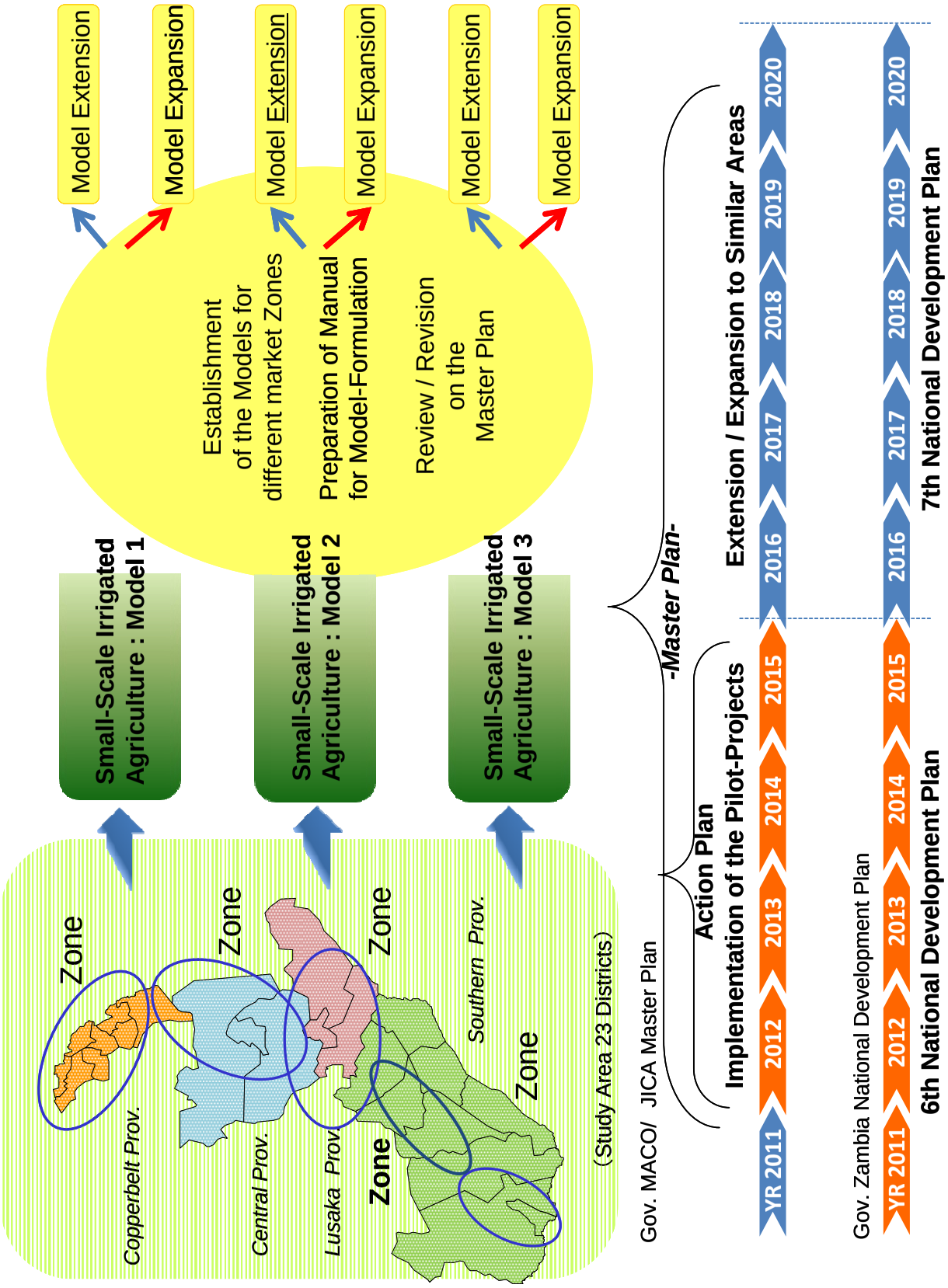



Fig. 5.1.3 Implementation Plan of M/P

## 5.3 Development Strategy for Irrigated Agriculture

### 5.3.1 Cross Sectional Strategy

(1) Phased development process

As mentioned in the previous chapter, the smallholders in this study area have the potential for development, but also face many constraints. Farming in existing small-scale irrigation schemes is not necessarily managed efficiently, and for them to be used to their full development potential, they must switch from their current model of externally dependent operation of irrigation zones to sustainable irrigated agriculture on a business footing. There are issues to be dealt with, such as lack of experience in joint(or cooperative) maintenance and management of irrigation facilities, the acquisition and improvement of basic business skills for the operation and management of farmer's organizations, and reform of perceptions, and it will also be necessary to build a system to provide support in these areas. To that end the M/P will be drawn up as indicated in Irrigation Policy and Strategy (2004), containing the following elements in a process of phased implementation:

1) Building the necessary environment in the initial phase for improving market access, including empowerment of agricultural organizations, preparation of beneficiary participatory plans and the preparation, dissemination and reception of information, and the establishment of an outreach unit.

2) Based on the status of these improvements, implement measures to improve existing and informal irrigation zones.

3) Monitor and evaluate activities in existing zones and then draw on the lessons learnt to prepare and implement a plan including measures for extension to similar zones and expansion of scale etc. and prepare and implement a project plan for new zones, based on the experience gained.

1) Initial phase (4 years): 2012-2015

During the initial phase of the M/P (the A/P), a pilot project will be implemented in a model site. The pilot project aims to enforce maintenance and rehabilitation of the small-scale irrigation scheme, while developing an activity in alignment with "Theme and Verification item" which is shown in the following table. However, depending on the progress of the farmer/farmer's organization, a new theme may be realized during the pilot periods.

| | Theme and Verification item | Main activity |
|---|---|---|
| Contents | (1) Strengthening of the farmer/farmer's organization with an aim to conduct market capacity building.<br>(2) Strengthening of marketing capacity of the farmers' cooperative.<br>(3) Preparation of a farm management plan based on business.<br>(4) Establishment of Small-scale irrigation farming support system (within DACO).<br>(5) Rehabilitation of the existing irrigation schemes.<br>(6) Preparation of extension tool. | ・ Capacity building<br>・ Establishment of a support unit (within DACO)<br>・ Preparation of a participatory plan<br>・ Small-scale investment and implementation<br>・ Monitoring and evaluation of pilot projects<br>・ Compilation of pilot project results into a technical package |

2) Intermediate phase (3 years) : promotion and extension phase into similar zones.

The intermediate phase of the M/P aims to disseminate the project into the other areas, by using the

results and the extension tools obtained from the pilot projects. A new challenge or a business chance may arise from the results of the pilot projects, by strengthening the farmer/farmer's organization. The current phase is an extension period into similar zones however, the themes shown in the following table are also considered; such as "Promotion of the networking of irrigation schemes by strengthening marketing" and "Advancement into the related business".

| | Theme and verification item | Main activity |
|---|---|---|
| Contents | (1) Use of experiences and lessons learnt from the pilot projects.<br>(2) Promotion of the networking of irrigation schemes in the same district for strengthening marketing.<br>(3) Advancement into the related business (sale of early maturing compost (Bokashi), input credit loan, management of coop-shop etc).<br>(4) Study for a new irrigation scheme. | ・ Extension into the other zones and size expansion, using the technical package (investment and implementation)<br>・ Planning of new zones and acquisition of funding<br>・ Monitoring and evaluation. |

3) Final phase (2 years): self sustaining phase

The final phase of the M/P is self sustaining phase for the existing irrigation scheme to develop the irrigated agriculture as a business, while the support activities will be limited to monitoring and evaluation. On the other hand, small scale irrigation development in new irrigation schemes will be implemented based on the results and the experiences gained in the initial and intermediate phases.

- Enforcement in a new area.
- Monitoring and evaluation

(2) Selection and concentration (intensification)

As mentioned above, pilot projects will be applied as the A/P during the first four years of the M/P. The pilot projects first comprehend management situation of the existing irrigation schemes and farmers organization. Target sites and development methods will be selected regarding its sustainability, investments will be concentrated for the priority zones/fields, and finally formulation of an exemplary model will be emphasized. In addition, a method with low maintenance and management costs on irrigation facilities is prioritized, in order to enable sustainable irrigated agriculture.

Pilot projects will be implemented in high-potential zones, with the emphasis on small-scale investments and demonstration effects. Based on the lessons learnt from the pilot projects, development methods of the second half of the M/P will be reviewed

(3) Emphasis on empowering farmers

Farming by smallholders combines production for self-support and for sale. However, in order for them to develop commercial irrigated agriculture, it is essential to view farming as a business. Accordingly, it is important to 1) have market oriented farming as it base, and 2) to implement a program concerning farmer's needs.

The followings are considered vital when enforcing a transition in farmers' behavior; shift from "*grow then sell*" to "*grow to sell*" approach.

1) To raise farmers' market awareness and alter their perception to see farming as a business, by

introducing stakeholder meetings and participatory market surveys.

2) To raise the basic business skills, such as by training on cropping calendar preparation as a part of the business planning.
3) To make an effective use of workforce within the household, by introducing gender awareness training.
4) To encourage farmers to acknowledge the problems on crop production, which varies depending on the markets needs (quality/quantity). Also to provide trainings to solve the problems based on the needs.
5) To encourage organizational activities (group work) for the problems that cannot be solved by individual farmers (business units).

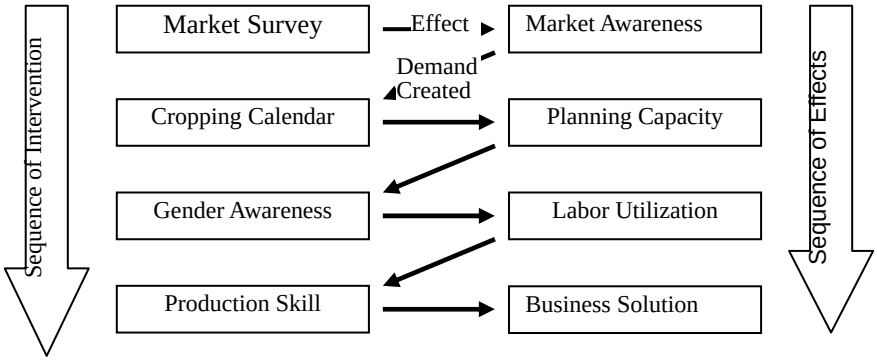



Fig. 5.3.1 Market Oriented Approach

### 5.3.2 Sectional Strategy

(1) Farm management/cropping

The basic approach of the farm management/cropping determines “Realization of Profits Oriented Farm Management”. This approach indicates the fundamental direction to develop irrigated agriculture based on market needs. In order to realize the approach, the following three major sectional strategies are implemented.

| |
|---|
| Strategy 1.1 : Improvement of Soil Conditions for Sustainable Production |
| Strategy 1.2 : Implementation Strategic Cropping |
| Strategy 1.3 : Improvement of Cultivation Technologies |

For smallholders and the farmers’ organization to sustainably maintain the commercial irrigated agriculture, it is essential to operate farm management as a business and also to conserve the soil fertility in the irrigated farmland. From the viewpoint of stable farm management, it is important to formulate a simple business plan which includes a cropping plan (when to sell the crops and to whom), and its expected earning and expenses. Further, it is very vital to eventually establish farm management based on this business plan.

When formulating a business plan, lowering of costs need to be well considered. For instance, periods (planting season) and areas of possible irrigation, charge on water use, collective purchase of

materials and collective sale of products may influence the outcomes. Therefore a comprehensive measure which includes organized activities such as an irrigation strategy, water management and selling strategy are required.

In order to fully maintain the merits gained from small scaled but with the constant area for irrigated agriculture, establishment of "stable production area" is necessary. Hence, for the local farmers to obtain the basic cultivation techniques is one of the most essential elements of a success.

(2) Distribution and marketing

Based on the result of the analysis in Chapter 3 (3.4.12), Sectional Development Strategies for distribution and marketing have been set. The Basic Approach to improve distribution and marketing is determined as "Promotion of Farmers-Marketers Linkage" ("Linkage" here refers to the establishment of continuous transaction in any form of agreement between farmers and marketers). For attaining the Basic Approach, the following four (4) Sectional Development Strategies are set for the distribution and marketing in the M/P.

| |
|---|
| Strategy 2.1: Revitalization of Farmers-Marketers Bi-directional Information Exchange |
| Strategy 2.2: Strengthening of Competitiveness |
| Strategy 2.3: Attainment of Large-lot Shipment |
| Strategy 2.4: Diversification of Market Channels |

"Promotion of Farmers-Marketers Linkage" is a common and basic direction for the improvement of marketing problems in the study area, which is consistent with the Study concept to improve smallholders' livelihood through value addition for whole value chains. Also, as clarified in the previous field survey (cf. Section 3.4.10), farmers and marketers have a keen interest in market linkage with each other, but a chance of mutual exchange of information is very limited.

(3) Irrigation and water management

The Basic Approach for improvement of Irrigation and Water Management is determined as "Water supply in stable condition". The following are major sectional strategies for irrigation and water management in the Master plan.

| |
|---|
| Strategy 3-1：Rehabilitation of existing irrigation schemes |
| Strategy 3-2：Facilitation of surface water including groundwater |
| Strategy 3-3：Introduction of proper water management |

In recent years, irrigation projects have been implemented through Public-Private Sector Partnership (PPP) combined with a large scale and traditional irrigation that runs as a business model to tackle the constraints faced in the irrigation sector with financial assistances of WB and AfDB. It is however not practicable for these business models to prevail on the entire small scale farming in the country because the model forming a farm block can be applied to at least ten projects nationwide.

Promotion of small scale farming that commands an absolute majority of farm households is the most important task to improve agro-economic infrastructure in whole region.

Surface flow, bore holes and dambos are utilized as water sources for irrigation of small scale farmers. It is preferably promoted to implement gravity irrigation system composed of intake weirs and storage dams often located in the Southern Province instead of electric pump systems that are very far from the economical production. A bucket, treadle pump and movable engine pump have been successfully used among smallholder farmers, especially in the dry region in the dry season. It is observed that the irrigation systems are less developed in the four Provinces given that few intake weirs have been constructed and most of the storage dams constructed in the 1990s to the beginning of 2000s have no intake devices.

With respect to this situation, effective use of surface water through rehabilitation of these existing irrigation schemes are encouraged to substantially support smallholders, and the rehabilitation work can be a model for similar schemes surrounding the areas because of their easiness of maintenance for the purpose of sustainable use. Farmers cultivate vegetables and beans along and in the rivers/ wet lands / dambos to raise farm income and to secure purchase of agricultural input in the coming wet season cropping after cultivation of stable crops such as maize in the upland during the wet season. To secure the cultivation cycle above, plans for improving surface water use efficiency and groundwater in and around dambo areas shall be established so as to improve farm income and consequently reduce poverty conditions by the dissemination of small scale farming practice.

(4) Farmers' organization

The Basic Approach for Farmers' Organization is determined as "Farmers' Organization Enforcement". The followings are major sectional strategies for farmers' organizations in the Master plan.

| | | | |
|---|---|---|---|
| 1) | Strategy 4-1 | : | Strengthening of marketing ability |
| 2) | Strategy 4-2 | : | Enhancement of support system for farmers' organizations |
| 3) | Strategy 4-3 | : | Strengthening of water users associations (WUAs) |

This Study aims to enforce organization of small-scale farmers as a business entity through promoting irrigated agriculture. To enforce farmers' organization, it is important that each member share same incentive toward joint work, rather than individual incentive. To achieve this, the farmers have to understand the benefit of group work is greater than that of individual pursuit. Figure 5.3 shows basic concept of enforcing farmers' organization which considers sharing farmer's incentive for group activities. The concept includes 3 elements representing the types of approach of capacity building, namely 1) Input, 2) Output, and 2) Stimulus approach.

1) Input approach

This is an approach to input targeted farmers necessary knowledge in order to implement commercial farming as a farmers' group. Typical activities are seminar, training, and workshop in which farmers learn about production skill, market survey, book keeping, group work, and so on.

2) Output approach

This is an approach to output what farmers learnt from the training in the input approach through doing by learning. Farmers are expected to formulate their plan from production to marketing and implement it as pilot activities. If farmers find difficulties to conduct pilot activities, one goes back to input approach as on-demand solution trainings.

3) Stimulus approach

This is an approach which aims that farmers have incentive for group activities. In this approach, farmers visit other farmers group seen as a model conducting a good practice of group activities. This will be stimulus for famers to confirm incentive of group activities. Farmers can actually see what the benefit of group activities is with their own eyes. This approach is expected to affect positively further activities in input and output approaches.

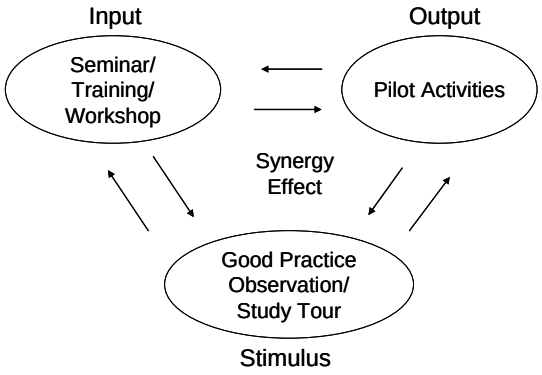



Fig. 5.3.2 Concept of Enforcement of Farmers' Organization

The underlying purpose of this concept is to make farmers learn, see, and have incentive for group work. It can be said that one of the biggest constraints of farmers' organization is that farmers are prone to pursue individual benefit neglecting group benefit. This concept of group incentive will be carefully considered as a critical aspect in formulating the Master Plan and Action Plan.

In addition to above 1) to 3), farmers' organization would be strengthened by the strategy below in regard of water use for irrigation.

It is important that the smallholders themselves recognize the importance of having knowledge and experiences on irrigation practice to realize sustainable irrigated agriculture. It is furthermore necessary for the farmers to recognize the importance of payment of an irrigation fee for proper operation and maintenance of the facilities as well as water management.

Since few WUA have been established in the existing schemes, irrigation efficiency is low and necessary maintenance work is insufficiently conducted. In addition, the life of the facilities has been also shortened because their replacement was not periodically made. The following are skills in terms of irrigation and water management to transfer to the farmers during the strengthening of the WUAs:

- Irrigation :
  - Technical transfer of participatory irrigation management
  - Irrigation method to reduce labor force such as treadle pump, movable engine pump in joint use
  - Irrigation method to improve irrigation efficiency such as on-farm management for furrow irrigation, introduction of multi cultivation, etc.
- Water management :
  - Method of rotational irrigation
  - Water supply in conformity to proposed cropping pattern
  - Plan of rotation block

(5) Capacity development

The followings are major sectional strategies for capacity development in the Master Plan.

| | | | |
|---|---|---|---|
| 1) | Strategy 5-1 | : | Capacity building of farmers and extension officers on agricultural extension services |
| 2) | Strategy 5-2 | : | Promotion of farmer to farmer extension |
| 3) | Strategy 5-3 | : | Capacity building on irrigation and water management |

As discussed in Section 4.4.3, the problems of extension services are the scarcity of the number of field extension officers and the lack of operational resources. To reverse the situation, the farmer to farmer extension approach will be the key (See 4.5. Development Potential). Additionally because the '*unquestioned professionalism*[*] is essential, it is also crucial for the governmental institutions to reinforce its capacity to provide extension services for the promotion of irrigated agriculture. Therefore, training and upgrading of the key personnel and staffs is vital.

The irrigation sector needs a robust institution at the central level. That institution should have advising and operational links with other water and agriculture concerned stakeholder institutions and departments and should correspond with technical committees and management entities which deal with the share of freshwater resources in Zambia. On the other hand, the mobilization of farmers into robust Water Users groups would increase their bargaining power and operation of scheme. Accordingly, this would lay on the foundation of the irrigation by farmers' management, promote training in on-farm training of water management, rationalize the collection of irrigation water tariff collection, and create buyer / producer relationships between irrigation service providers and the users.

However, there should be an associated technical unit at each district level to promote irrigated agriculture which supports CEOs in the field. This should be consisted of district departments of irrigation, market, farmers' organization, and crops, a sort of 'cross-sectional support unit', although it will be quite challenging due to sectionalism.

To conclude, the creation of such a cross-sectional support unit will be the key to support farmers with associated efforts from the governmental side, while support and promotion of farmer to farmer extension would be encouraged at grass roots level in order to complement insufficiency of extension services.

In addition, capacity development for farmers' organization would be designed upon the strategy below in regard to water use for irrigation.

It is proposed to assign irrigation engineers and technicians to each irrigation scheme to instruct operation and maintenance skills to the farmers. Through the technical instruction including irrigation fee collection, monitoring and evaluation of irrigation activities, sustainable irrigated agriculture is to be achieved by proper operation and maintenance work of the farmers. In line with its National Irrigation Plan, MACO has employed irrigation engineers/ technicians in early 2000; however expected results are still unreached due to the lack of knowledge and experiences in the

[*] MACO (2004), 'Irrigation Policy and Strategy – A strategy for the development of Zambia's irrigation sector -,' MACO.

project sites. It is therefore necessary to establish training program for especially irrigation engineers and technicians so as to strengthen operation and maintenance organizations of irrigation schemes, in addition for the training of farmers' groups in terms of irrigation methods, irrigation fee collection and maintenance skills.

Legislation and guideline on environmental conservation, water right and land matters should be drawn up prior to the planning of potential (new) irrigation schemes. For this purpose, capacity building of the Government officials is essential to obtain knowledge and experiences on irrigation technology, planning ability and legislation. Government control system including ownership of major facilities should be built, especially for major irrigation facilities such as dams and irrigation canals so as not to impose all operation and maintenance responsibility to farmers, which was one of the constraints of maintenance failure of the irrigation systems.

## 5.4 Basic Plan

### 5.4.1 Basic Plan

(1) Farm management /cropping development

The Basic Approach of the Farm Management/Cropping Development is determined as "Realization of Profits Oriented Farm Management". In order to realize this approach, the three major sectional strategies are implemented; "improvement of soil conditions for sustainable production", "implementation of strategic cropping based on the project plan" and "improvement of cultivation technologies".

In order to attain a sustainable production, an appropriate cropping pattern and well managed fertilization are essential. However in the targeted area, there is a large technical variation among small scale farmers in the targeted area. Hence it is important to first emphasize the strengthening of the basic measures; for instance to introduce leguminous and gramineous crops into the cropping pattern and also to introduce an early maturing compost (Bokashi). Possible crops to be introduced with high demands from the urban residents are green beans and green maize etc. As for the management of fertilizer by farmers, chemical fertilizer and cattle manure have been utilized. The problem concerning cattle manure production by farmers is that, since it is usually left outside for a long time, chemicals such as nitrogen and phosphates tend to leak out into the soil during the wet season. Therefore, it is highly recommended to introduce "early maturing compost", which can produce good fertilizers in a short period with secured effect. (Please refer to Annex A Farm Management).

"Implementation of Strategic Cropping" is also considered important. Many smallholders are facing a serious situation on marketing. This is because with limited choices on customers, the market is saturated and thus the cost on agricultural products is lowered. The strategic cropping should be implemented based on the collected information and the analysis of market conditions. Therefore, when the farmer / farmers' organizations intend to develop "capacity building", they first have to plan a cropping pattern by themselves.

"Improvement of cultivation technology" is also an important factor. The M/P highly focuses on strengthening the competitiveness and the marketing capacity by establishing a production area within the irrigation scheme. Thus in order to ensure the quality of products it is also crucial to basic cultivation technologies. As for the next step, a new and simple technology would be introduced with an aim to differentiate.

| Development Strategy 1.1: Improvement of Soil Conditions for Sustainable Production | |
|---|---|
| Objective | For sustainable irrigated agriculture, cropping system which contributes to maintain soil fertility and avoids continuous cropping will be introduced. |
| Countermeasures | 1-1-1 Improvement of cropping pattern (introduction of leguminous crops)<br>1-1-2 Introduction of early maturing compost (*Bokashi*) |
| Outputs expected | (1) Improvement of soil conditions<br>(2) Sustenance of soil fertility<br>(3) Control of diseases and insects<br>(4) Reduction of input cost |
| Remarks | ・ These countermeasures should be verified through pilot project for confirming these effects and then disseminate to other areas.<br>・ Materials of compost should be selected among local easy availabilities.<br>・ Compost selling should be considered for motivation of farmers. |

| Development Strategy 1.2: Strategic Cropping | |
|---|---|
| Objective | Planned production will be introduced contact farming and productions for high price season. |
| Countermeasures | 1-2-1 Promotion of planned production and shipment (shipment during pre-harvest season)<br>1-2-2 Establishment of local brand crops |
| Outputs expected | (1) Improvement of profitability<br>(2) Securement of stable market channel<br>(3) Establishment of brand name |
| Remarks | ・ In order to sell based on market needs, introduce a market research, planning, production and sales in a series of farming system.<br>・ Original production and shipping plan should be made through the participatory market research, business skill training etc. |

| Development Strategy 1.3: Improvement of Cultivation Technologies | |
|---|---|
| Objective | Improvement of yield and stabilizing of farm management will be strengthened through the simplified technologies. |
| Countermeasures | 1-3-1 Introduction of new simplified technologies (appropriate nursery management, extension of harvesting period, sheltering cultivation from rain) |
| Outputs expected | (1) Increase of yield<br>(2) Improvement of profitability |
| Remarks | ・ These countermeasures should be verified through pilot project for confirming these effects and then disseminate to other areas.<br>・ It is important to collaborate with local advanced farmers.<br>・ Seedling bushiness should be considered. |

(2) Distribution and marketing development

The Basic Approach of Distribution and Marketing Development is determined as “Promotion of Farmers-Marketers Linkage”. For attaining the basic approach, four (4) Sectional Development Strategies are set, i.e. 1) Revitalization of Farmers-Marketers Bi-directional Information Exchange; 2) Strengthening of Competitiveness; 3) Attainment of Large-lot Shipment; and 4) Diversification of Market Channels. Summarized below is the outline of countermeasures to be implemented in line

with the sectional development strategies.

It should be noted that countermeasures for each sector (farm management/ marketing/ irrigation/ farmers' organization) need to be implemented integrally for multiplier effect, since all these are closely related to each other.

The strategy "Revitalization of Farmers-Marketers Bi-directional Information Exchange" aims to promote the linkage between farmers and marketers, through the mechanism that smallholders are aware of market needs and marketers have more exact production related information. Currently, although farmers and marketers have a keen interest in market linkage with each other, a chance of mutual exchange of production/ market information is very limited. A majority of farmers are, therefore, unable to conduct marketing activities in compliance with market requirement, and consequently their improvement of livelihood is not attained. Marketers also cannot make a proper sale plan because of the lack of information of production potential. The countermeasure "Mobile Information Center" (Center) is an initiative taken by each district office with the support of experts, where the Market Information Center is made mobile to visit a number of farmers (groups) and marketers as frequently as possible, using a vehicle as a travelling center, covering the whole model district. The Center's main functions are collection and provision of production/ market related information at every visited site; mediation/ promotion of linkage; and monitoring, for the benefit of farmers and marketers. The Center initially covers each model district only, and eventually aims to cover wide areas of inter-district and inter-province. It is advisable to implement this countermeasure in close connection with "Matching Meeting" proposed in the M/P, for synergistic effect.

The objective of the strategy "Strengthening of Competitiveness" is the improvement of smallholders' key constraint, i.e. "Lack of experiences, knowledge and business-mind". Through OJT, target farmers group's practical marketing skill is expected to be strengthened up to a self-sustainable level, together with the transfer of skill to district officers. The main marketing activity in the OJT is a process cycle to (a) forecast future market trend; (b) make a plan of production/ selling; (c) implement production/ selling; (d) follow-up a result of selling (verification/ analysis); (e) feed it back to planning of each process for next production/ selling. Through the implementation of the OJT program, the expert (s) joins the marketing activities of the target farmers' groups to fully support them, and also transfer marketing skill to district officers. After the program (A/P) finished, district officers are expected to support target farmers 'group, playing the same role as the expert (s), and to also transfer the skill to other district officers for dissemination. It is recommendable to implement this countermeasure integrally with the training program "Strengthening of marketing skill as farmers' group" in the M/P.

The strategy "Attainment of Large-lot Shipment" aims at the dissemination of the "Multi Purpose Shed" (MPS), as the countermeasure, that is a simple structure for facilitating collective shipment by farmers' groups. Distribution by small lots originated in individual shipment weakens smallholders' bargaining power and also lowers distribution efficiency. Although advantages of collective shipment by groups (cost reduction/ quality improvement/ strengthening of competitiveness, etc.) are widely recognized, farmers' groups conducting collective shipment are very limited actually. One of the main reasons for that has been found to be a lack of necessary facilities. It is therefore proposed to establish and disseminate MPS designed as simple dissemination model, for use of temporary storage, sorting

& packaging, preparation for shipment, various meetings/ training, etc., thus attaining the strengthening of smallholders' competitiveness and more smooth distribution of farm produce.

The strategy "Diversification of Market Channels" is indispensible for smallholders. The objective of the strategy is to develop new market channels other than current "sale to nearby marketplaces", and eventually attain smallholders' continuous market expansion. In major urban areas, large scale distributors and processors of vegetables and fruit have a difficulty in the consistent procurement of fresh produce as raw materials, although they desire to have direct connection with smallholders. The establishment of continuous supply system by farmers' groups to meet the requirement (both volume and quality) of such distributors/ processors can be one option for the diversification of market channels. Another option is "Roadside Markets" (RSM, current street vendors). RSM along main roads keep a firm popularity with the sales point of fresh, cheap and local specialty. Travelling motorists, however, have often difficulty in finding what they need. Currently, farmers have a constraint in securing stable market channels, and retailers require consistent procurement source, while consumers desire to have more options of where to purchase. If any improvement is made properly for the modernization of RSM, the market will probably continue to expand with the background of rapid progress of motorization and possible change of consumption trend. Since the model sites of A/P are all located adjacent to the main roads, it is proposed to conduct a feasibility survey for RSM during the implementation of A/P (see Annex B / B 3 for details of the RSM).

| Development Strategy 2.1: Revitalization of Farmers-Marketers Bi-directional Information Exchange | |
|---|---|
| Objectives | Revitalize farmers-marketers bi-directional information exchange, and eventually promote a market linkage between farmers and marketers |
| Countermeasures | 2-1-1Promotion of Farmers-Marketers Linkage by Mobile Market Information Center<br>2-1-2 Strengthening of Practical Marketing Skill of Smallholders by OJT |
| Outputs expected | 2-1-1 Promotion of Farmers-Marketers Linkage by Mobile Market Information Center<br>(1) Number of farmers' groups making a linkage with marketers is increased<br>(2) Marketing channels are secured and increased<br>(3) Market-oriented production is attained<br>(4) Efficiency of whole value chain is improved<br>(5) Distribution cost is lowered and quality is improved<br>(6) As a result of above outputs, farmers' income increases<br>(7) District officers' extension ability is enhanced<br><br>2-1-2 Strengthening of Practical Marketing Skill of Smallholders by OJT<br>(1) Learn fundamental business cycle (forecast/plan/do/verify/feedback) by experiences, and attain an activity pattern of "grow to sell"<br>(2) Marketing competitiveness and bargaining power is strengthened<br>(3) Marketing channels are secured and increased<br>(4) Market-oriented production is attained<br>(5) As a result of above outputs, farmers' income increases<br>(6) District officers' extension ability is enhanced |

| Development Strategy 2-2: Strengthening of Competitiveness | |
|---|---|
| Objectives | Strengthen smallholders' marketing competitiveness practically and systematically, and eventually establish market-oriented activities |
| Countermeasures | 2-2-1 Strengthening of Practical Marketing Skill of Smallholders by OJT<br>2-2-2 Promotion of Farmers' Collective Shipment by use of Multi-Purpose Shed (MPS) |

| | |
|---|---|
| Outputs expected | 2-2-1 Strengthening of Practical Marketing Skill of Smallholders by OJT<br>(Same as 2-1-2)<br><br>2-2-2 Promotion of Farmers' Collective Shipment by use of Multi-Purpose Shed<br>(1) Farmers' collective shipment is promoted<br>(2) Farmers' labor and cost for postharvest handling and shipment is reduced<br>(3) Value addition for whole value chain is attained, as a result of reduction of distribution cost and stable procurement on the part of marketers by large-lots distribution<br>(4) Farmers' products are upgraded in uniformity and quality, with improvement of production technology<br>(5) Markets' (consumers') confidence in the products is strengthened<br>(6) Marketing competitiveness and bargaining power is strengthened<br>(7) Marketing channels are secured and increased<br>(8) Farmers' activities as a group are implemented more smoothly and effectively<br>(9) As a result of above outputs, farmers' income increases |
| Remarks | Multi-Purpose Shed (MPS)<br>(1) Preparatory work:<br>Site determination; Land acquisition; Designing of MPS; Contractor selection<br>(2) Purpose<br>-Temporary storage of farm produce<br>-Preparation for shipment (loading, unloading, collection, etc.)<br>-Sorting and packaging<br>-Quality assessment and weight check<br>-Meeting and training for various purpose<br>-Announcement of market information, etc. for member farmers<br>-Negotiation with marketers<br>(3) Structure of MPS<br>Simple structure designed as dissemination model, with locally available materials and equipment, comprising:<br>Closed structure for temporary storage of farm produce; and<br>Open structure (No walling, with working tables, chairs, scale, etc.) for sorting, packaging, shipment preparation, various meetings, and other possible purposes;<br>(4) Size of MPS<br>To be determined by area/ site depending on crops (number/ volume), number of member farmers, etc.<br>(5) Location<br>To be placed within the premises of farmers' group for use of one (1) or plural number of cooperatives |

| Development Strategy 2-3: Attainment of Large-lot Shipment | |
|---|---|
| Objectives | Improve low distribution efficiency caused by small-lot shipment, and eventually enhance value of whole value chains and increase farmers' income |
| Countermeasures | 2-3-1 Promotion of Farmers' Collective Shipment by use of Multi-Purpose Shed<br>2-3-2 Establishment of Linkage between Farmers' Groups and Large-scale Retailers / Processors |
| Outputs expected | 2-3-1 Promotion of Farmers' Collective Shipment by use of Multi-Purpose Shed<br>(Same as 2-2-2)<br>2-3-2 Establishment of Linkage between Farmers' Groups and Large-scale Retailers / Processors<br>(1) Large-lot shipment system is established.<br>(2) Marketing channels are secured and increased, through the linkage with marketers/ processors (contract based sales).<br>(3) Products are upgraded, with improvement of quality and production technology.<br>(4) Market-oriented production is attained<br>(5) Value of whole value chain is enhanced, with more smooth supply and procurement.<br>(6) As a result of above outputs, farmers' income increases |

| Development Strategy 2-4: Diversification of Market Channels | |
|---|---|
| Objectives | Develop new market channels other than current "sale to nearby marketplaces", and eventually attain smallholders' continuous market expansion and income increase |
| Countermeasures | 2-4-1 Establishment of Linkage between Farmers' Groups and Large-scale Retailers / Processors<br>2-4-2 Development of Niche Market by Roadside Market (RSM) |
| Outputs expected | 2-4-1 Establishment of Linkage between Farmers' Groups and Large-scale Retailers / Processors (Same as 2-3-2)<br>2-4-2 Development of Niche Market by Roadside Market<br>(1) Marketing channels are developed and diversified<br>(2) Value addition of whole value chain is attained with smooth procurement and supply of the products under linkage of smallholders/ local retailers<br>(3) Local brand is established with increase of sale of local specific products<br>(4) Market-oriented production is attained, by knowing market requirement always in nearby RS<br>(5) Increase of demand is expected by "new shop announcement effect" and quality improvement with indoor sale<br>(6) As a result of above outputs, farmers' income increases |
| Remarks | Roadside Market (RSM) (See Annex B / B 3 Supplemental Explanation)<br>(1) Preparation and preliminary work (To be conducted during implementation of A/P, for feasibility survey)<br>Market survey; determination of the best location; identifying and organizing farmers' groups/ local retailers; business planning; designing of RSM; selection of contractor; etc.<br>(2) Main facilities and functions of RSM:<br>-Sale of local farm produce (mainly irrigated cash crops, such as vegetables and fruit.)<br>-Function as "Antenna shop"<br>-Display stand<br>-Cash desk |

(3) Irrigation and water management development

For irrigation and water management, the following four approaches are formulated to realize stable supply of irrigation water, i.e., 1) Rehabilitation of existing irrigation schemes, 2) Acceleration of surface/ groundwater use, 3) Introduction of proper water management system and 4) Rehabilitation of dam and its appurtenant facilities.

Surface water, groundwater such as shallow well and dambos are utilized for small scale irrigation schemes. In addition, diversion weirs and small scale dams have been recently developed for irrigation in the Southern Province. Groundwater is drawn by man-power using buckets, treadle pumps and movable engine pumps in the areas where surface water dries up in the dry season. Few diversion weirs have been constructed in the four provinces and dam intake devices have been installed in a few small dams. In this regard, rehabilitation and new construction works of the surface irrigation system are promoted to support smallholders. The surface irrigation system is also recommended from a view point of dissemination effect to the surrounding areas because the system requires less advanced skill for farmers on operation and maintenance works. Groundwater has high potential for irrigation, especially in the dambo area where adequate and stable groundwater is obtained through the year in relatively shallow depth.

As noted above, emphasis is put on improvement of irrigation efficiency of the surface water and acceleration of groundwater use in irrigation development strategy in M/P.

| Development strategy 3-1: Rehabilitation work for existing irrigation schemes | |
|---|---|
| Objectives | Irrigation water is constantly and stably supplied by a rehabilitation work of existing system and canal construction. |
| Countermeasures | 3-1-1 Rehabilitation works of irrigation canals, dams<br>3-1-2 Installation of intake device on the existing dams<br>(1) Canal lining of a main canal and reshaping of secondary canal<br>(2) Canal extension to enlarge beneficial area<br>(3) Dredging of siltation in the reservoir<br>(4) Introducing watershed management |
| Outputs expected | Stable and incremental benefit is expected from cultivation by small investment rehabilitation work. |
| Remarks | ・Commencement of rehabilitation works<br>・installation of water control devices such as diversion pit<br>・Reforestation and contour band are installed as an activities of watershed management |

| Development strategy 3-2 : Acceleration of surface/ groundwater use | |
|---|---|
| Objectives | Unused water is effectively used for irrigation to attain stable irrigation water supply. |
| Countermeasures | 3-2-1 Expansion of surface water use by the construction of diversion weirs and canals<br>3-2-2 Expansion of farm lands in the wet land (dambos)<br>(1) Installation of diversion devices to divert storage water in the existing dam.<br>(2) Promoting surface water use together with construction of a diversion facilities<br>(3) Distribution of treadle pump and removable engine pump for common usage |
| Outputs expected | Irrigable farm area is enlarged by the use of available water source. |
| Remarks | ・Installation of diversion device (siphon) on the existing dam<br>・Readjustment of farm land corresponding to available water volume<br>・Acceleration of groundwater in dambos and wet lands for irrigation use. |

| Development strategy 3-3: Introduction of proper water management system | |
|---|---|
| Objectives | Maximizing irrigable area with strengthening of water management system |
| Countermeasures | 3-3-1 Planning of water distribution<br>3-3-2 Planning of land use in the dry and wet seasons<br>(1) Reducing labor force for irrigation by control of irrigation water volume as well as on-farm leveling<br>(2) Introduction of mulching to reduce evaporation from soil, weeding and soil erosion, etc.<br>(3) Introducing pipe conveyance from dag well to farmland |
| Outputs expected | Agricultural productivity is improved using limited water source |
| Remarks | ・Seasonal control of water supply volume<br>・Improving on-farm management such as land leveling, furrow irrigation along contour, etc. |

(4) Farmers' organization

The basic approach for farmers' organizations is determined as "Farmers' Organizations Enforcement". The following three sectional strategies are introduced to realize this approach: "Strengthening marketing ability", "Enforcing support system for farmers' organizations", and "Strengthening water users associations". Based on these strategies, countermeasures will be implemented.

As discussed in Section 3.6.3, one of the direct causes hindering commercial agriculture by farmers' groups in the Irrigation Schemes is that cooperatives do not regard agriculture as business, and their marketing capacity is lacking. Therefore, to develop farmers' organizations regarding commercial agriculture, it is indispensable to reinforce their marketing capacity. For this objective, the three

approaches presented in Section 5.3.2 (4) (See Figure 5.3.2) will be a base, aiming to acquire knowledge through inputs and generate outputs through concrete activities. Furthermore, marketing capacity and farmers' organizations will be reinforced, increasing their incentives for organizational activities through means such as visiting successful cases.

Second, a support system is also important for developing farmers' organizations. As it is clear from the characteristics of the Irrigation Schemes in the peri-urban area (Section 3.6.1) and the results of SWOT analyses of farmers' organizations experiencing success (Section 3.6.3), the area concerned is well covered by media and mobile phone networks, which was one of the components of Opportunity for the organizations. Utilizing these channels, enforcing the supports to farmers will be possible through the effective use of a mutual information system between them and other marketing actors. It is also possible to reinforce collaboration through frequent matching meetings. These activities will allow farmers and other marketing actors to share the right information, which will promote the capacity transfer from these actors to farmers regarding organizational activities and planned sales.

Finally, in addition to enforcing marketing capacities, appropriate maintenance of irrigation facilities by WUA is also an indispensable component to promote irrigated agriculture. The above mentioned SWOT analyses indicated the lack of knowledge about facility maintenance and missing ownership as Weakness of the organizations. On the other hand, strong leadership was considered as Strength of the successful organization. To complement the lack of knowledge, it is effective to intensively transfer techniques to leaders, who in turn diffuse the techniques learnt in their organizations. In this way, the leaders' ability to guide the organization and WUAs' techniques will be reinforced. With regard to the management, the method of collecting management fee of WUAs and Water Committees is a core of the capacity development. Moreover, regarding the Water Committees, members will be renewed for a more effective management. Such enforcement in terms of both techniques and organizational management is expected to make possible stable supply of irrigation water, which leads to the promotion of irrigated agriculture.

In addition, to increase the irrigated area, land tenancy is more effective than the acquisition by farmers. Therefore, land tenant system needs to be further developed for the realization of sustainable expansion of irrigated agriculture.

Where there is no WUA, a WUA will be first created, and then, organizational enforcement will be undertaken following the same above-described process.

| Development Strategy 4.1 Strengthen Farmers' Marketing Activities | |
|---|---|
| Objective | To improve knowledge and skills about marketing |
| Countermeasures | 4.1.1 Strengthening of marketing skills of farmers' group<br>4.1.2 Undertaking of trial marketing activities<br>4.1.3 Enhancement of farmers' incentive for group work |
| Outputs expected | ・ Farmers' group acquires necessary knowledge for marketing.<br>・ Farmers' group formulates and conducts a trial marketing plan.<br>・ Farmers renew their understanding about the purpose of group work and better understand benefits of group work. |
| Remarks | ・Implement as a pilot project along with other sections' countermeasures.<br>・Make as a package, incorporating lessons learnt, and implement in similar areas. |

| Development Strategy 4.2 Strengthen Support System of Farmers' Group | |
|---|---|
| Objective | To collect and manage information on farmers and market traders |
| Countermeasures | 4.2.1 Collect and manage information on farmers and market traders<br>4.2.2 Strengthen linkage between farmers and market traders |
| Outputs expected | ・ Information necessary for group activities and marketing is transferred to farmers' group.<br>・ Farmers' group formulates and conducts a trial marketing plan. |
| Remarks | ・Implement as a pilot project along with other sections' countermeasures.<br>・Make as a package, incorporating lessons learnt, and implement in similar areas. |

| Development Strategy 4.3 Strengthen WUAs (Water Users' Associations) | |
|---|---|
| Objective | Stable water supply for irrigation is achieved through proper water management of the WUAs with full leadership of farmers 'group leaders |
| Countermeasures | 4.3.1 Strengthening of farmers' group (WUAs)<br>4.3.2 Establishment of farmers' group (WUAs)<br>4.3.3 Restructuring of Water Board<br>4.3.4 Acceleration of land tenant system within a framework of the community development |
| Outputs expected | Sustainable irrigation development is accomplished by proper maintenance and water distribution plan originated by the beneficiaries. |
| Remarks | ・Training of farmers' group leaders and technical transfer to the whole group.<br>・Conducting study tours to highly advanced areas.<br>・For promotion of participatory development, acquiring skills especially related to maintenance, through supporting WUA activities. |

(5) Capacity development

For the capacity development plan, the following three strategies are implemented; 1) capacity building of farmers and extension officers on the agricultural extension service, 2) promotion of farmer to farmer extension, and 3) capacity building on irrigation and water management.

For the promotion of small scale irrigated agriculture, more emphasis should be given on irrigation and marketing of the extension system in addition to the current one. In order to attain this, other departments related to the promotion of small scale irrigated agriculture shall support the CEOs. Nonetheless, it is important that such supports are consistently provided. Therefore, installation of a 'cross-sectional support unit' which consists of relevant departments is vital for the integration of such supports so that they will enhance the capacity of extension officers. In the counter measure of 'capacity development of CEO, BEO, DACO staffs for extension services', it is designed that government staffs, who are expected to provide extension service of organization management, participate in the training of trainers (ToT) to learn skills to be trainers for farmers group training.

For the promotion of farmer to farmer extension, the existence of practical farmers or cooperative farmers as an innovator is essential (see Fig. 5.4.1). The basic concept is for the farmers to attain knowledge and skills on "on-farm" irrigated agriculture together with CEOs and then to disseminate it to the other farmers. The CEOs are expected to locate any farmer or association which has already acquired such knowledge and skills, thus to encourage them to visit an "on-farm" model site. Furthermore, 1) Implement a visit to the "on-farm" model site into the field day program, 2) introduce the successful results of irrigated agriculture though media such as radio, and enhance more farmers to visit the model site with their growing interests.

When implementing the irrigated agriculture for smallholders, it's the most importance to build up the

human resource development of government officials. More precisely when promoting the irrigated agriculture, it's important to encourage a cooperative support of farmer's organization and CEOs by installing "technical support units (supports the CEOs in the field) " at each site. Technical support unit is a sectional unit which consists of specialists found in each office from various fields such as irrigation, marketing, famer's organization as well as cultivation. This may become constrain for vertical administration, however, it will be well adopted by the DACO with cross sectional activities. It is recommended to send specialists on irrigation together with that of agriculture to each irrigation scheme and to undertake training on controlled maintenance targeting the farmers in the field. The training includes, collection of water charges, monitoring and evaluation of irrigation activities and technical training (including knowledge on irrigation). According to "National Irrigation Plan" submitted by the Office of Farmer's Association, the government of Zambia would start to recruit irrigation and agriculture specialists from 2000.

| Development Strategy 5-1: Capacity development of farmers and improvement of extension services. | |
|---|---|
| Objectives | ・ To improve farmers' knowledge and technology of organization management.<br>・ To improve CEO, BEO, DACO staffs' skill as a trainer. |
| Countermeasures | 5-1-1 Capacity development of farmers.<br>5-1-2 Installation of cross-sectional support unit.<br>5-1-3 Capacity development of CEO, BEO, DACO staffs for extension services. |
| Outputs expected | (1) Farmers manage their group as a business entity.<br>(2) Support system of government staffs for farmers groups is reinforced. |
| Remarks | Major Activities<br>・ CEO, BEO, DACO staffs participate training of trainers (ToT) programme.<br>・ Training of organization management is provided to farmers' groups by trained government officers.<br>・ Government staff arrangement is maintained to provide necessary support to farmers' groups. |

The core concept of farmer to farmer extension is farmers to be diffusers of the technology (see also 4.5.3). However, there are diverse farmers, and not all of them would be such diffusers. According to the diffusion curb, there are people called innovators and early adapters who will challenge a new innovation. When the new innovation is adopted by innovators and early adaptors, early majority and late majority will follow them. This is to say that the new innovation will be gradually adapted by the population starting from the innovators and early adaptors followed by early majority and late majority. Therefore, it is important to find such innovators and early adaptors.

Regarding this, it is critical to find practical or collaborative famers as innovators or early adaptors in an organization that would be a core to promote farmer to farmer extension, and they acquire the knowledge and skills of the conservation farming together with CEOs.

| Development strategy 5-2: Promotion of farmer to farmer extension | |
|---|---|
| Objectives | Acquisition and extension of knowledge and skills on small scale irrigation agriculture by farmers |
| Countermeasures | ・Adoption of conservation farming technology by on-farm demonstration farms by practical farmers and collaborate farmers<br>・Extension of this knowledge and skills by them |
| Outputs expected | ・Productivity is increased by adoption of conservation farming<br>・Practical and collaborate farmers accept many visitor to their on-farm demonstration farm, and the visitors were practiced the knowledge and skills |

| | |
|---|---|
| Remarks | ・Implement with counter measures of other fields as a pilot project<br>・ Implement as a package project in areas with similar conditions according to lessons learnt from the pilot project. |

| Development strategy 5-3: Strengthening of Government officials on irrigation and water management | |
|---|---|
| Objective | Improvement of technical skill of irrigation engineers and technical officers contributes to Government support for the WUA, accordingly irrigation schemes are well maintained by the farmers. |
| Countermeasures | 5-2-1 Capacity building of TSB, MACO<br>5-2-2 Capacity building of Leaders of WUAs<br>5-2-3 Establishment of registration system of WUAs |
| Outputs expected | Sustainable irrigation system is realized by the technical assistances such as operation and maintenance skill, collection of irrigation fee, monitoring and evaluation of the irrigation, etc. |
| Remarks | - Introduction of trainers training to the irrigation engineers<br>- technical training by seminar and preparation of irrigation guideline and standard design/ drawings<br>- Technical transfer through OJT |

These development strategies, however, are not mutually exclusive. In fact, improvement of extension system should be realized before promotion of farmer to farmer extension. After installation of the unit and training of CEOs, then the CEOs will be able to support farmers in the promotion of small scale irrigation agriculture. In addition, the cross-sectional support unit will continue to back up CEOs, and the CEOs also will continue to support farmers. On the other hand, any feedback from farmers will reach the unit through CEOs. After this, the members of the unit will modify the training program of CEOs, and implement it. In this way, both development strategies will be able to improve the extension system. The conceptual image of relationship between them is given below.

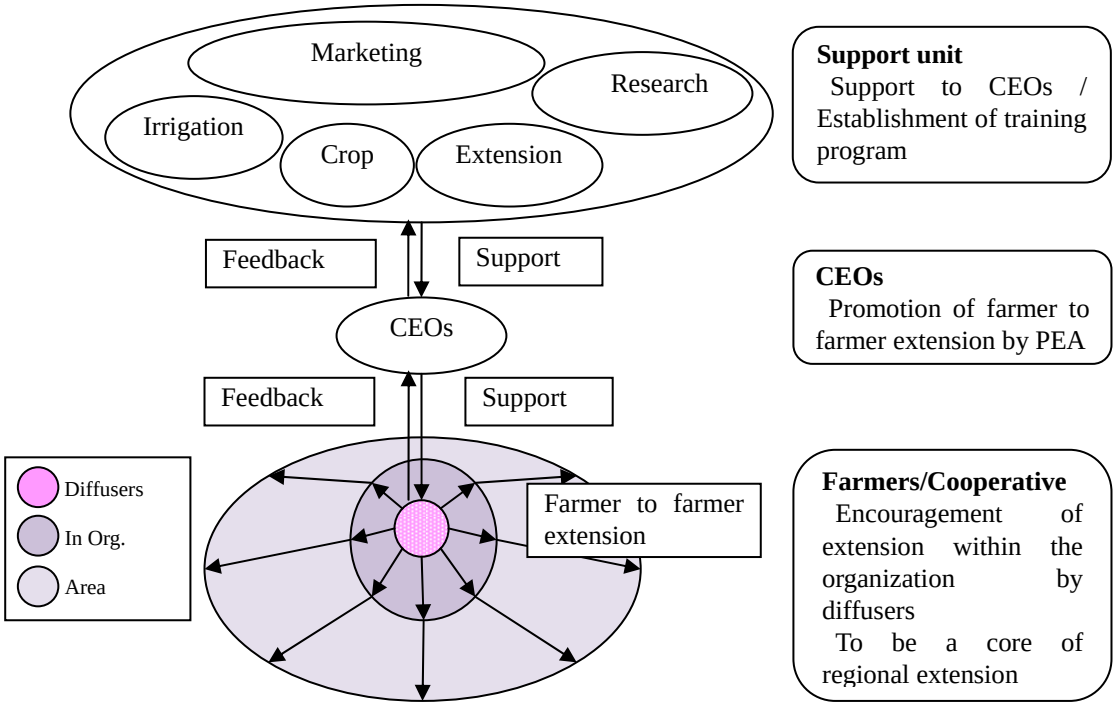



Fig. 5.4.1 Relationship between Development Strategies 5.1 and 5.2

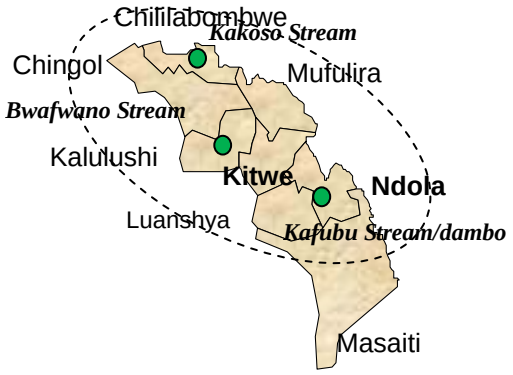
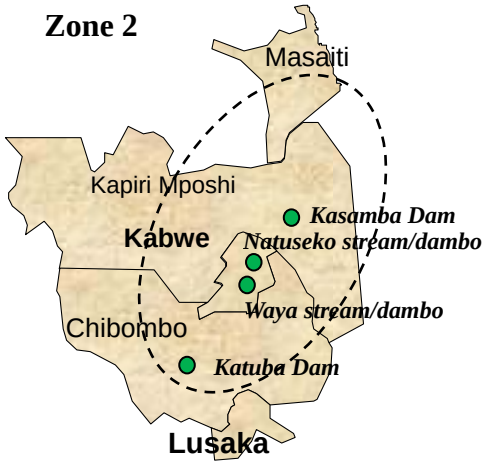
### 5.4.2 Development Direction by Zone

(1) Zoning of study area

The study area is located in the line of rail from Copperbelt in the North to Livingstone in the South. The type of farming varies along this North to South line. It was observed that the vegetable marketing destination area of smallholders tend to follow a certain pattern. Accordingly, the study area is divided into the following five zones.

(2) Direction of promotion of small-scale irrigated agriculture by zone

The basic measures are to shift to selling based on market needs and to diverse products for risk management. In addition, the following direction should be considered to utilize positive characteristics of the zones.

| | |
|---|---|
| **Zone 1**<br>  <br> | · Zone has abundant water resource as contributions from affluent basins draining into Kafue River<br>· Zone holds vast consumers within Ndola and Kitwe areas etc., and huge demands arising from new mine industrial area, North Western Province as well as DR. Congo.<br>· More than 80 % of the total population of the province settle in urban area whereas potentials for farm land, water resource and marketing are not fully utilized.<br>· Promotion of local production upon reduction of import is expected by utilizing lowland areas or perennial streams, and constructing simple diversion weirs and hence formation of irrigation areas.<br>· Establishment and expansion of the model for small-scale irrigated agriculture; the model applicable to the zone and targeting “quality improvement and production increase” to compete with imported products. |
| **Zone 2**<br>  <br> | · Zone covers wide range of wet lands with shallow groundwater depth in dry season period over the skirts of Kabwe township area. Many small-scale dams exist around its suburb region.<br>· Zone is characterized by its high self-sufficiency rate of agro-product. Huge amount of products are gathered into three major markets in Kabwe town while surplus of products distributed over the district are redistributed to other provinces via those markets.<br>· Smallholders yet suffer from poor market development in the suburb of Kabwe. Improvement based on marketing initiatives such as collective assembly of product for persistent marketing channels as well as partnership between farmers and marketers, and .production for small amounts and multi-products.<br>· Establishment of the model in local city market area will be emphasized. |

| | |
|---|---|
| **Zone 3**<br>  <br> | · Zone covers the largest marketing center in Zambia. In addition, huge potential exist for various players; super markets, processers, numerous marketers for the smallholders as producers.<br>· In this zone, existing small-scale dams and its reserved water are efficiently utilized contrary to the case in other zones. There is, however, unsteady rainfall condition, requiring use of storage water to be more effective.<br>· Smallholders can appreciate many marketing opportunities from several channels with demand while facing competitive situations among farm enterprises, large-scale farmers and emerging farmers. Most of these smallholders fail to utilize their favorable environment and remain as individual minute sellers and confine themselves to production targeting only typical highly demanded crops.<br>· Empowerment of famers' organization, efficient use of existing small-scale dams promoting highly competitive brand products are necessary for the zone to fully take advantage of its high market potential. |
| **Zone 4**<br>  <br> | · Zone is characterized with topographical location of production area and market areas scattered over Lusaka, Livingstone and other local markets.<br>· Smallholders cultivate their small-sized field with fresh vegetables using water source from small-scale dams and lowland swamps outside the town suburbs, whereas large-scale famers irrigate their farms vastly using pumped-up ground water along the railway area.<br>· Potential of water resource is similar to Zone 5.<br>· Marketing strategy employs the partnership between farmers and marketers to obtain stable marketing channels as similar to the case in Zone 2. Irrigation strategy uses the model of small-scale dam utilization that is applicable to Zone 5. |
| **Zone 5**<br>  <br> | · Annual average precipitation is less than 800mm in the zone. Many small-scale dams have been constructed in the past; however, most of these dams are not fully utilized as water intake systems are not maintained.<br>· Zone is located on high potential area for marketing with demands for large consumption area of Livingstone with its tourist hotels or lodges and cross boarder trading.<br>· Smallholders, as individual sell base, try out cropping highly demanded vegetables, however, appear not to fully utilize the market potential. Quality control, strategic production for niches in tourist facilities and cross boarder trading are keys for Zone 5.<br>· Rehabilitation of existing small-scale dams for water-intake facilities and irrigation canals is necessary to use full beneficial areas. |

## 5.5 Selection of Irrigation Sites

### 5.5.1 Outline of Site Selection

As stated in Sub-chapter 5.4.2, irrigation schemes have zonal characteristics such as rainfall pattern, water availability, topographical feature and irrigation method as shown in Fig. 5.5.1. In the M/P, model projects shall be selected to expect dissemination effect to surrounding areas.

### 5.5.2 Existing Irrigation Schemes

The sites for rehabilitation of irrigation facilities will be selected with careful consideration to small investments and potentiality as a model in the initial stage. Existing irrigation schemes are indicated in Table 5.5.1(except pump irrigation schemes).

Table 5.5.1 Existing Irrigation Schemes

| No | Schemes | Province | District | Irrigation Area (ha) | Water Source | Remarks | Zone |
|---|---|---|---|---|---|---|---|
| 1 | Kafubu block | Copperbelt | Ndola | 10 | Stream | Treadle pump | Zone 1 |
| 2 | Katuba | Central | Chibombo | 10 | Dam | Gravity with canal | Zone 2 |
| 3 | Mulila Kazembe | Central | Kapiri Mposhi | — | Dam | Gravity with canal | Zone 2 |
| 4 | Shantumbu | Lusaka | Chongwe | 15 | Dam | Gravity with canal | Zone 3 |
| 5 | Chunga | Lusaka | Lusaka | 15 | Stream | Weir, canals | Zone 3 |
| 6 | Chipapa | Lusaka | Kafue | 10 | Dam | Gravity with canal | Zone 3 |
| 7 | Siafwa-kweda | Southern | Choma | 4 | Dam | Gravity | Zone 4 |
| 8 | Nkandabwe | Southern | Sinazongwe | 10 | Dam | Gravity with canal | Zone 4 |
| 9 | Mulabalaba | Southern | Kazungula | 15 | Dam | Gravity with canal | Zone 5 |

It is recommended to select the pilot project sites aiming at particularly capacity building of the beneficial farmers for improvement of farming practice and market development in the initial phase in the Master plan. Table 5.4.2 shows the evaluation of the existing irrigation schemes from the view point of not only irrigation development but improvement of farmers' capability on farming practice, market development. Two of the existing schemes, i.e., the Chipapa and Mulabalaba irrigation schemes are recommended as a model site to comprehensively improve farming practice, market capability, irrigation skills and water management system of the farmers own in line with the development policy in the Master Plan.

Table 5.5.2 Evaluation of Existing Irrigation Schemes

| No | Schemes | Zone | Irrigation technology | Water management | Model of irrigation system | Farming skill | Market capability | Evaluation[1)] |
|---|---|---|---|---|---|---|---|---|
| 1 | Kafubu block | 1 | | ○ | ○ | | ○ | ○ |
| 2 | Katuba | 2 | | ○ | ○ | | ○ | ○ |
| 3 | Mulila Kazembe | 2 | ○ | ○ | ○ | ○ | | ○ |
| 4 | Shantumbu | 3 | ○ | ○ | ○ | | ○ | ○ |
| 5 | Chunga | 3 | ○ | ○ | | ○ | ○ | ○ |
| 6 | Chipapa | 3 | ○ | ○ | ○ | ○ | ○ | ◎ |
| 7 | Siafwa-kweda | 4 | | | ○ | | | △ |
| 8 | Nkandabwe | 4 | ○ | ○ | ○ | ○ | | ○ |
| 9 | Mulabalaba | 5 | ○ | ○ | ○ | ○ | ○ | ◎ |

[1)]Evaluation ◎ Highly suitable as a model site on irrigation, farming and market improvement
○ Following to ◎
△ Low suitability as a model site on irrigation, farming and market improvement


| Outline | Resources | Concept in M/P |
|---|---|---|
| Zone 1: Copperbelt Province<br>As Zone 1 is blessed with rainfall, perennial flow in several rivers/ streams, as well as wetland (dambo) is available for gravity irrigation. | Due to an annual rainfall of 1,200mm or more, adequate surface water is useful for irrigation. | WUAs should be established and strengthened to expand surface water irrigation schemes.<br>Irrigation system composed of river intake and canal becomes a typical model. |
| Zone 2: Central Province<br>Large consuming city Kabwe is located in Zone 2. Farm income is improved by cash crop cultivation by enhancement of irrigation activities using dams and dambos in the dry season in addition to staple food cultivation in the wet season. | Annual rainfall amount is about 950 mm.<br>Dambos widely spread in a hilly terrain produce adequate groundwater, and enough surface flow in observed in the upstream of the Mwomboshi River. | Investment should put on the rehabilitation and installation of intake and canal construction. Environmental conservation, land use plan and community development plan to improve living condition should be formulated to accelerate dambo use plan. |
| Zone 3: Lusaka Province<br>Gravity irrigation using impounding water in the existing dam has been well developed in the Kafue District and its surrounding area in the Lusaka Province. | Annual rainfall amount is about 860 mm. | As an advanced region, upgrading of water management and maintenance system becomes good model for similar irrigation schemes surrounding the area. For dambo development, improvement of social infrastructure has highly advantageous in the M/P. |
| Zone 4: North and central area of the Southern Province<br>Irrigation schemes using dam water are developed as the same strategy as Zone 5 | Annual rainfall amount is small about 740 mm. For this reason, river flow is not perennial, but there exists many small scale dams. | Rehabilitation of existing dam facilities, mainly intake installation is first conducted. Secondly impounding dam is constructed taking consideration of watershed management and environmental preservation. |
| Zone 5: South of the Southern Province<br>It is vital to expand gravity irrigation system, especially in existing dam sites. Since most of dams have no intake facilities, minimal investment for construction of intake, irrigation canal and expansion of farmland provides high benefit of agriculture. | Annual rainfall amount is small about 620 mm.<br>Many small scale dams has constructed in the tributaries of the Zambezi river. | Rehabilitation of existing dam facilities, mainly intake installation is first conducted.<br>Priority of the rehabilitation works is decided from economical point of view. |

Fig.5.5.1 Zonal Development Policy in Small Scale Irrigation in the Master Plan

### 5.5.3 Potential Irrigation Schemes

(1) Scheme selection by MACO

Based on the initial selection of the potential irrigation schemes by MACO, potential sites were identified with the following screening procedure:

To attain sustainable irrigated agriculture,

i) water storage such as dam is available for irrigation,
ii) perennial flow is observed in the river/ stream, and
iii) shallow groundwater is obtained for irrigation

Potential irrigation schemes of 116 sites composed of gravity and dambo area irrigation schemes were selected, excluding 20 pump irrigation schemes out of total potential schemes of 136 proposed by MACO. (see Annex C)

(2) Site selection in line with development plan

The M/P presents a model for sustainable irrigated agriculture for smallholders, and further similar projects are developed in the surrounding areas based on the model. The model scheme shall have high model performance and it shall be prevailed to surrounding similar irrigated agricultural areas. In this regard, 11 potential irrigation schemes indicated in Table 5.5.3 were selected through a screening of 116 sites.

Table 5.5.3 Potential; Irrigation Schemes

| No | Potential schemes | Province | District | Irrigation area (ha) | Water source | Zone |
|---|---|---|---|---|---|---|
| 1 | Kakoso | Copperbelt | Chililaombwe | 26 | Spring | Zone 1 |
| 2 | Bwafwano | Copperbelt | Kalulushi | 60 | Stream | Zone 1 |
| 3 | Kasamba | Central | Kapiri Mposhi | 12 | Dam | Zone 2 |
| 4 | Juda | Central | Kapiri Mposhi | 8 | Dam | Zone 2 |
| 5 | Natuseko | Central | Kabwe | 20 | Stream, dambo | Zone 2 |
| 6 | Waya Camp | Central | Kabwe | 5 | Stream | Zone 2 |
| 7 | Munga | Central | Kabwe | 23 | Dam | Zone 2 |
| 8 | Lifwambula | Central | Chibombo | 22 | Dam | Zone 2 |
| 9 | Chikupi | Lusaka | Kafue | 10 | Dambo | Zone 3 |
| 10 | Nakempa | Southern | Choma | 16 | Dam | Zone 4 |
| 11 | Siakasipa | Southern | Kazungula | 8 | Dam | Zone 5 |
| | Total | | | 210 | | |

Note: Irrigation area is irrigable area by gravity.
Irrigation area is in gross area.
Irrigation area 10ha of 9. Chikupi irrigation area a part of total area of 250 ha of estate area along the Kafue river.

The potential irrigation schemes in the table above are also evaluated as shown in Table 5.5.4 from the viewpoint of irrigation development, improvement of farmers' capability on farming practice, and market development.

Table 5.5.4 Evaluation of Potential Irrigation Schemes

| No | Schemes | Zone | Irrigation technology | Water management | Model of irrigation system | Farming skill | Market capability | Evaluation[1)] |
|---|---|---|---|---|---|---|---|---|
| 1) | Kakoso | 1 | | | ○ | | ○ | ○ |
| 2) | Bwafwano | 1 | ○ | ○ | ○ | ○ | ○ | ◎ |
| 3) | Kasamba | 2 | | | ○ | | ○ | ○ |
| 4) | Juda | 2 | | | ○ | | | ○ |
| 5) | Natuseko | 2 | ○ | | ○ | ○ | ○ | ◎ |
| 6) | Waya Camp | 2 | | | ○ | ○ | ○ | ◎ |
| 7) | Lifwambula | 2 | | | ○ | ○ | ○ | ○ |
| 8) | Munga | 3 | | | ○ | ○ | ○ | ○ |
| 9) | Chikupi | 3 | | | ○ | ○ | ○ | ◎ |
| 10) | Nakempa | 4 | | | ○ | | | ○ |
| 11) | Siakasipa | 5 | ○ | | ○ | ○ | ○ | ◎ |

[1)] Evaluation ◎ Highly suitable as a model site on irrigation, farming and market improvement
○ Following to ◎

The zonal development policy in small scale irrigation in the M/P is summarized in Fig.5.5.2 in relation to outline (current state), major water resource and the concept, which is fed back into the M/P.

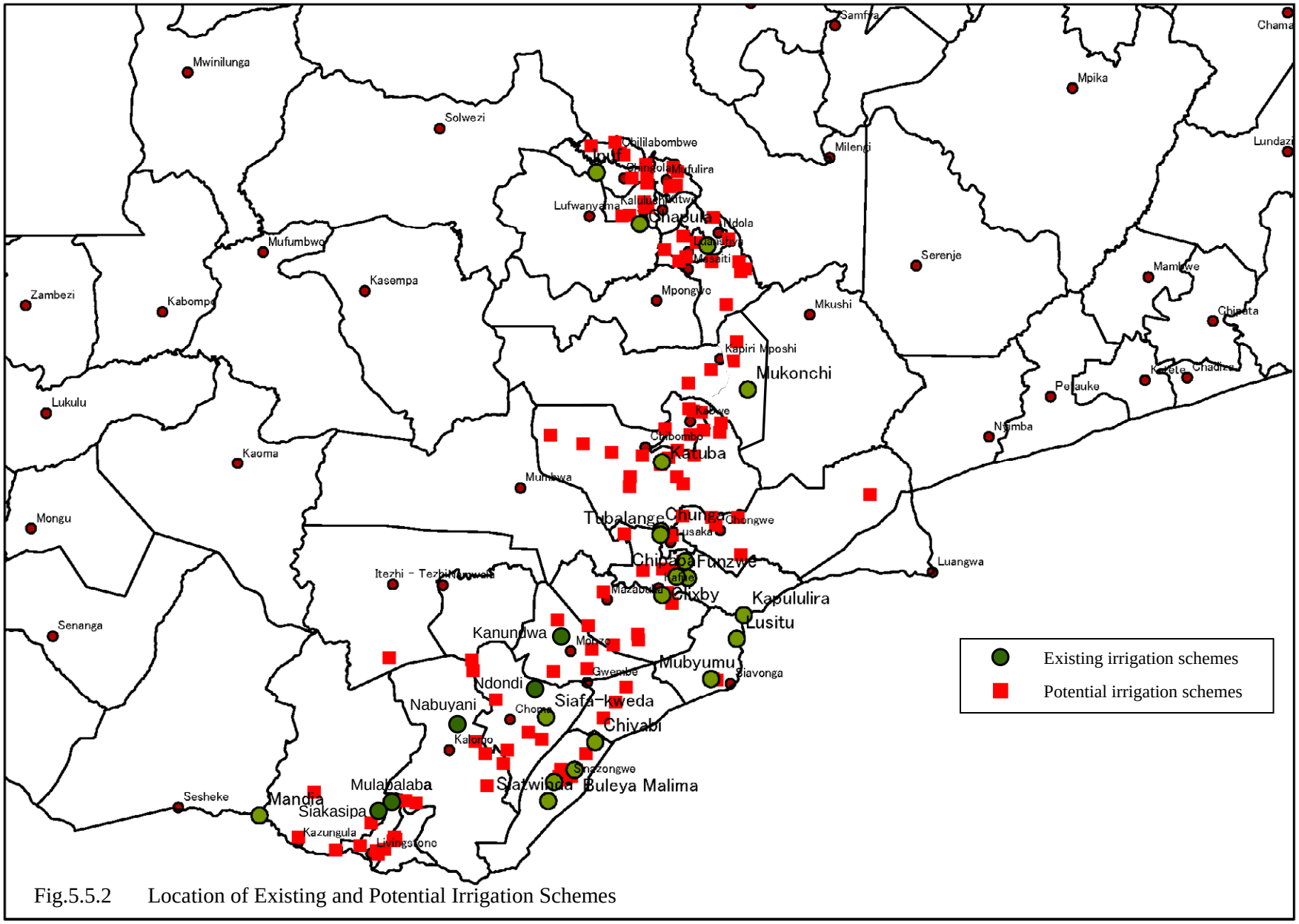



Fig.5.5.2 Location of Existing and Potential Irrigation Schemes

### 5.5.4 Extensive Work for Irrigation Facilities

(1) Basic plan

In the M/P, proposed extensive works for the rehabilitation and new construction for irrigation are selected to mitigate several constraints of the production in a value chain. As indicated in 4.6.5 “Identification of Irrigated Agricultural Potential by Field Survey”, extensive works shall be selected aiming at increase of intake capacity of impounding water and improvement irrigation efficiency. Extensive works are shown in Annex D in detail.

(2) Rehabilitation and new construction works

The components of the rehabilitation and new construction works shall be determined considering efficient budgetary plan. The following are constitutive points:

1) Investment plan shall be formulated taking account of economical issue, i.e., cost - benefit relationship of the project,
2) The irrigation system shall be designed in conformity to technical and financial ability of the farmers to achieve sustainable project implementation by the farmers,
3) Rehabilitation and new construction works shall be evaluated by not individual project but overall projects proposed in the Master plan,
4) Effective rehabilitation plan shall be proposed for dam structures taking their long term use as a water source for the irrigation. The rehabilitation cost and investment schedule shall be examined comparing damaged cost without rehabilitation work and expected benefit originated by long term use of the impounding water.

About 1), irrigation canal rehabilitation in on-farm level is proposed from a cost-benefit perspective. About, 2), it is essential to apply gravity irrigation system, about 3), aver all project cost shall be estimated to satisfy en economical internal rate of return (EIRR) ranging from 12 to 15 % referring to other economical evaluation of the irrigation sector. About 4), rehabilitation of the spillway canal shall be promptly commenced to protect dam embankment. It is strongly recommended the Governments to allocate rehabilitation cost for the dam and its appurtenant structures as a physical input to prolong their life spans of these social assets. The rehabilitation cost was estimated for a reference, so it was excluded from the cost in the Mater plan.

(2) Project cost for irrigation facilities

The construction cost for rehabilitation and new construction works for the irrigation facilities is shown in Table 5.5.7 and 5.5.8. Total cost is estimated at ZMK18, 644 million (Cost for rehabilitation work: ZMK5, 174 million, new construction work: ZMK13, 470 million) Detailed calculation sheets are attached in Annex D.

Construction cost per hectare is calculated at ZMK38.6 million and ZMK64.1 million for rehabilitation and new construction work, respectively.

Table 5.5.5 Construction Cost of Irrigation Facilities

| | Irrigation scheme | Construction cost (ZMK million) | I¥Beneficial area (ha) | Cost per ha (ZMK million) |
|---|---|---|---|---|
| 1. | Existing irrigation scheme | 5,174 | 134 | 38.6 |
| 2. | New construction scheme | 13,470 | 210 | 64.1 |
| | Total | 18,644 | 344 | 54.2 |

In the case of rehabilitation work of the existing irrigation schemes, the Economical Internal Rate of Return (EIRR) is calculated at about 17.5% with the provision of construction cost of ZMK38.6 million and incremental benefit of 9.4 million per hectare under the conditions below. Meanwhile, EIRR is calculated at about 13.9% for new construction works. In this regard, proposed plan is deemed to be in appropriate investment.

1) Project life is 20 years.
2) Incremental benefit is generated from not only rehabilitation work of irrigation facilities but improvement of farming skill, introduction of collective marketing and so on. Thus incremental benefit by the rehabilitation work is assumed about 60 % of entire project benefit.
3) Incremental benefit of the new construction work is assumed at 1.5 times of that of existing scheme.

(3) Rehabilitation cost for dam structures

The rehabilitation cost for dam and its appurtenant structure is estimated at ZMK9,473 million. As stated above, it is strongly recommended the Governments to allocate rehabilitation cost for the dam and its appurtenant structures.

Table5.5.6 Rehabilitation Cost for Dam Structures

| | Irrigation scheme | Construction cost (ZMK million) |
|---|---|---|
| 1. | Existing irrigation scheme | 6,365 |
| 2. | New construction scheme | 3,108 |
| | Total | 9,473 |

Table 5.5.7 Project Cost for the Rehabilitation Works

(Unit: ZMK '000)

| | Existing schemes | Province | District | Cost for Irrigation Scheme | Cost for Dams | Total |
|---|---|---|---|---|---|---|
| 1 | Kafubu | Copperbelt | Ndola | 1,649,237 | 0 | 1,649,237 |
| 2 | Katuba | Central | Chibombo | 223,968 | 1,575,215 | 1,799,183 |
| 3 | Mulila Kazembe | Central | Kapiri Mposhi | 0 | 680,764 | 680,764 |
| 4 | Chunga | Lusaka | Lusaka | 739,120 | 0 | 739,120 |
| 5 | Funzwe | Lusaka | Kafue | 216,432 | 549,839 | 766,271 |
| 6 | Shantumbo | Lusaka | Chongwe | 15,339 | 0 | 15,339 |
| 7 | Chipapa | Lusaka | Kafue | 1,553,972 | 944,171 | 2,498,143 |
| 8 | Kanundwa | Southren | Monze | 0 | 993,490 | 993,490 |
| 9 | Siafwa-kweda | Southern | Choma | 323,548 | 665,814 | 989,362 |
| 10 | Ndondi | Southern | Choma | 0 | 0 | 0 |
| 11 | Nkandabwe | Southern | Sinazongwe | 251,088 | 632,042 | 883,130 |
| 12 | Nabuyani | Southern | Kalomo | 0 | 0 | 0 |
| 13 | Mulabalaba | Southern | Kazungula | 201,657 | 323,668 | 525,325 |
| Total | | | | 5,174,361 | 6,365,002 | 11,539,363 |

Table 5.5.8 Project Cost for Proposed Irrigation Schemes

(Unit: ZMK '000)

| | Potential schemes | Province | District | Cost for Irrigation Scheme | Cost for Dams | Total |
|---|---|---|---|---|---|---|
| 1 | Kakoso | Copperbelt | Chililaombwe | 2,702,233 | 0 | 2,702,233 |
| 2 | Bwafwano | Copperbelt | Kalulushi | 2,171,918 | 0 | 2,171,918 |
| 3 | Kasamba | Central | Kapiri Mposhi | 1,863,382 | 452,955 | 2,316,337 |
| 4 | Juda | Central | Kapiri Mposhi | 1,247,449 | 452,955 | 1,700,404 |
| 5 | Natuseko | Central | Kabwe | 35,925 | 0 | 35,925 |
| 6 | Waya Camp | Central | Kabwe | 23,573 | 0 | 23,573 |
| 7 | Lifwambula | Central | Chibombo | 1,031,872 | 639,659 | 1,671,531 |
| 8 | Munga | Central | Chibombo | 1,863,382 | 558,340 | 2,421,722 |
| 9 | Chikupi | Lusaka | Kafue | 35,925 | 0 | 35,925 |
| 10 | Nakempa | Southern | Choma | 939,482 | 502,133 | 1,441,615 |
| 11 | Siakasipa | Southern | Kazungula | 1,555,415 | 501,740 | 2,057,155 |
| Total | | | | 13,470,555 | 3,107,782 | 16,578,337 |

## 5.6 Proposed Model Projects

### 5.6.1 Outline of Model Projects

The sector related measures shown in Figure 5.1.2 will be implemented as model projects targeting irrigation schemes selected along the above mentioned 5.4.2 Development Direction by Zone. That is, the M/P proposes a project that implements a small scale development that is integrated with farm management, cultivation, marketing, irrigation, farmers' organization, capacity development etc. in irrigation scheme unlike past projects which tend to support each sector.

Three model projects proposed in the M/P are one of the models which indicate the directionality of small scale irrigated agriculture on the target areas. Therefore, when applying a project in more specific areas, the contents of activities need to be well adjusted according to the present condition of the respective areas.

| Project | Target area and objectives of model projects |
|---|---|
| 1. Small scale irrigated agricultural model project in the surroundings of Lusaka city | ＜Target Area＞: Zone 3<br>＜Objectives＞<br>The suburb of Lusaka has a high potential on marketing while there is also a severe competition. The project aims to develop an advancement model on small scale irrigation agriculture within the suburbs of large cities, by strengthening farmers/farmer's association and rehabilitation of the irrigation facilities. |
| 2. Vegetable complex promotion project | ＜Target Area＞: Zone 1, Zone 2<br>＜Objectives＞<br>In order to benefit from a high potential water resource in the irrigation areas, the project aims to bring about a model for developing a vegetable complex, by initiating consistent production and improvement on product quality.<br>Also, in order to benefit from a high marketability and water potentials within the same zone, a model on small scale irrigation agriculture needs to be developed. This would provide a possibility to prepare a systematic cultivation base and also to produce high value (quality) products to satisfy the demands of within and out of the state. |
| 3. Irrigated agricultural project with water source of the existing small scale dam | ＜Target Area＞: Zone 4, Zone 5<br>＜Objectives＞<br>Several small scale dams exist in the Zone 4 and 5. The project aims to develop and propagate a model on the existing small scale dams to be reused in irrigation. |

### 5.6.2 Small-scale Irrigated Agricultural Model Project in the Surroundings of Lusaka City

<table>
<tr><td>Target Area</td><td colspan="4">Zone 3</td></tr>
<tr><td>Target Group</td><td colspan="4">Smallholders and farmers' cooperatives in Zone 3</td></tr>
<tr><td>Implementing Agency</td><td colspan="4">Department of Agriculture, Department of Agribusiness and Marketing, Department of Cooperatives and Department of Policy and Planning, MACO</td></tr>
<tr><td>Collaborating Agency</td><td colspan="4">Provincial & District Agricultural Offices in the Lusaka Province</td></tr>
<tr><td>Background</td><td colspan="4">Zone 3 is located in largest market area such as Soweto market. In this connection, highly maintained market condition in Zone 3 provides large agro-business potential for super market owners, processors, traders and also smallholders. Although Zone 3 is blessed with various market channels, needs and business environment, most of smallholders are facing a difficulty of competition with agricultural enterprises, large scale farmers and emerging farmers. Majority of the smallholders cannot make use of blessed environment and still behind an economic development.<br>Contrary to other areas where intake devices were not installed on the dam body, storage water in the reservoirs has been effectively utilized for irrigation purpose in the Kafue District in the Lusaka Province. Meanwhile three consecutive droughts in 2000s became a useful experience to establish proper water use regulation for effectively use dam storage water. Even though irrigation canals have been constructing since 2000, their improvement ratio is still low. Considering high irrigation potentiality in Zone 3, vital model project(s) is selected as a model for irrigated agriculture.</td></tr>
<tr><td>Objectives</td><td colspan="4">The project aims at presentation of a model project in the suburbs of the large cities with rehabilitation of small scale dam. The project is mainly composed of empowerment of farmers' organizations making use of high market potential.</td></tr>
<tr><td>Outputs expected</td><td colspan="4">(1) Increase of farm productivity and farm income<br>(2) Improvement of business skill of farmers and farmers' organizations<br>(3) Presentation of an irrigated agricultural business model by the smallholders in the suburbs of large cities</td></tr>
<tr><td>Project Outline</td><td colspan="4">(1) Training of farmers and farmers' organizations<br>- Market research with participatory measure<br>- Training of business skill<br>- Seminar for farming skills and farming practices<br>- Exchange of views and experiences, study tours<br>(2) Matching meeting<br>(3) Installation of multi-purpose shed<br>(4) Rehabilitation work for existing dams and reservoirs, intakes and irrigation canals</td></tr>
<tr><td rowspan="2">Related Countermeasures</td><td>Farm management</td><td>Marketing</td><td>Irrigation</td><td>Organization</td></tr>
<tr><td>1.1.1<br>1.1.2<br>1.2.1</td><td>2.1.1.<br>2.1.2<br>2.3.1<br>2.4.1</td><td>3.1.1<br>3.3.1<br>3.3.2</td><td>4.1.1 4.3.1<br>4.1.2 4.3.2<br>4.1.3<br>4.2.1</td></tr>
<tr><td>Remark</td><td colspan="4"></td></tr>
</table>

### 5.6.3 Vegetable Complex Promotion Project

| | | | | |
|---|---|---|---|---|
| Target Area | Zone 1, 2 | | | |
| Target Group | Smallholders and farmers' cooperatives in Zones 1, 2 | | | |
| Implementing Agency | Department of Agriculture, Department of Agribusiness and Marketing, Department of Cooperatives and Department of Policy and Planning, MACO | | | |
| Collaborating Agency | Provincial & District Agricultural Offices of the Copperbelt and Central Provinces | | | |
| Background | In Zone 1, several small tributaries run and form flood plains in the most upstream of the Kafue river, thus blessed with water sources. From the point of market potential, large consuming cities such as Ndola and Kitwe are located in Zone 1. Zone 1 also borders on the North West Province that has been developed as a new mining industrial region and the Republic of Congo at where the food demand is increasing rapidly. On contrary to this blessed situation, Zone 1 supply cannot meet with the demand, and often depends on import from adjacent Provinces and countries. Because of this situation, it is encouraged to increase shipping volume of internal produces. Use of wetland, river flow, construction of small intake, improvement of quality of produces, differentiation of produce from other regions are stimulated for increase of internal production. | | | |
| Objectives | The project aims at creating coordinated cultivation base with high marketability and water potential. Furthermore, the project aims at presentation of a model project producing high value (quality) products that satisfy demand requirement in and around the area. | | | |
| Outputs expected | (1) Coordinated water management is realized in the small scale irrigation scheme under joint ownership<br>(2) Systematic production infrastructure is equipped for improving quality control | | | |
| Project Outline | (1) Training of farmers and farmers' organizations (identification of production area)<br>(2) Land acquisition for farming (Collective land management through agricultural cooperatives)<br>(3) Seminar of farming practice (disease control, simple farming of tomato, etc.)<br>(4) Construction of primitive intake weir and earth canal (gravity irrigation)<br>(5) Land development/ reclamation in small scale (re-sloping, as well)<br>(6) Land management (new and existing land)<br>(7) Introduction of simple farm facilities (low cost rain cover shed, etc.)<br>(8) Training and workshop of cropping management for farmers and extension officers of MACO (DACO). | | | |
| Related Countermeasures | Farm management | Marketing | Irrigation | Organization |
| | 1.1.1<br>1.1.2<br>1.2.1<br>1.3.1 | 2.1.1<br>2.1.2<br>2.3.1<br>2.4.1 | 3.2.2<br>3.3.1<br>3.3.2 | 4.1.1 4.2.2<br>4.1.2 4.3.1<br>4.1.3 4.3.2<br>4.2.1 |
| Remark | | | | |

### 5.6.4 Irrigated Agricultural Project with Water Source of Existing Small-scale Dam

| | | | | |
|---|---|---|---|---|
| Target Area | Zone 4, 5 | | | |
| Target Group | Smallholders and farmers' cooperatives in Zone 5 | | | |
| Implementing Agency | Department of Agriculture, Department of Agribusiness and Marketing and Department of Cooperatives, MACO | | | |
| Collaborating Agency | Provincial & District Agricultural Offices of the Southern Province | | | |
| Background | Most of the dams constructed in 1990s to the beginning of 2000s have not been well utilized for irrigation purpose because these projects aimed at water supply for livestock and domestic water supply in rural areas, and did not included intake construction. After decade, their usability for irrigation is found due to insufficiency of irrigation water source.<br>Zone 4 and 5 in the Southern Province have high market potential due to large consuming cities of Livingstone, hotels, lodges as well as cross boarder marketing. Since smallholders transaction is individual style, such high market potential is not taken up at present.<br>Niche and cross border markets for tourist facilities are proposed together with high quality produce supply. | | | |
| Objectives | The project aims at dissemination of irrigation model with its water source of small scale dams/ ponds. | | | |
| Outputs expected | (1) Stable trading system realize increase of farm income<br>(2) Partnership between small traders and smallholders secures suppliers<br>(3) Producing center is formed through selling local specialty produces (local brand crops)<br>(4) Market oriented agriculture is developed with market need analysis within the area | | | |
| Project Outline | (1) Training of farmers and farmers' organizations<br>- Market research with participatory measure<br>- Training of business skill<br>- Seminar for farming skills and farming practices<br>- Exchange of views and experiences, study tours<br>(2) Matching meeting<br>(3) Installation of multi-purpose shed<br>(4) Rehabilitation work for existing dams and reservoirs, intakes and irrigation canals | | | |
| Related Countermeasures | Farm management | Marketing | Irrigation | Organization |
| | 1.1.1<br>1.1.2<br>1.2.1<br>1.3.1 | 2.1.1<br>2.1.2<br>2.3.1<br>2.4.1 | 3.1.1<br>3.3.1<br>3.3.2 | 4.1.1 4.2.2<br>4.1.2 4.3.1<br>4.1.3 4.3.2<br>4.2.1 4.3.3 |
| Remark | | | | |

## 5.7 Environmental and Social Consideration - Environmental Impact Assessment (EIA) Study

(1) Preparatory work for EIA study

According to the Zambian environmental guidelines, the requirement to undertake an EIA depends on whether the proposed development falls within the stipulated criteria listed in the EIA regulations. The criteria fall into two categories: those projects requiring only the preparation of a project brief, Category B projects, and those requiring a full EIA to be undertaken and an EIA report (environmental impact statement or EIS) to be prepared, Category A projects.

(2) Category A projects

Projects that are likely to cause significant adverse impacts on the environment and society. Those are projects whose effects are supposed to be undesirable, complex, or unprecedented, and therefore difficult to predict, or multiple or irreversible. The broad range of impacts on the environment and society fall into this category.

Projects requiring a study of environmental impact assessment, according to the legal framework and socio-economic and environmental conditions of the beneficiary countries are also of Category A. Category A also includes projects in principle in sensitive sectors (i.e., with characteristics that are likely to cause adverse effects on the environment as mining, for example) and projects located in or near some fragile environments.

(3) Category B projects

Projects under this category are likely to cause less adverse effects on the environment and human populations than projects of Category A and are generally specific to the site. Most of these impacts are not irreversible and, in general, normal mitigation measures are adequate.

# Chapter 6 Action Plan

In the Action Plan, Pilot Projects will be implemented as model projects to meet the Development Direction by Zone as described in section 5.4.2. Pilot Projects will be implemented in a 4-year-period from 2012 to 2016. Three to four sites will be proposed.

## 6.1 Framework of the Action Plan

### 6.1.1 Selection of Model Sites

Model sites will be selected among high model potential sites described in section 5.4 in both the existing irrigation schemes and irrigation potential sites. In addition, roadside market improvement project will be model even not targeting the irrigation sites.

Table 6.1.1 Outline of the Model Sites

| Site | District | Province | Beneficiary Area (ha) | Beneficiary (household) |
|---|---|---|---|---|
| 1. Chipapa Irrigation Scheme | Kafue | Lusaka | 7.5 | 120 |
| 2. Bwafwano Irrigation Area | Kalulushi | Copperbelt | 90 | 176 |
| 3. Natuseko Irrigation Area | Kabwe | Central | 20 | 76 |
| 4. Mulabalaba Irrigation Scheme | Kazungla | Southern | 5.5 | 64 |

Note: Beneficiary area and beneficiaries are in real figures.

Workshops were held in above 4 model sites (candidate) in November 2010 after the explanatory meetings on the Action Plan to discuss detailed planning between stakeholders of farmers' groups and MACO district officers as main actors of the project implementation. In the workshop, DACO officials and representatives of farmers' groups have proposed their ideas and perspectives for the content of the Action Plan based on the explanatory meeting. Recording of the workshops are supplied as Annex F 3 for reference.

### 6.1.2 Role of Model Sites

Pilot Projects are expected to bring about exhibition-effect as the model for small-scale irrigated agriculture established on individual potentials for each Zone.

- Monitoring activities will be implemented as the monitoring verifies how potentials are utilized for each zone. Experience and projects effect will be summarized.
- Development process will be summarized in a manual as technical packages to facilitate application of the obtained experience to similar areas.

### 6.1.3 Plan Period

Pilot Projects are implemented in the first half of the M/P (April 2012 to March 2016). Irrigation facilities are rehabilitated in early stage, which will contribute to increase productivities through getting necessary irrigation water. Improvement of farm income by finding a new market accelerates a formulation of chain for investment to farming and irrigation.

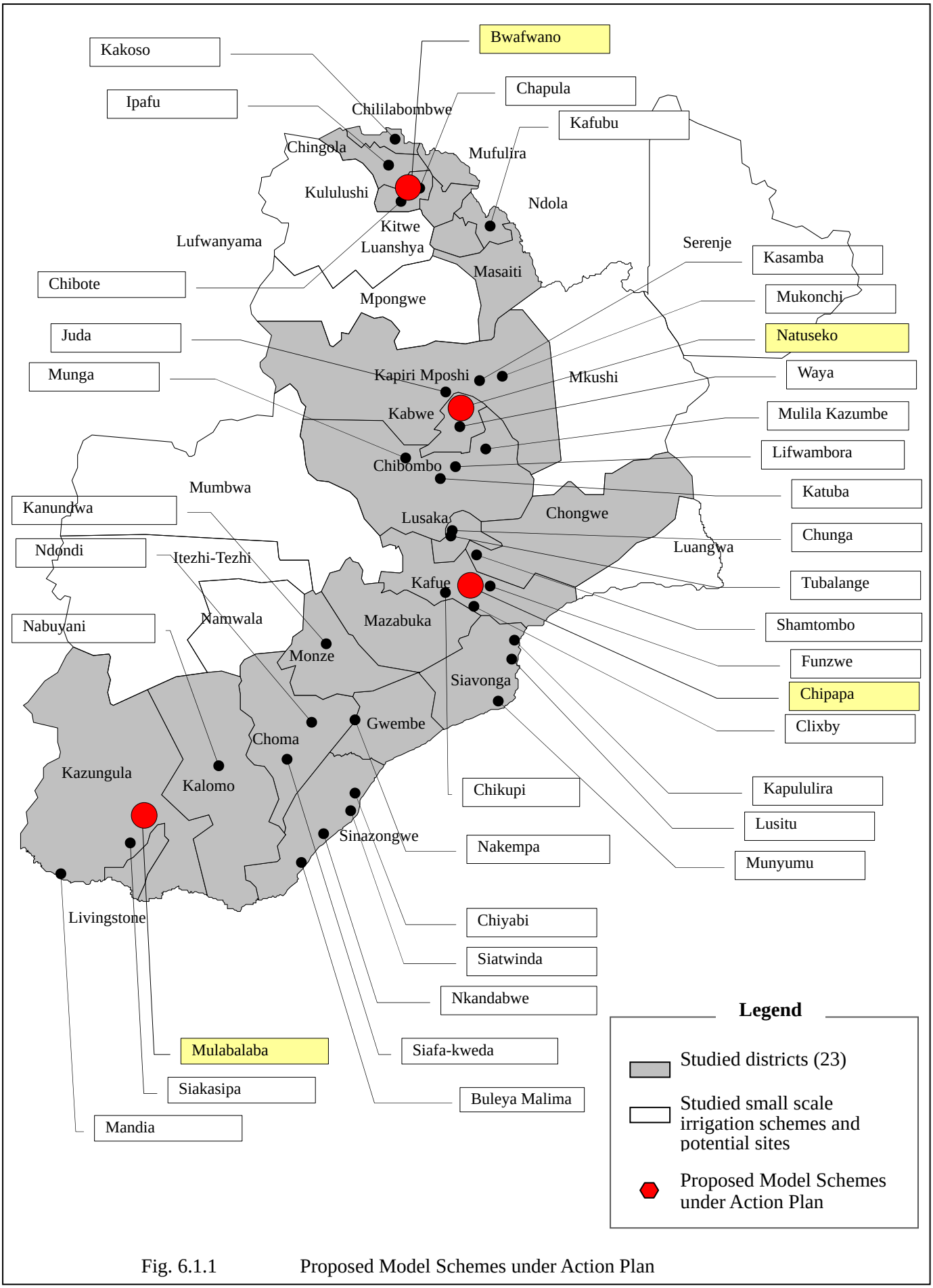



Fig. 6.1.1 Proposed Model Schemes under Action Plan

## 6.2 Model Projects under Action Plan

### 6.2.1 Outline of Model Sites

(1) Chipapa irrigation scheme

The site is located at 7km from the junction of Lusaka-Kafue road. The site is adjacent to Lusaka, the capital of the country, where large scale marketplaces, supermarkets, processors are available. Market potential is very high, with big demand and various marketing channels. Potential crops are green beans, rapes, cabbages, cauliflowers, various leaf vegetables, etc. Potential market channels are wholesalers (Soweto market and other major market in Lusaka); wholesale company; processors (e.g. Freshpict); supermarket chains (e.g. Shoprite/ Freshmark, Spar, Melisa); hotels/ lodges; institutions; exporters, etc.

Impounding water is a water source of the Chipapa irrigation scheme. The irrigation canal rehabilitation work is necessary to increase the flow capacity of the canal with rising of the canal wall. Similar irrigation schemes utilizing impounding water are located near the Chipapa scheme, thus irrigation canal rehabilitation work is applicable to those schemes. Irrigation water management skill of the farmers will be improved through capacity building of WUAs, and financial assistance by the Government is necessary to achieve effective use of the impounding water. Concrete material is used for rising of the canal height.

Target farmers' group is Chipapa Dam Garden Community. Although collective marketing is not conducted at the moment, they are taking actions for its realization. They have a fresh memory that their parents have been conducting collective marketing long ago, and recognize the advantage of such operation. This memory is now shared by all member farmers for motivation. Although sufficient impounding water is available, the farmers used to start irrigated farming in the middle of the dry season because of a shortage of labour force for maize harvest in the rain-fed cultivation. Farm income is thus limited in small amount.

(2) Bwafwano irrigation area

The site has a high market potentiality, with 30km to Kitwe (large consuming area), 100km to cross-border market and adjacent to main road. Potential crops are carrot, cabbages, tomato, and other various vegetables. Potential market channels are Wholesalers (Chisokone market, Kitwe / main Masala market, Ndola); wholesale company; processors; supermarket chains (e.g. Shoprite); hotels/ lodges; institutions; Kasumbalesa border market (exporters in cross border trade to DRC), etc.

Agricultural model using underwater in the layers of river deposits, similar to a dambo, is proposed in the Copperbelt Province where small alluvial plains have been widely developed along the small tributaries. In the Bwafwano irrigation scheme, irrigation system is well being operated under the appropriate control of the Water Board. The irrigable area is variable depending on the flow volume of the natural stream and drainage flow from the Mindro pond owned by a Mining company. Upstream farm lands take advantage of the water distribution during the dry season according to a vested like water right. It is proposed to establish WUA and encourage its activities aiming at the increase of agricultural productivity of the scheme and smooth operation and maintenance of the irrigation facilities.

Target farmers' group is Bulimi Cooperative / Tiwonge Multi-Purpose Cooperative / Tusheni Cooperative. Although collective marketing is not conducted at the moment, they have "market" in mind. 3 groups recognize one of the main reasons for no collective marketing is a lack of facilities. They desire to own and utilize one (1) shed jointly for the realization of collective marketing. Surface water is diverted to three farmers groups. It is necessary to organize these three groups into a unified WUA to effectively utilize the limited irrigation water. In addition, it is essential to accelerate all farmers to join the WUA to strengthen their activities because about half of the farmers are members of the water users group at present.

(3) Natuseko irrigation area

The site is located at 15km to Kabwe, the centre of Central Province, where several medium scale marketplaces are in operation. The irrigation site is adjacent to the main road. Expansion of marketing channels is expected by linkage with marketers under the background of high self-sufficiency rate of the province. Potential crops are tomato, rape, water melon (new crop), and other various vegetables. Potential market channels are wholesalers (New Kasanda market, Kabwe / Kabwe town centre market, Kabwe), wholesale companies, exporters (in future), etc.

Depressed swampy areas and dambo areas are scattered in Kabwe District, especially at the most upstream stretches of the rivers Kafue, Luangwa and Chambeshi. Since the farmers lift up groundwater manually for irrigation, irrigated farm land area has not been expanded and cropping is also limited in a short period. Treadle and movable engine pumps are widely introduced to mitigate laborious work, especially for women in the area.

Target farmers' group is Moto-Moto Gardening Group (A and B). 72% of member farmers possess bicycles. They frequently do "group transportation by bicycles" to marketplaces. However, transactions are usually conducted individually. They have a keen interest in a shed for joint utilization (group A and B) for the realization of collective marketing, with advantages of location (near marketplaces) and group leadership. About 50 ha or more of the dambo has been developed, however adequate groundwater has not been used for irrigation due to small incentive of farmers for farming, in particular collective marketing. Sharing system of water lifting equipment may lead to expansion of the irrigable area in the dambo area.

(4) Mulabalaba irrigation scheme

The site is located at 6km from the Lusaka-Livingstone road in Kazungula District. The centre of this district is a strategic point in marketing, being located at 60km to Livingstone, 40km to Western Province, and adjacent to 3 neighbour countries. Potential crops are tomato, cabbages, rape, leaf vegetables, green beans, and other various vegetables. Potential market channels are wholesalers (Maramba main market/ Mbita market, Livingstone), wholesale companies, LFCS green market (Livingstone), processors, supermarket chains, hotels/ lodges, institutions, Kazungula border market (exporters in cross border trade to Botswana),etc.

Impounding water is a water source of the Mulabalaba irrigation scheme. Since the irrigation canal is centrally located in the farm land, water is drawn manually for the land higher than the canal. Water lift equipment such as treadle pumps offer increase of irrigation water supply. It is preferable to

extend the irrigable area by gravity downstream with canal extension.

Target farmers' group is Mukamba Multi-Purpose Cooperative Society. This group conducts very active marketing operation, such as collective marketing, contract based transactions with marketers, linkage with other farmers' groups, advertisement, etc. They desire to have a much bigger multi-purpose shed, since the existing one is too small for operation. To realize well operated water management and effective use of impounding water, water distribution system must be improved through an aggressive intervention of WUA. Community by-laws constituted by the WUA of Mulabalaba is introduced as Annex E 2.

### 6.2.2 Components

The components implemented in the pilot projects which are set up based on sectoral strategies and countermeasures in M/P contribute to the development potential of each site. The common components are as follows;

(1) Farm management/cropping

a) Appropriate cropping system
b) Strategic Cropping
c) Improvement of cultivation technology

(2) Distribution and marketing

a) Promotion of collective marketing by use of multi-purpose shed
b) OJT for strengthening of practical marketing skill smallholders
c) Technology transfer to district officers through OJT

(3) Irrigation and water management

a) Lining of the irrigation canal with concrete
b) Effective use of impounding water (existing dam) for irrigation
c) Dambo and swamp area development with groundwater use
d) Expansion of an irrigable area with efficient irrigation water supply

(4) Farmers' organization

a) Strengthening of marketing ability
b) Enhancement of support system for farmers' organization
c) Formulation of Registered Cooperative
d) Strengthening of Water Users Associations

(5) Capacity development

a) Technical transfer to Government technical officers
b) Capacity development of farmer's leaders, staff of cooperatives

### 6.2.3 Model Projects

(1) Small scale irrigated agriculture project for promoting brand crops

| | | | |
|---|---|---|---|
| **Master Plan Program** | **Small scale irrigated agricultural model program in Zone 3** | | |
| **Implementation Period** | **2012～2015 (4 years)** | | |
| **Target Group** | **Chipapa Dam Garden Community** | | |
| **Implementing Agency** | **MACO / Kafue DACO's Office** | **Collaborating Agencies** | |

**Background and Objectives**

The project site is located in largest market area such as Soweto market in Zone 3. In this connection, highly maintained market condition in Zone 3 provides large agro-business potential for super market owners, processors, traders and also smallholders. Although Zone 3 is blessed with various market channels, needs and business environment, most of smallholders are facing a difficulty of competition with agricultural enterprises, large scale farmers and emerging farmers. Majority of the smallholders cannot make use of the blessed environment and are still behind in terms of economic development.

The project area encompasses potential irrigable traditional land of about 100 ha. However, only 10 ha of the available arable land are actually used for crop production due to limited amount of water from the dam. There are about 120 farmers in the project area most of whom are females and widowed. Individual or family plot sizes range from 0.1 to 0.5 ha.

The main crops are green beans, rape, tomato, okra and cabbage etc. During the rainy season, the fields are planted with maize under rain-fed cultivation. All the vegetables grown in the Chipapa Dam Vegetable Scheme area are sold at Soweto market in Lusaka. The vegetables are transported in sacks or boxes using local pickup trucks and buses which are hired individually. The farmers in the Chipapa scheme cannot get benefits effectively from accessibility to market and high marketing potential.

The project aims at presenting a model project in the suburbs of the large cities with the rehabilitation of a small scale dam. The project is mainly composed of empowerment of farmers' organizations making use of high market potential.

**Project Goal**

Presentation of an irrigated agricultural business model by the smallholders in the suburbs of large cities

**Expected Outputs**

1. Increase of farm productivity and farm income
2. Improvement of business skill of farmers and farmers' organizations

**Activities**

1. Farm management / cropping
   - 1-1 Promoting Vegetable Complex
   - 1-1-1 Participatory market research for improvement of market awareness
   - 1-1-2 Cropping calendar formulation for Improvement of planning capacity
   - 1-1-3 Demonstrations for improvement of productivity
   - 1-1-4 Business plan preparation for improvement of business solution
   - 1-2 Strategic Planting to get good business chances
   - 1-2-1 Planting for high price season
   - 1-2-2 Contract farming planning
   - 1-2-3 Matching meeting
   - 1-3 Introducing early maturing compost
   - 1-3-1 Bokashi (Early maturing compost) preparation
   - 1-3-2 Dissemination of Bokashi application

2. Marketing (For detail, see Attachment 3)
   Following activities for strengthening practical marketing skill of smallholders by OJT:
   - 2-1 Formulation of sales plan based on market requirement
   - 2-2 Implementation of sales promotion
   - 2-3 Promotion of collective marketing
   - 2-4 Technology transfer to district officers for self-sustainability of the project

3. Irrigation and water management
   Total 7.8 ha (Gross)
   - 3-1 Rehabilitation of main canal (Raising of canal height, L=300m, incremental height of 0.15 m)
   - 3-2 Reshaping of section and canal profile of secondary canals (21 secondary canals ×250m)

4. Farmers' Organization
   - 4-1 Enhancement of Market Activities
   - 4-1-1 Conducting Farmers' Training
   - 4-1-2 Conducting Business Plan
   - 4-1-3 Conducting Study Tour
   - 4-2 Enhancement of Support System for Farmers' Organization
   - 4-2-1 Support of Information Management
   - 4-2-2 Monitoring and Evaluation of Farmers Business Plan
   - 4-3 Strengthening of Water User's Associations (WUAs)


Fig. 6.2.1 Chipapa Irrigation Scheme

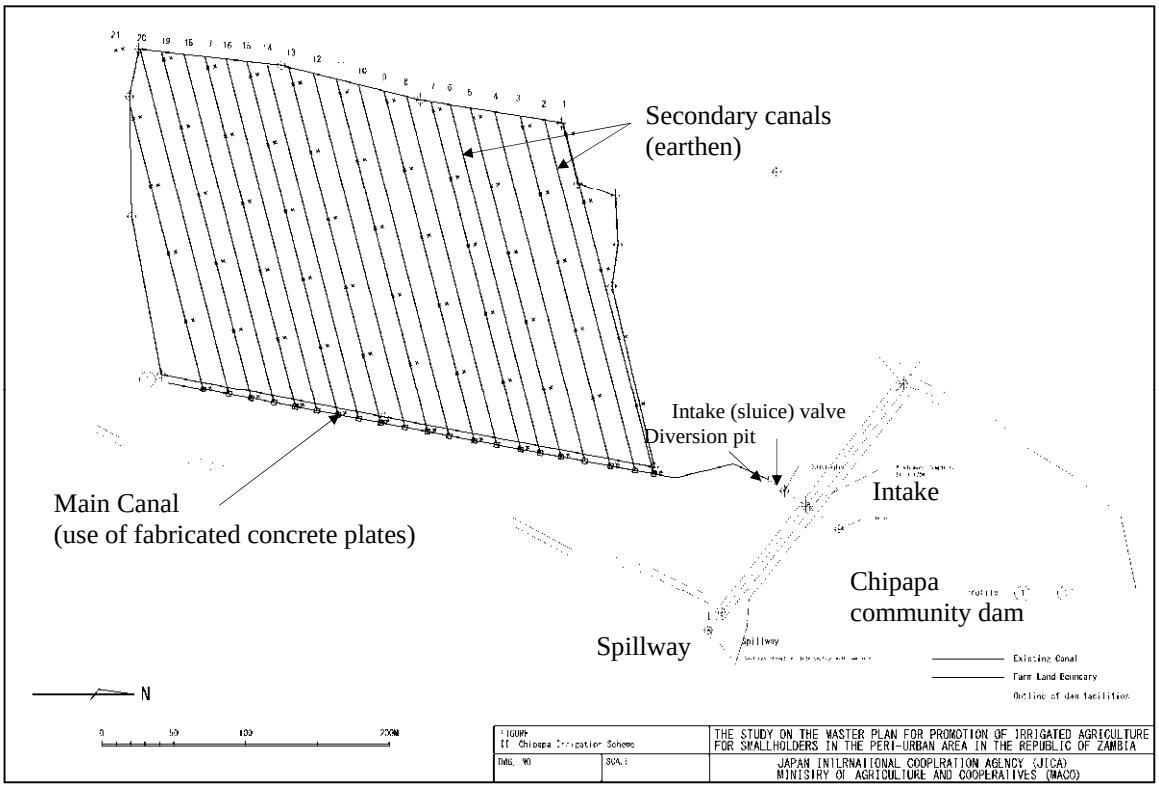



Fig. 6.2.2 Layout of Chipapa Irrigation System

## (2) Vegetable complex promotion project (Zone 1)

| | | | |
|---|---|---|---|
| **Master Plan Program** | **Vegetable complex promotion project in Zone 1** | | |
| **Implementation Period** | **2012～2015 (4 years)** | | |
| **Target Group** | **Bulimi Cooperative / Tiwonge Multi-Purpose Cooperative / Tusheni Cooperative** | | |
| **Implementing Agency** | **MACO / Kalulushi DACO's Office** | **Collaborating Agencies** | |

**Background and Objectives**

Zone 1 is blessed with abundant water sources due to large rainfall, and perennial flow is observed in several small tributaries in the most upstream stretches of the Kafue river. From the point of market potential, large consuming cities such as Ndola and Kitwe are located in this zone. Zone 1 also borders on the North Western Province that has been developed as a new mining industrial region and locates close to the Republic of Congo where the food demand is increasing rapidly. In spite of this blessed situation, productivity in Zone 1 cannot meet the demand in the area, which often depends on import from adjacent Provinces and Congo. Because of this situation, increase of shipping volume of internal produce is encouraged. Improvement of quality of produce, differentiation of produce from other regions are stimulated for increase of internal production together with development of wetland (dambo), diversion of the river surface flow, etc.

Cropping vegetables with high variation and less quantity at individual level; while quantity for each crop commodity is secured within the regional community for collective shipment, this can lead the community to a farming complex for an intensive production of vegetables.

**Project Goal**

The project aims at creating coordinated cultivation base with high marketability and water potential.
Furthermore, the project aims at presenting a model project producing high value (quality) products.

**Expected Outputs**

(1) Coordinated water management is realized in the small scale irrigation scheme under joint ownership
(2) Systematic production infrastructure is equipped for improving quality control

**Activities**

1. Farm management / cropping
   - 1-1 Promoting Vegetable Complex
     - 1-1-1 Participatory market research for improvement of market awareness
     - 1-1-2 Cropping calendar formulation for Improvement of planning capacity
     - 1-1-3 Demonstrations for improvement of productivity
     - 1-1-4 Business plan preparation for improvement of business solution
   - 1-2 Strategic Planting to get good business chances
     - 1-2-1 Planting for high price season
     - 1-2-2 Contract farming planning
     - 1-2-3 Matching meeting
   - 1-3 Introducing early maturing compost
     - 1-3-1 Bokashi (Early maturing compost) preparation
     - 1-3-2 Dissemination of Bokashi application

2. Marketing (For detail, see Attachment 3)
   Following activities for strengthening practical marketing skill of smallholders by OJT:
   - 2-1 Formulation of sales plan based on market requirement
   - 2-2 Implementation of sales promotion
   - 2-3 Promotion of collective marketing
   - 2-4 Technology transfer to district officers for self-sustainability of the project

3. Irrigation and water management
   Total 70 ha (3 cooperatives)
   - 3-1 Rehabilitation of existing irrigation canal (Widening and lining of main canal of3.0 km long)
   - 3-2 Installation of diversion pits (60 pits at 50m interval)

4. Farmers' Organization
   - 4-1 Enhancement of Market Activities
     - 4-1-1 Conducting Farmers' Training
     - 4-1-2 Conducting Business Plan
     - 4-1-3 Conducting Study Tour
   - 4-2 Enhancement of Support System for Farmers' Organization
     - 4-2-1 Support of Information Management
     - 4-2-2 Monitoring and Evaluation of Farmers Business Plan
   - 4-3 Strengthening of Water User's Associations (WUAs)

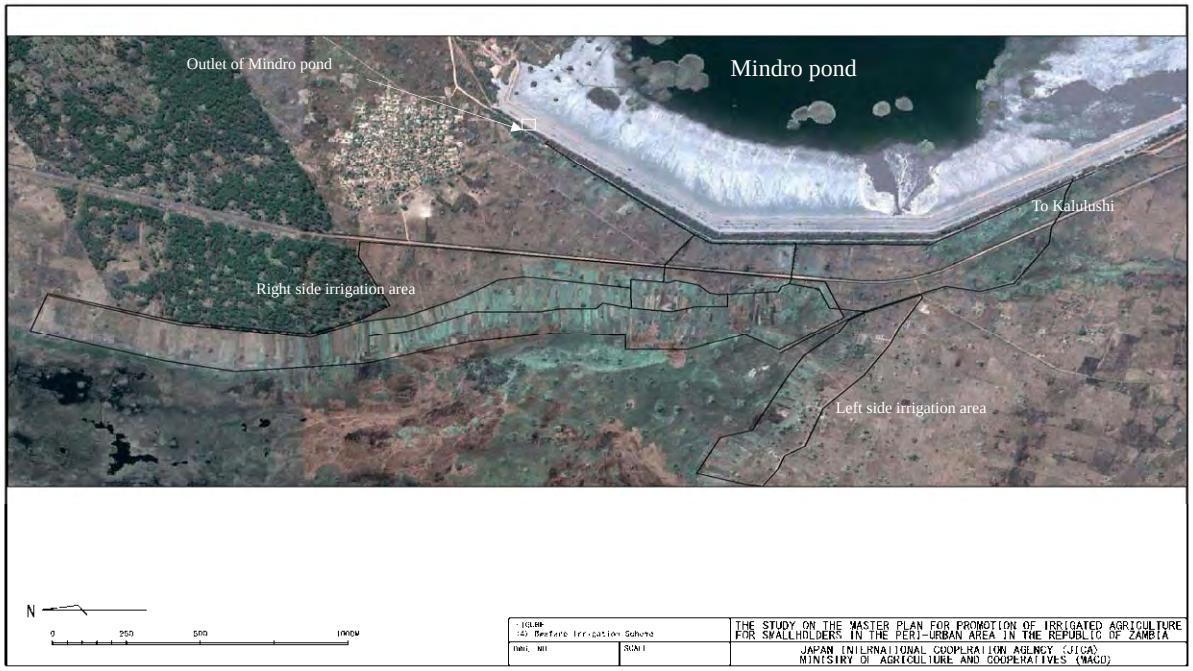



Fig. 6.2.3 Bwafwano Irrigation Scheme

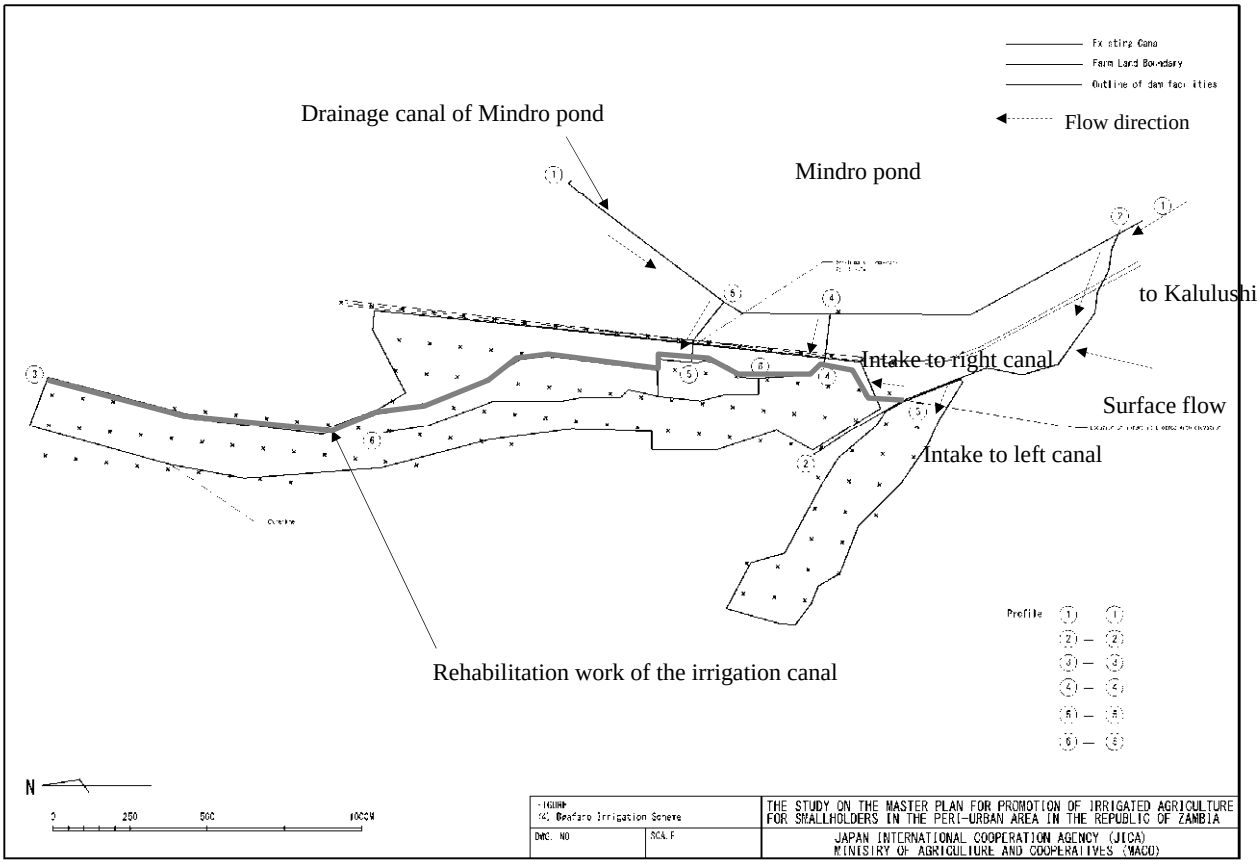



Fig. 6.2.4 Layout of Bwafwano Irrigation System

## (3) Vegetable complex promotion project (Zone 2)

| | | | |
|---|---|---|---|
| **Master Plan Program** | **Vegetable complex promotion project in Zone 2** | | |
| **Implementation Period** | **2012～2015 (4 years)** | | |
| **Target Group** | **Moto-Moto Gardening Group** | | |
| **Implementing Agency** | **MACO / Kabwe DACO's Office** | **Collaborating Agencies** | |

**Background and Objectives**

Large consuming city Kabwe is located in Zone 2. Farm income is improved by means of cash crop cultivated through the enhancement of irrigation activities using dams and dambos in the dry season in addition to staple food crop cultivation in the wet season. Annual rainfall is about 950 mm. Dambos widely developed in a hilly terrain produce adequate groundwater and surface flow in the upstream stretches of Mwomboshi River as well as Kafue River.

Cropping vegetables with high variation and less quantity at individual level; while quantity for each crop commodity is secured within the regional community for collective shipment, this can lead the community to a farming complex for an intensive production of vegetables.

**Project Goal**

The project aims at creating coordinated cultivation base with high marketability and water potential. Furthermore, the project aims at presenting a model project producing high value (quality) products that satisfy demand requirement in and around the area.

**Expected Outputs**

(1) Coordinated water management is realized in the small scale irrigation scheme under joint ownership
(2) Systematic production infrastructure is equipped for improving quality control

**Activities**

1. Farm management / cropping
   - 1-1 Promoting Vegetable Complex
   - 1-1-1 Participatory market research for improvement of market awareness
   - 1-1-2 Cropping calendar formulation for Improvement of planning capacity
   - 1-1-3 Demonstrations for improvement of productivity
   - 1-1-4 Business plan preparation for improvement of business solution
   - 1-2 Strategic Planting to get good business chances
   - 1-2-1 Planting for high price season
   - 1-2-2 Contract farming planning
   - 1-2-3 Matching meeting
   - 1-3 Introducing early maturing compost
   - 1-3-1 Bokashi (Early maturing compost) preparation
   - 1-3-2 Dissemination of Bokashi application

2. Marketing (For detail, see Attachment 3)
   Following activities for strengthening practical marketing skill of smallholders by OJT:
   - 2-1 Formulation of sales plan based on market requirement
   - 2-2 Implementation of sales promotion
   - 2-3 Promotion of collective marketing
   - 2-4 Technology transfer to district officers for self-sustainability of the project

3. Irrigation and water management
   Total 20 ha cultivated by the Moto Moto group in entire arable land of 50 ha in the Natuseko area, 76 households (Group A 40 households, Group B 36 households)
   - 3-1 Procurement of watering equipment (Treadle pumps: 3 sets, movable engine pumps (3 sets) for group use)
   - 3-2 Procurement of conduit pipes (Polyethylene pipe, dia. 50mm, 50m ×30 pipes)

4. Farmers' Organization
   - 4-1 Enhancement of Market Activities
   - 4-1-1 Conducting Farmers' Training
   - 4-1-2 Conducting Business Plan
   - 4-1-3 Conducting Study Tour
   - 4-2 Enhancement of Support System for Farmers' Organization
   - 4-2-1 Support of Information Management
   - 4-2-2 Monitoring and Evaluation of Farmers Business Plan
   - 4-3 Strengthening of Water User's Associations (WUAs)

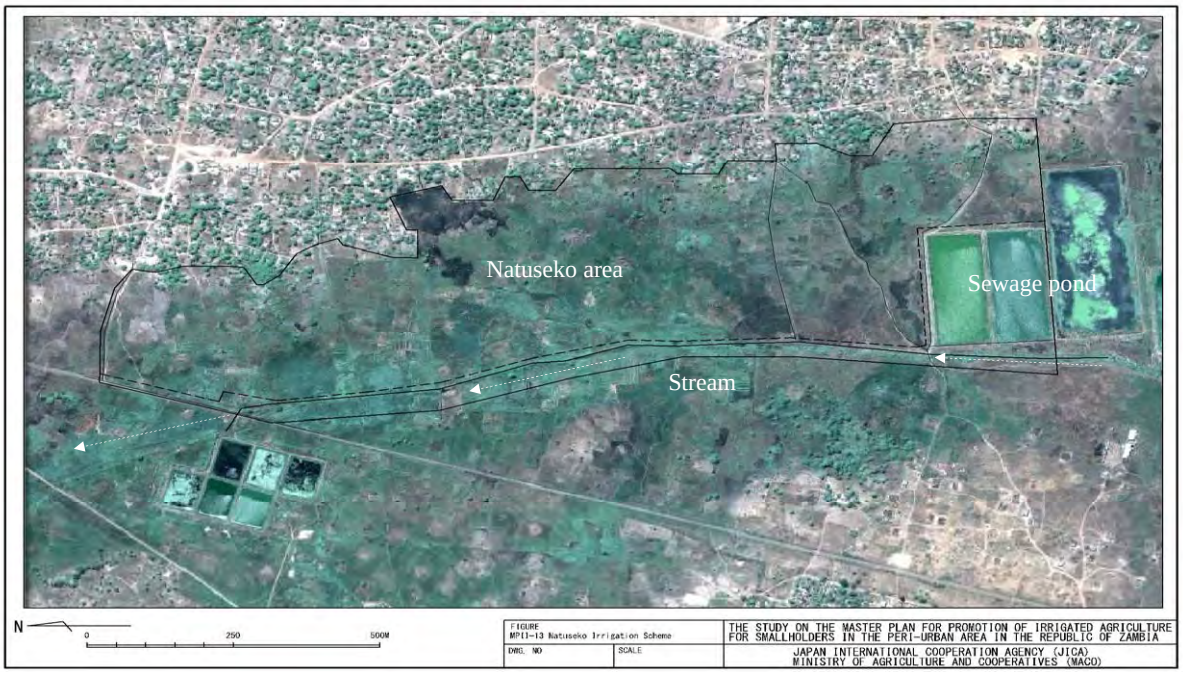



Fig. 6.2.5 Natuseko Irrigation Scheme

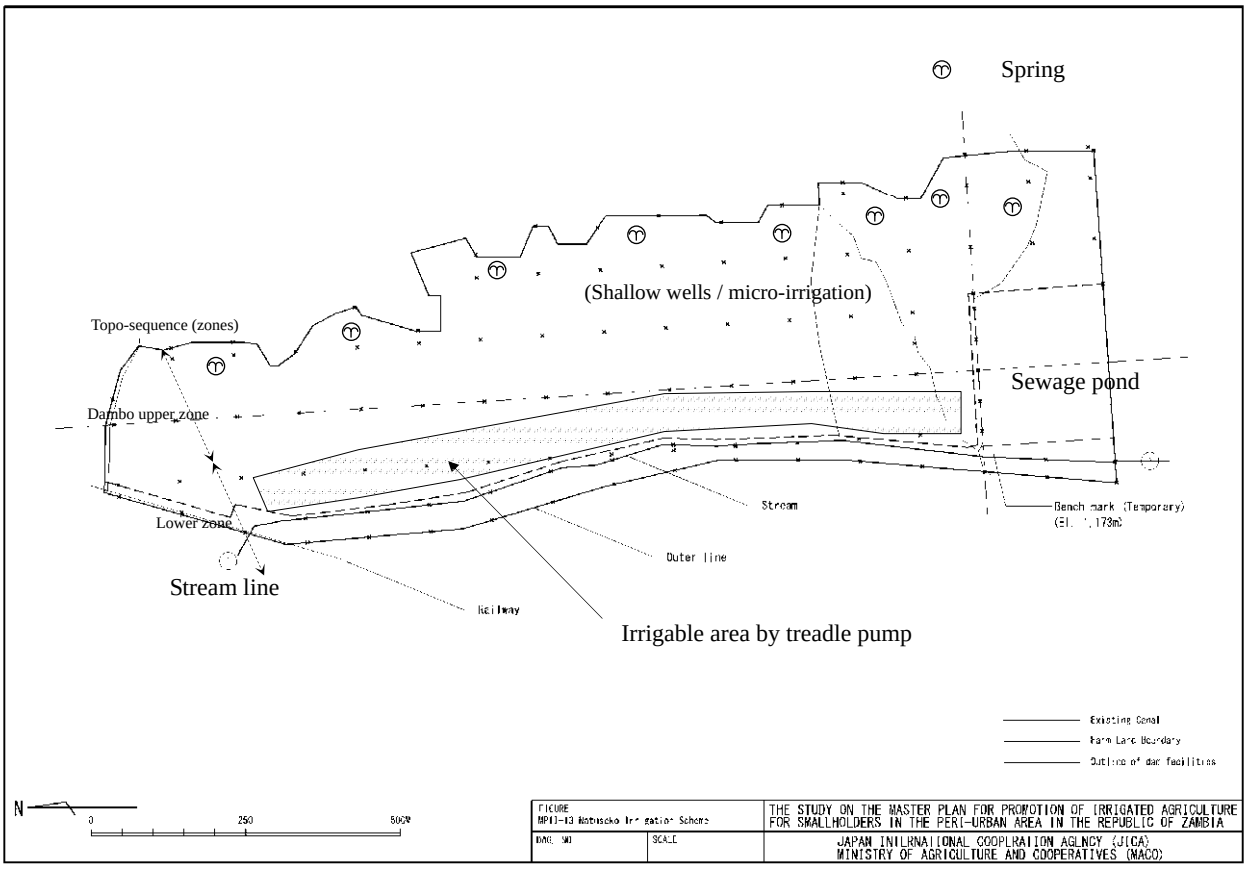



Fig. 6.2.6 Layout of Natuseko Irrigation System

## (4) Irrigated agricultural project with water source of existing small scale dam

| | | | |
|---|---|---|---|
| **Master Plan Program** | **Irrigated agricultural project with water source of existing small scale dam in Zone 4, 5** | | |
| **Implementation Period** | **2012～2015 (4 years)** | | |
| **Target Group** | **Mukamba Multi-Purpose Cooperative Society** | | |
| **Implementing Agency** | **MACO / Kazungula DACO's Office** | **Collaborating Agencies** | |

**Background and Objectives**

Most of the dams constructed in 1990s to the beginning of 2000s have not been well utilized for irrigation purpose because these projects aimed at water supply for livestock and domestic water supply in rural areas and did not include intake facilities. After decades, their usability for irrigation is found due to insufficiency of irrigation water source in the Southern Province.

Zone 4 and 5 in the Southern Province have high market potential due to large consuming cities such as Livingstone, hotels, lodges as well as cross boarder marketing. Since smallholders' transaction is on an individual basis, such high market potential is not taken up at present. Niche and cross border markets for tourist facilities are proposed together with high quality produce supply.

It is targeted to accelerate vegetable production for tourist season with tomato and cabbage. Cabbage and rape are produced for cross boarder trading and existing market-channels. Green beans, as leguminous crops are newly introduced.

**Project Goal**

The project aims at disseminating irrigation model with its water source of small scale dams/ ponds.

**Expected Outputs**

(1) Stable trading system realizes increase of farm income
(2) Partnership between small traders and smallholders secures suppliers
(3) Producing center is formed through selling local specialty produces (local brand crops)
(4) Market oriented agriculture is developed with market need analysis within the area

**Activities**

1. Farm management / cropping
   - 1-1 Promoting Vegetable Complex
   - 1-1-1 Participatory market research for improvement of market awareness
   - 1-1-2 Cropping calendar formulation for Improvement of planning capacity
   - 1-1-3 Demonstrations for improvement of productivity
   - 1-1-4 Business plan preparation for improvement of business solution
   - 1-2 Strategic Planting to get good business chances
   - 1-2-1 Planting for high price season
   - 1-2-2 Contract farming planning
   - 1-2-3 Matching meeting
   - 1-3 Introducing early maturing compost
   - 1-3-1 Bokashi (Early maturing compost) preparation
   - 1-3-2 Dissemination of Bokashi application

2. Marketing (For detail, see Attachment 3)
   Following activities for strengthening practical marketing skill of smallholders by OJT:
   - 2-1 Formulation of sales plan based on market requirement
   - 2-2 Implementation of sales promotion
   - 2-3 Promotion of collective marketing
   - 2-4 Technology transfer to district officers for self-sustainability of the project

3. Irrigation and water management
   Total 10 ha (Gross)
   - 3-1 Treadle pumps (5 sets) to pump up canal water to the farm lands
   - 3-2 Installation of additional siphons and pipelines (2 siphon lines (dia. 60mm) and PVC pipe installation (dia. 60mm))

4. Farmers' Organization
   - 4-1 Enhancement of Market Activities
   - 4-1-1 Conducting Farmers' Training
   - 4-1-2 Conducting Business Plan
   - 4-1-3 Conducting Study Tour
   - 4-2 Enhancement of Support System for Farmers' Organization
   - 4-2-1 Support of Information Management
   - 4-2-2 Monitoring and Evaluation of Farmers Business Plan
   - 4-3 Strengthening of Water User's Associations (WUAs)

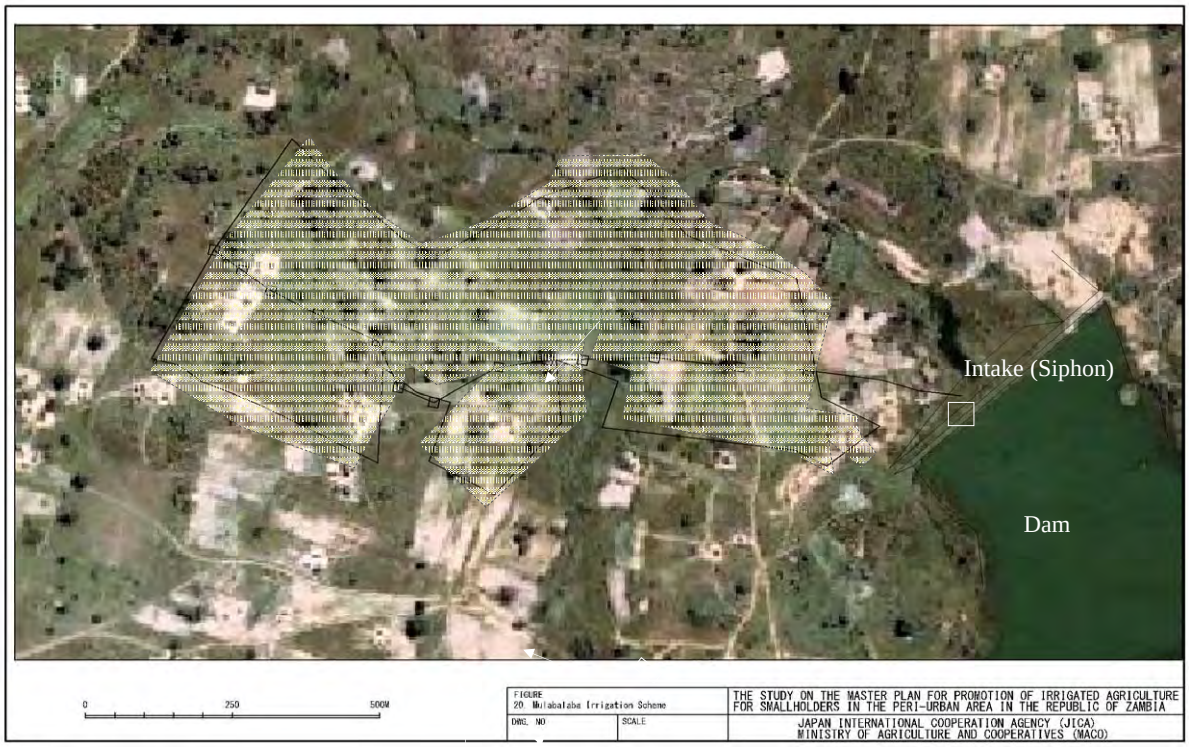



Fig. 6.2.7 Mulabalaba Irrigation Scheme

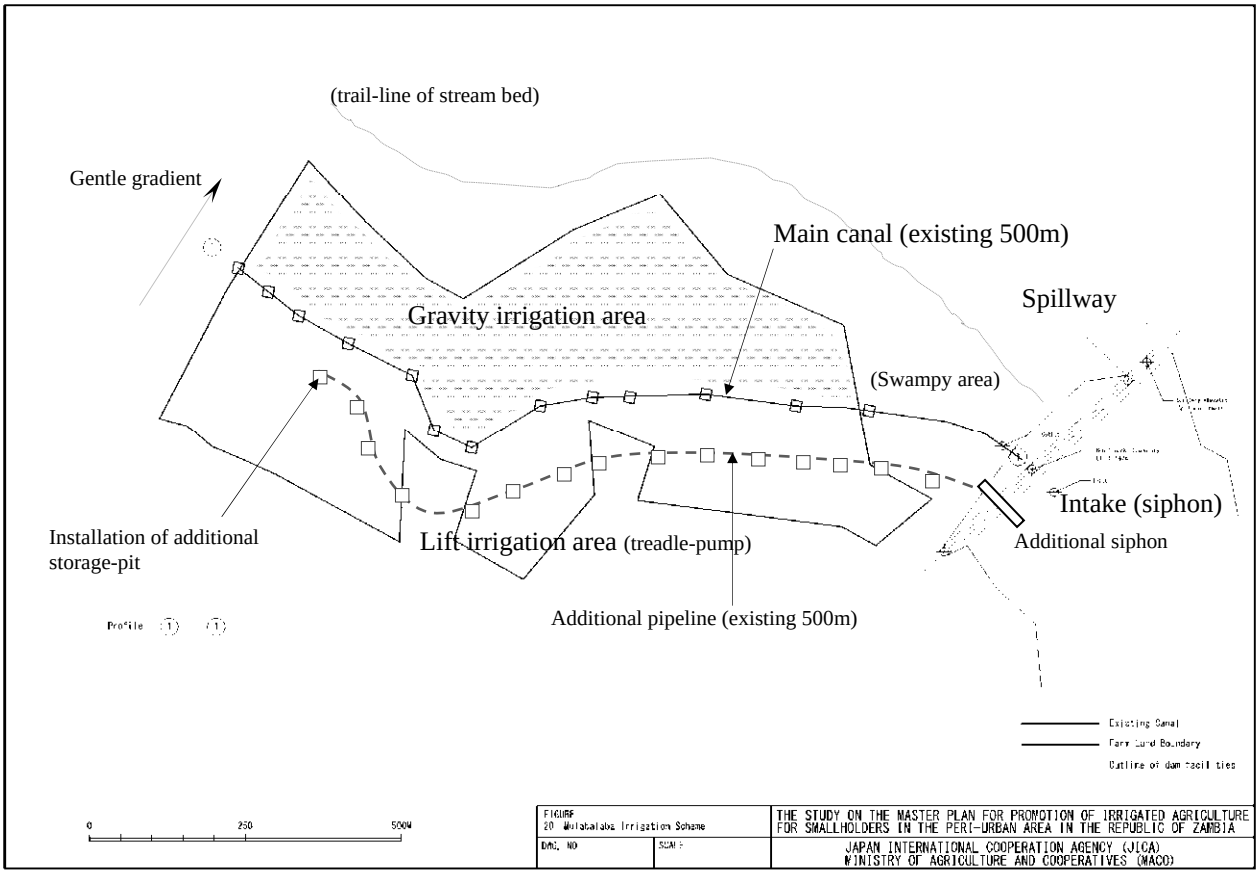



Fig. 6.2.8 Layout of Mulabalab Irrigation System

## (5) Capacity development of government and farmers' leaders

| | | | |
|---|---|---|---|
| **Master Plan Program** | **Capacity development of Government farmers' leaders** | | |
| **Implementation Period** | **2012～2015 (4 years)** | | |
| **Target Group** | **Government officials (MACO) and farmers' leaders** | | |
| **Implementing Agency** | **MACO** | **Collaborating Agencies** | |

**Background and Objectives**

For the promotion of small scale irrigated agriculture, more emphasis on irrigation and marketing in the extension system should be given in addition to the current one. For this to occur, other departments which are related to the promotion of small scale irrigated agriculture can provide their supports to CEOs. Nonetheless, it is important that such supports are given in a consistent way. Therefore, installation of a 'cross-sectional support unit' which consists of relevant departments is vital for the integration of such supports so that they will enhance the capacity of extension officers as well as irrigation officers
The development strategy related to 'capacity development of farmers and improvement of extension services' has three countermeasures, which are 'capacity development of farmers, installation of Cross-sectional Unit and 'capacity development of CEO, BEO, DAO staffs for extension services' and also technical training of TSB staff for irrigation development.

**Project Goal**

- To improve farmers' knowledge and technology of organization management
- To improve CEO, BEO, DACO staffs' skill as trainers
- To acquire knowledge and skills on small scale irrigated agriculture
- To improve technical skill of irrigation engineers and technical officers as well as farmers

**Expected Outputs**

(1) Farmers manage their group as a business entity.
(2) Support system of government staffs for farmers groups is reinforced.
(3) Productivity is increased by adoption of conservation farming
(4) Practical and collaborate farmers accept many visitors to their on-farm demonstration farm, and visitors practice the knowledge and skills
(5) Sustainable irrigation system is realized through technical assistances such as operation and maintenance skill, collection of irrigation fee, monitoring and evaluation, etc.

**Activities**

1. Farm Management
   - 1-1 Participatory market research
   - 1-2 Cropping calendar formulation
   - 1-3 Production skill improvement through demonstrations
   - 1-4 Business plan preparation

2. Marketing
   For marketing sector, capacity development of government and farmers' leaders is conducted through OJT program. Activities in the OJT are described by site in 4.1 – 4.4 and Attachment 3.

3. Irrigation and water management
   Capacity building program is subject to the staff of the Provincial and District offices of MACO. In the program, "trainers training" for irrigation engineers is first conducted. Trainers (Irrigation engineers) shall continuously train the irrigation technical officers.
   - 3-1 Participatory irrigation project implementation
   - 3-2 Community development
   - 3-3 Planning and design of the irrigation project (Small structures)
   - 3-4 Construction management
   - 3-5 Operation and maintenance of the irrigation project
   - 3-6 Monitoring and evaluation
   - 3-7 Environmental issues
   - 3-8 System design process

4. Farmers' Organization
   The government staffs, CEO/BEO and DACO officers, are expected to be trainers for the farmers' training in target sites. As a part of activities on the capacity development of the government officers, the trainers' training will be provided to them. The government staffs who are in charge of the neighbour districts in the Action Plan area will also participate in the training with the object of extending the process to make a model site to the other areas. The JICA expert, DACO/MACO expert, and NGOs will be assumed as trainers of the trainers' training.

## 6.3 Environmental and Social Consideration

### 6.3.1 Screening of the Projects proposed in the Action Plan

The Master Plan, to be entitled, "Master Plan 2012-2020" provides a road map for development over a 9 years period and an "Action Plan 2012-2015" with a 4-year implementation period in early stage.

The early stage of the Master Plan, the 4-year period (2012-2015) Action Plan, aims to establish models of commercial small-scale irrigated agriculture upon implementation of pilot projects. Experiences and lessons from the pilot projects shall be fed back to be summarized as a technical package to be utilized for implementing the said Master Plan.

The SEA study has highlighted the potential negative impacts of developments that could be considered in the Master Plan and has promoted alternatives such as gravity irrigation, exploitation of dry dambos, which are not classified as wetlands, to minimize these impacts. Furthermore the SEA study has established that rehabilitation is preferable to the option of new development, the former having shown that environmental objectives to reduce damages on the natural environment would be much easier to reach. In line with these findings, the Master Plan has selected rehabilitation projects over new developments for the 4 provinces considered in the Study.

To that effect, the Action Plan considers the implementation of the following 4 model projects or pilot projects in the said 4 provinces. The components of the projects in each site are described in section 2 in this Chapter.

(1) Small scale irrigation project for promoting brand crops through the rehabilitation of Chipapa irrigation scheme in Kafue District, Lusaka Province.

This project, which uses an area of 7.8 ha, targets the members of the Chipapa Dam Garden Cooperative which counts 125 members.

Environmental issues include:

- Land degradation
- Protection against animals
- Human health as related to water source

(2) Promoting vegetable complex project through the rehabilitation of Bwafwano irrigation scheme in Kalulushi District, Copperbelt Province.

This project, which uses an area of 70 ha, targets the members of 3 cooperatives, namely Tiwonge, Bulimi and Tusheni with respectively 40, 57 and 76 members.

Environmental issues include:

- Water sources and water quality
- Human health as related to water source
- Forest area preservation
- Sustainable use of dambos

(3) Promoting vegetable complex project through the rehabilitation of Natuseko irrigation scheme in Kabwe District, Central Province.

This project, which uses an area of 20 ha, targets the members of 2 farmers groups, namely Moto-Moto A and Moto-Moto B with respectively 40 and 36 members.

Environmental issues include:

- Water sources and water quality
- Human health as related to water source
- Sustainable use of dambos

(4) Promoting efficient use of existing small scale dam project through the rehabilitation of Mulabalaba irrigation scheme in Kazungura District, Southern Province.

This project, which uses an area of 10 ha, targets the members of 3 cooperatives, namely Mukamba, Tulime and Now with 29, 19, and 16 members, respectively.

Environmental issues include:

- Land degradation
- Protection against animals
- Human health as related to water source

### 6.3.2 Projects Categorization and Reasons

The above mentioned projects proposed in the Action Plan are model projects that shall be extended to other areas based on the experience and lessons learnt during their implementation. To that effect, the government staffs, CEO/BEO and DACO officers, are expected to be trainers for the farmers' training in target sites. Hence, these government officers will be trained to be trainers as a part of their capacity development during the implementation of the Action Plan so as to help in extending the model sites to other areas.

Overall the model projects are expected to have minor effects on the environments as they consist mainly of non-structural measures intended to improve government staffs and farmers' capacity in namely farm management, marketing and organization.

As seen previously in the irrigation component, the only structural measures concerned consist of rehabilitation of existing canals, construction of small weirs and diversion pits to improve water storage and conveyance.

Also the SEA study completed at the planning phase has shown that the environmental objectives to protect the natural and social environment will be easily reached when rehabilitation is involved as the associated environmental effects are minor and can be easily mitigated.

With these considerations in mind, the above mentioned projects can therefore be categorized as Category B projects, requiring a project brief or an IEE level study to secure the approval of ECZ for their implementation.

The Terms of Reference (TOR) of the IEE study is detailed in Annex F4. What follows gives the outline of the said TOR.

### 6.3.3 TOR of the IEE Study

For Category B projects, TOR of IEE is prepared to reflect the nature of each project and to serve as project brief for ECZ review and approval.

Under the TOR, studies on environmental and social consideration are conducted at the IEE level and are consequently less detailed than studies conducted at the EIA level.

(1) Objectives of the IEE study

The objectives of the IEE study are as follows:

- to clarify the impacts that will accrue from the implementation of the model projects
- to prepare and suggest the mitigation measures and monitoring plans for the identified impacts
- to prepare the basic and reference data necessary for the Environmental Project Brief (EPB) submitted to ECZ by MACO for the issuance of the approval decision letter preceding the construction works

(2) Study area

The IEE study is required to be carried out in the following four (4) models projects:

- Chipapa Model Scheme (Kafue district)
- Bwafwano Model Scheme (Kalulushi district)
- Natuseko Model Scheme (Kabwe district)
- Mulabalaba Model Scheme (Kazungura district)

(3) Items to be surveyed in the IEE study

The following items shall be surveyed in the IEE study.

- Water pollution (water quality)
- Soil and air pollution
- Land degradation
- Protection against animals
- Impact for the rural environment
- Impact for future land use plan
- Health hazard of farmers

(4) Project activities

The project activities to be studied refer to before construction, at construction and at operational phases

(5) Schedule of the IEE study

The survey is to be carried out by a local consultant entrusted with the study. The term of the survey is 15 days per model project, which includes the completion of a final report. The review of the report by ECZ will take approximately 35-40 days, which represents a new time frame necessary for review of one EPB (Please refer to Annex F5 for cost estimates and schedule of the IEE study).

(6) Costs incurred per model project

ECZ review cost of 1 EPB: **ZMK 7,799,940** approximately, USD equivalent **USD 1696** (as at Nov. 2010) (Please Refer to EIA Review Fees at Table 2.3.2)

Cost of the undertaking of IEE per project: **ZMK 19,402,800** approximately USD equivalent **USD 4218** (Please Refer to cost estimates of the IEE study in Annex F5).

Other costs include those of water quality and soil fertility analysis to be undertaken in the IEE study. The analysis can be entrusted to the University of Zambia with a minimal cost.

### 6.3.4 Further Environmental and Social Consideration

(1) Sustainable use of dambos

Dambos' wide coverage of 3.6 million hectares country-wide offers the greatest potential for irrigation expansion using small scale farmers. As the A/P promotes the use of dambos to improve the productivity of farmers in namely Bwafwano scheme (Copperbelt Province) and Natuseko scheme (Central Province), and to extend this use in other areas during the M/P implementation, the need for sustainable use of dambos raises questions about the need to ensure that the various utilisations strategies employed are both environmentally sustainable, and economically beneficial. Other experiences in Southern Africa have shown that dambo exploitation can lead to soil erosion, gully formation, water shortages and subsequently the loss of dambo-based livelihood opportunities. In addition, there are conflicts over use of these valuable resources as people compete for access and control. Hence, a key challenge at the present time is to identify ways in which wetland benefits can be sustained through the use of sustainable management practises by the local communities and the coordination and enforcement of these. The SAB project in Central Southern Africa, namely in Zambia and Malawi, did just that and lessons learnt from it can be extended to this present project (Refer to the Annex F6).

(2) Way ahead for the M/P and A/P

As the project anticipates studies tours to other districts to promote farmers to farmers' extension and exchange of experience, it is suggested that these study tours be organised for the dambos areas of Copperbelt and Central Provinces to the Northern Province, Mpika District, or to Malawi, where the SAB project has demonstrated sustainable use of dambos. DACO staffs and farmers in the areas concerned of M/P and A/P can learn from the experiences of SAB project, develop their own areas and extend the techniques to other areas concerned. Furthermore, as a supplementary study at this stage, the JICA Study Team has entrusted to a local consultant a short review of literature on sustainable dambos use in Zambia. The results of this survey are confined in Annex F7 of this report for the DACO staffs and farmers to share in the course of the implementation of the projects.

## 6.4 Supplementary Explanation

The pilot projects are implemented in line with the activities described in 6.2.3 for project sheets. The projects aim to develop a model on small scale irrigated agriculture as a business, by inducing capacity building of the farmers/farmers' organization with performing rehabilitation works on basic

irrigation facilities of the targeted existing irrigation schemes. Concurrently, the projects contain experimental proofs for verifying developmental direction of irrigated agriculture which is to be practically used by small scale farmers.

In this section, important elements of the pilot project such as methods on "Capacity building of the farmers/farmers organization" are mainly described. In addition, an example on "Cropping Plan" is also included, which is drawn up in proportion to the improvement of abilities of the farmers/farmers' organization.

### 6.4.1 Strengthening of Farmers/Farmers' Organization

(1) Enhancement of marketing activities (applying to all 4 target sites)

a) Conducting farmers' training

The training for target farmers will be conducted in order to strengthen farmers' organization and enhance the capacity of commercial farming. The trainers are expected to be CEO/BEO, DACO officers, and also representative of farmers, who complete trainers' training conducted in the Action Plan. The contents of the training will be divided in two aspects depending on the type of capacities aimed to be enhanced, namely core capacity and technical capacity. The core capacity is to be used for strengthening the organization management. The technical capacity is to be used for conducting activities of commercial farming. Proposed contents of the training are shown below.

Table 6.4.1 Proposed Contents of Farmers' Training

| Core capacity | Technical capacity |
|---|---|
| ・Leadership<br>・Participatory decision making<br>・Conflict management<br>・Gender issues, etc. | ・Farm management<br>・Water resource management<br>・Marketing<br>・Business management, etc. |

b) Conducting business plan

Through utilizing the knowledge earned from the training, farmers are expected to formulate a Business Plan to conduct commercial farming as a group. The Business Plan must be comprehensive, which covers from production to selling. The monitoring will be done simultaneously with conducting the Business Plan by CEO/BEO and DACO officers. The result of the Business Plan will be evaluated by farmers and government officers at the end of the cropping season to be a feedback to the next season's Business Plan.

c) Conducting study tour

The Study Tour will be conducted in order to give farmers incentives toward commercial farming during the implementation of the Action Plan. There are two modes of the Study Tour. One is the Study Tour to visit other good exercising farmers to observe their activities; the other is the Study Tour to be visited by farmers from other area to show activities of the project site.

(2) Enhancement of support system for farmers' organization (applying to all 4 target sites)

a) Support of information management

Support for farmers' business activity will be enhanced in two ways, 1) collecting and managing information of farmers and market traders, and 2) strengthen of linkage between farmers and market traders, for instance conducting the matching meeting. DACO office is expected to manage these activities to support commercial farmers' groups and also market traders who are looking for farmers as the future business partners.

b) Monitoring and evaluation of farmers business plan

Implementation of the Business Plan which is made by farmers as a part of the activities of the Action Plan will be monitored and evaluated in order to extract necessary lessons fedback to the Business Plan of the next cropping season. Monitoring and evaluation will be observed by the government officers; especially CEO/BEO will play an important role since they work close to farmers in the village area.

(3) Formulation of registered cooperative (applying to Chipapa irrigation Scheme and Natsuseko irrigation Scheme)

Farmers of the Moto Garden Group in Kabwe District and Chipapa Dam Garden Community in Kafue District are not formed as a Cooperative. Therefore, the Project will support them to form a Cooperative as one of the activities of the Action Plan. It is recommended that farmers form themselves as a Cooperative because the successful Cooperative has a lot of necessary values to conduct commercial agriculture such as Self-help, Democracy, Equality, and Solidarity of the group. The officers from the Department of Cooperative (DOC) will take a significant role on this activity to motivate farmers toward forming and sustaining the Cooperative as a business entity.

(4) Strengthen water users associations (WUAs)

a) Tusheni Cooperative, Bulimi Cooperative and Tiwonge Multi-Purpose Cooperatives (Bwafwano Irrigation Scheme, Kalulushi District)

The Water Board well maintains water distribution system at present. The following are proposed to furthermore encourage farmers' incentives. The program aims at transmitting appropriate irrigation method and also shares common perceptions on the importance of water management between the farmers.

Appropriate training programs are selected from those in the Table below.

Table 6.4.2 Proposed Programs for Strengthening WUAs in Bwafwano Irrigation Scheme

| | Items | Target group | Inputs | Effects/ benefits |
|---|---|---|---|---|
| 1) | Establishment of a WUA | Water users groups | Seminar opening for WUA set up | WUA is established. |
| 2) | Strengthening of WUA's activities | Proposed WUA members | Technical and financial training for farmers | Farmers attain participatory approach on irrigation development. |

b) Motomoto Garden Group (Natsuseko Irrigation Scheme, Kabwe District)

Emphasis is put on an empowerment of farmers to increase farm production in the dry season through group use of treadle pumps and movable engine pumps in the dambo area.

Table 6.4.3 Proposed Programs for Strengthening WUAs in Natuseko Irrigation Scheme

| | Items | Target group | Inputs | Effects/ benefits |
|---|---|---|---|---|
| 1) | Establishment of a WUA | Water users groups*[1] | Seminar opening for WUA set up | WUA is established. |
| 2) | Strengthening of WUA's activities | Proposed WUA members | Technical and financial training of farmers | Management skill of WUA is improved. |

*[1] Target groups are the farmers belonging to the Moto Moto Garden Group.

c) Chipapa Dam Garden Community (Chipapa irrigation Scheme, Kafue District)

The WUA well maintains water distribution system at present. The following are proposed to furthermore encourage farmers' incentives. The program aims at strengthening WUA operation co-related to farming and marketing activities.

Table 6.4.4 Proposed Programs for Strengthening WUAs in Chipapa Irrigation Scheme

| | Items | Target group | Inputs | Effects/ benefits |
|---|---|---|---|---|
| 1) | Strengthening of WUA's activities | WUA members | Technical and financial training of farmers | Management skill of WUA is improved. |
| 2) | Water distribution planning | WUA members | Water distribution plan to maximize production | Irrigation skill of farmers is improved. |

d) Mukamba Multi-Purpose Cooperative (Mulabalaba irrigation Scheme, Kazungura District)

The scheme indicates typical development plan using impounding water. The following are proposed to furthermore encourage farmers' incentives.

Table 6.4.5 Proposed Programs for Strengthening WUAs in Mulabalaba Irrigation Scheme

| | Items | Target group | Inputs | Effects/ benefits |
|---|---|---|---|---|
| 1) | Establishment of a WUA | Water users groups | Seminar opening | WUA is established. |
| 2) | Strengthening of WUA's activities | WUA members | Technical and financial training of farmers | Management skill of WUA is improved. |
| 3) | Water distribution planning | WUA members | Water distribution plan to maximize production | Irrigation skill of farmers is improved. |

(5) Capacity development of government staffs and farmers' leaders

The government staffs, CEO/BEO and DACO officers, are expected to be trainers for the farmers' training in target sites. As a part of activities on the capacity development of the government officers, the trainers' training will be provided to them. The government staffs who are in charge of the neighbouring districts in the Action Plan area will also participate in the training with the object of extending the process to make a model site to the other areas. The JICA expert, DACO/MACO expert, and NGOs will be assumed as trainers of the trainers' training.

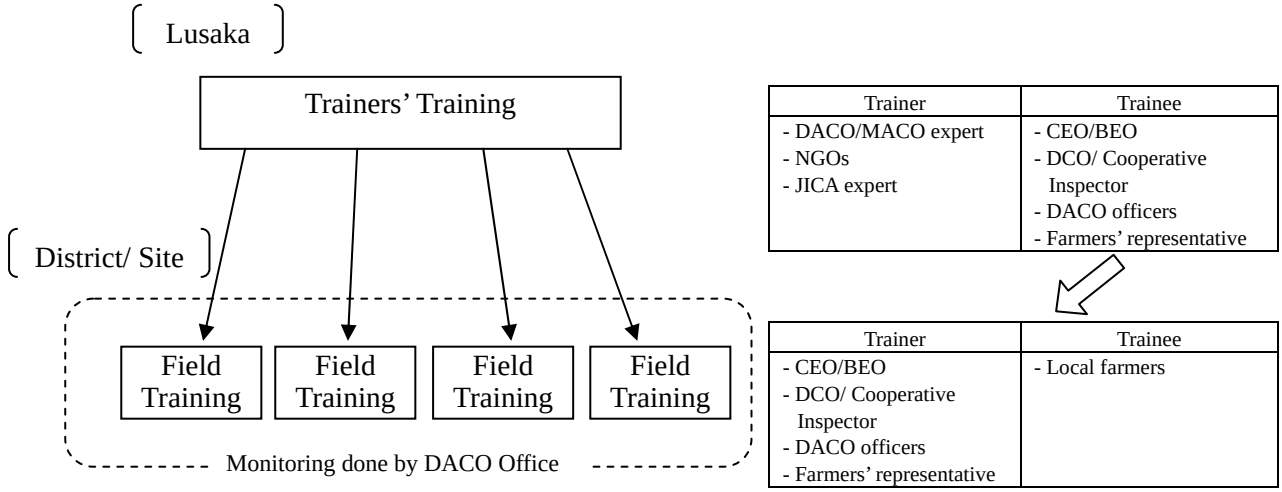



Fig. 6.4.1 Proposed Trainers Training Plan

### 6.4.2 Target Example on Cropping Plan

"Planting Plan" on the pilot project is developed and practiced through trainings of the farmers/farmer's association. The following table lists the goals on planting plan of respective area which are referred to the agriculture of practical farmers in the area. Therefore, through technical trainings and a visit to the technically advanced site, the farmers/farmer's association is requested to develop their own manoeuvre and plans, referring to the following goals. The following table on Planting Plan is a summary on the present condition of farmers' planting and their goals

(1) Chipapa irrigation scheme

120 farms are involved in the scheme. Among them, 90 farms possess irrigation farmland of 7.5 ha and an average cultivating area is as small as 0.4 lima. In the present situation, green beans are mainly cultivated followed by rape, tomato and okra in a small amount. Advanced farmers of the scheme perform dual cropping of green beans. Quality of their beans is relatively good, thus it is not so different from the beans found in supermarkets of Lusaka city. Meanwhile, approximately 40% of the farmland is not being used due to an insufficient water use. Accordingly, "affirmative sale on green beans" and "to improve crop intensity" are the main objectives for the Chipapa scheme to attain a sustainable production area.

The plan includes, dual cropping of green beans to be applied in the scheme, and introduction of vegetables which are well suited in the cool season such as Cauliflower, in order to improve an crop intensity of the farmland. Collective shipping and stagger cultivation also need to be introduced, in order to build up the market competitiveness of green beans and to favourably make a good sale.

Table 6.4.6 Sample of Cropping Plan per Farm for Chipapa Irrigation Scheme

| Scheme | Present | | Plan | |
|---|---|---|---|---|
| Chipapa | Crop | Planting area | Crop | Planting |
| | Green beans | 0.2 lima | Green beans | 0.4 lima |
| | Rape | 0.2 lima | Cauliflower | 0.2 lima |
| Total | | 0.4 lima | | 0.6 lima |

Note: 1 lima=0.25 ha

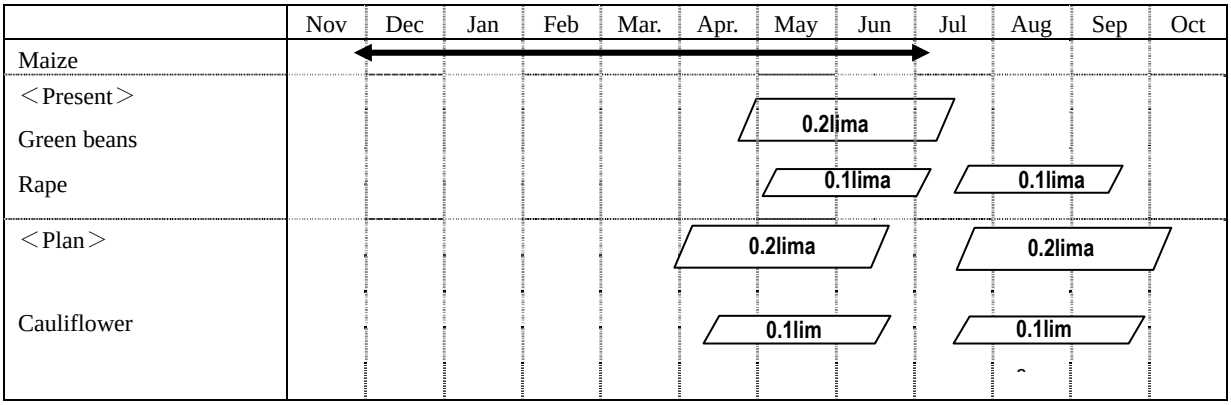



Fig. 6.4.2 Sample of Cropping Plan per Farm for Chipapa Irrigation Scheme

(2) Bwafwano irrigation scheme

In the scheme, 176 farms are involved in the scheme with the irrigation farmland of 90ha. An average cultivating area is approximately 1 lima. In the present situation, carrots, tomato, cabbage, and okra are mainly cultivated. Since a great deal of vegetables flow in the Copperbelt province from the other provinces, high demands can be expected within the province however, market competitiveness should be carried out in a favourable manner. Quality improvement and stable production are imperative for the scheme to competing with other production areas.

The plan includes, applying dual cropping of the main crops in the whole scheme, to perform planting at the time of a high price (during the rainy season), and to attain a sustainable production by introducing green beans and Akashi. The scheme as a whole should generate two to three main crops to be on a high name value and also to improve on the market competitiveness.

Table 6.4.7 Sample of Cropping Plan per Farm for Bwafwano Irrigation Scheme

| Scheme | Present | | Plan | |
|---|---|---|---|---|
| Bwafwano | Crop | Planting area | Crop | Planting area |
| | Carrot | 0.4 lima | Carrot | 0.4 lima |
| | Cabbage | 0.4 lima | Cabbage | 0.3 lima |
| | Tomato | 0.2 lima | Green beans | 0.3 lima |
| | | | Tomato | 0.2 lima |
| Total | | 1.0 lima | | 1.2 lima |

Note: 1 lima=0.25 ha

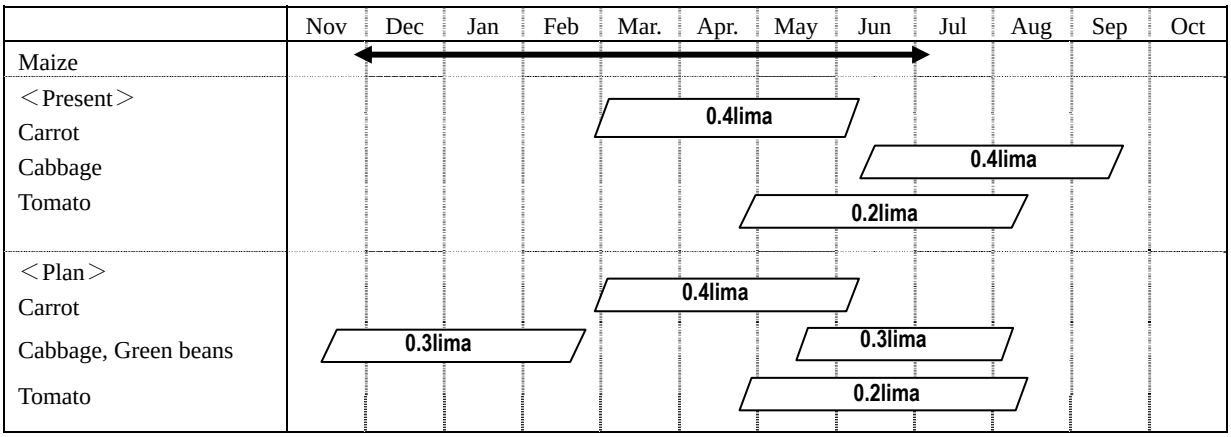



Fig. 6.4.3 Sample of Cropping Plan per Farm for Bwafwano Irrigation Scheme

(3) Natuseko irrigation scheme

In the scheme, within the Dambo area of Kabuwe city, two groups composed of 76 farms are practicing irrigated agriculture. Presently, each family owns 1 lima of the irrigation farmland out of which 0.8lima is being utilized for vegetable cultivation such as cabbage, rape/Chinese cabbage, tomato and okra. Approximately 80% of the farmers are engaged in vegetable cultivation. The scheme is located approximately 30 minutes to the city market by a bicycle. The advanced farmers are performing cabbage cultivation in the wet season as well stagger cultivation and also adjusting the shipment time with an intension to raise the rate of turnover. As for interfamilial labour, agricultural cultivation on 1 lima is the boundary. Thus some advanced farmers are handling weeding and irrigation works having employed labourers.

The plan includes to have cabbage in the wet season and green beans as the main crops and to introduce green beans as succeeding crop of cabbage. Okra will also be introduced to be planted during the wet season.

Table 6.4.8 Sample of Cropping Plan per Farm for Natuseko Irrigation Scheme

| Scheme | Present | | Plan | |
|---|---|---|---|---|
| Natuseko | Crop | Planting area | Crop | Planting area |
| | Cabbage | 0.3 lima | Cabbage | 0.3 lima |
| | Rape | 0.3 lima | Green beans | 0.3 lima |
| | Okra | 0.2 lima | Okra | 0.2 lima |
| | | | Rape | 0.2 lima |
| Total | | 0.8 lima | | 1.0 lima |

Note: 1 lima=0.25 ha

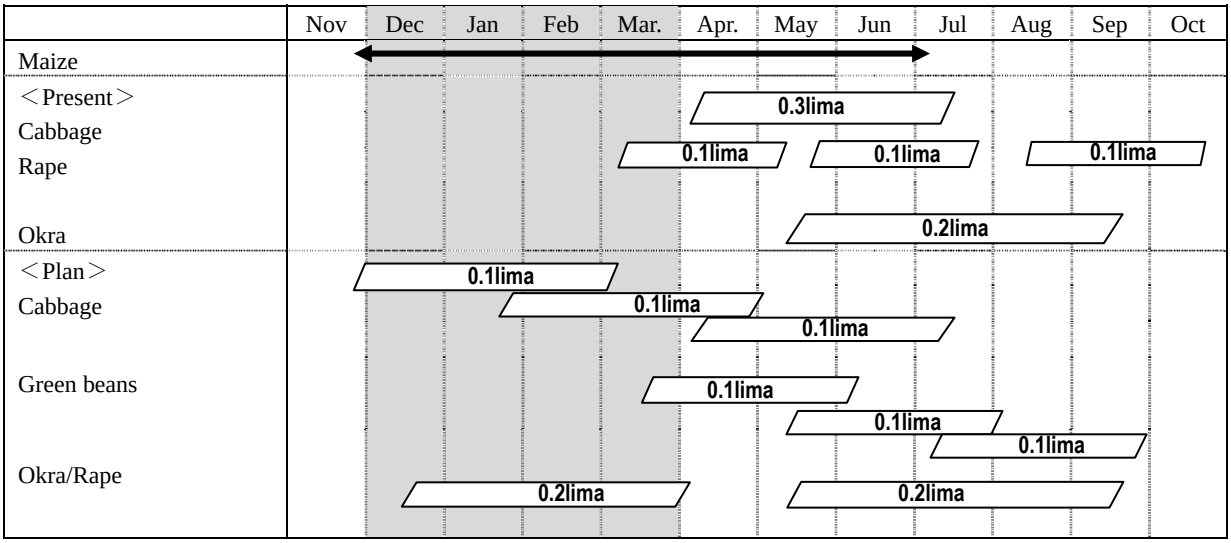



Fig. 6.4.4 Sample of Cropping Plan per Farm for Natuseko Irrigation Scheme

(4) Mulabalaba irrigation scheme

In the scheme, 64 farms are practicing agriculture on 5.5ha of the irrigation farmland. An average cultivating area is 0.35 lima. However, a crop intensity of the farmland is still limited to 50% due to livestock invasion problems, and insufficient cultivation skills, marketing and technology of water use. On contrary, the advanced farmers are conducting an active marketing activity by inviting marketers

to their village as an activity of the group. Therefore, increased participation of the engaged cooperative members in such a marketing activity would largely contribute to the development of "a stable production area". Tomato and cabbage will be introduced mainly for the tourist sites in Livingstone and similarly rape will be prepared for local and self-support purposes. The plan also includes introducing green beans as succeeding crop of tomato.

Table 6.4.9 Sample of Cropping Plan per Farm for Mulabalaba Irrigation Scheme

| Scheme | Present | | Plan | |
|---|---|---|---|---|
| Mulabalaba | Crop | Planting area | Crop | Planting area |
| | Tomato | 0.2 lima | Tomato | 0.2 lima |
| | Cabbage | 0.1 lima | Cabbage | 0.1 lima |
| | Rape | 0.1 lima | Green beans | 0.2 lima |
| | | | Rape | 0.1 lima |
| Total | | 0.4 lima | | 0.6 lima |

Note: 1 lima=0.25 ha

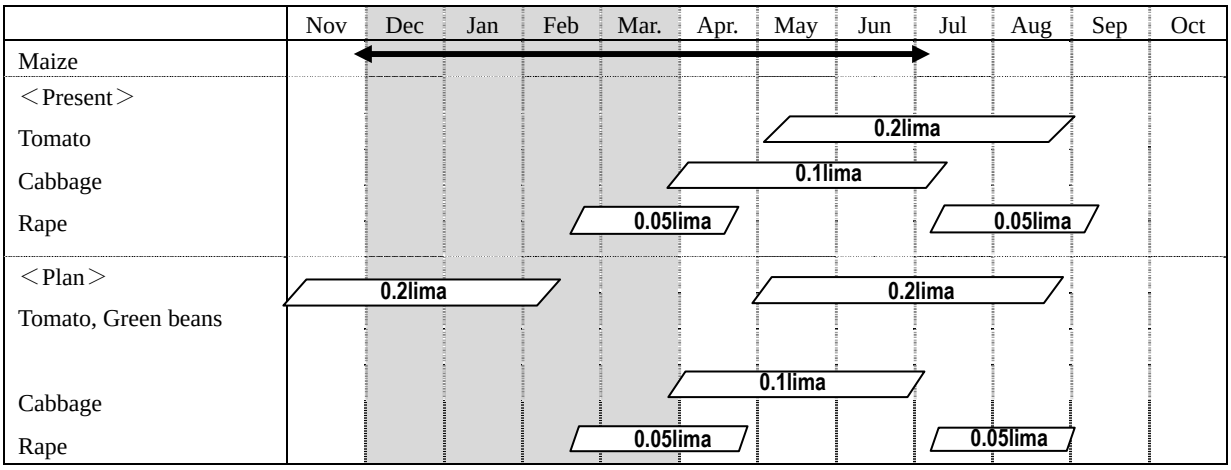



Fig. 6.4.5 Sample of Cropping Plan per Farm for Mulabalaba Irrigation Scheme

# Chapter 7 Implementation Plan and Project Cost

## 7.1 Institutional Setup

(1) Implementation organization

MACO is responsible for coordinating the project implementation organization in accordance with the project components. A Project Management Committee (PMC) shall be established to coordinate to overall project activities. The related Departments of MACO take the initiative in each sub program. Fig. 7.1.1 indicates the implementation organization of the M/P.

The Department of Policy and Planning (DPP) is responsible for the review of the project design and budget allocation plan from time to time as the planning section in MACO. The Crop Production Branch in DOA is in charge of the farming management and cropping component. The Department of Agribusiness and Marketing (DAM) is responsible for the distribution and marketing component and also farming production and sales of the produces in closed cooperative relation with DOA. The Technical Service Branch (TSB) and the Department of Cooperatives are in charge of the irrigation / water management and training/ strengthening of the farmers' organizations, respectively. In addition, the Zambia National Farmers Union (ZNFU) is requested to build a cooperative framework for the training/ strengthening of the farmers' organizations through the Action plan period.

The project is composed of various agricultural fields, i.e., irrigation, farm management, marketing and farmers', organizations. It is therefore essential to create favourable environment to reinforce a Cross- Sectional Supporting Unit in each responsible DACO offices with intense collaboration with related departments in the MACO Headquarter (H/Q)

(2) Farm management / cropping

Responsible for dissemination of farm management and cropping in MACO H/Q, is the crop production branch and agricultural advisory services in the Department of Agriculture. MACO, as the core of the organization, is confined to provide approval on a project and also to distribute budgets. Accordingly, DACO is to be the central player of implementing the M/P. Therefore in the M/P, staffs assigned to DACO, as well as BEO and CEO, are the front line officers to support the farmers/the farmers' organization. Similarly, the staffs of BEO/CEO and DACO will be the main trainers for farmers/farmers' organization. For specialized fields, ZARI will function as a backup.

(3) Distribution and marketing

Responsible for distribution and marketing in MACO H/Q is the Department of Agribusiness and Marketing, DAM. The organization is a simple and vertical division. In the Study, one (1) principal and supporting two (2) senior officers played the role of counterparts to the Study Team. Each provincial agricultural office has one (1) PMDO (Provincial Marketing Development Officer), while each district office has one (1) DMDO (District Marketing Development Officer) and one (1) assistant DMDO. Routine work of the district officers in charge covers wide areas such as a regular collection and report of market prices; provision of market information to farmers' groups; marketing guidance

for farmers; distribution of inputs; etc. MACO H/Q and provincial officers support such activities of the district officers in terms of basic planning; budget allocation; manning schedule; information transmittance; training; etc.

After the A/P period in this project, the district officers in charge, who have been subjected to technology transfer from experts during the A/P, are expected to transfer the same to other districts' officers in addition to a successive support to the model farmers' groups. Effective harmonization of this role with the said routine work of the district officers is required. This project is a comprehensive approach comprising various areas such as irrigation; farm management; farmers' organization; and marketing. Therefore, effective organizational arrangement needs to be made for much closer linkage among different departments concerned in MACO H/Q, in addition to the formulation of cross-sectional supporting unit within each district office.

(4) Irrigation and water management

The Irrigation Engineering Section and the Land Husbandry Section in TSB are in charge of overall works on irrigation and agricultural land development planning, respectively. In this regard, these sections have a role on irrigation and water management component as follows:

1) Rehabilitation work for the existing irrigation schemes
   The Irrigation Engineering Section takes charge of the rehabilitation of the existing irrigation schemes. As to on-farm development of the irrigated agriculture, the Land Husbandry Section provides counsel to the farmers.
2) Selection and implementation works for proposed irrigation schemes
   The Land Husbandry Section selects the new development sites and supports the farmers on land use plan together with the Irrigation Engineering Section, which is responsible for investigation, planning, design and construction supervision of the irrigation facilities.
3) Rehabilitation of dam and its appurtenant structures
   The Government shall rehabilitate several dams and their appurtenant structures at an early date. Since the administrative agencies such as the Ministry of Energy and Water Resources, and local governments have the responsibility of dam maintenance; a set of dam rehabilitation plan shall be drawn up by the Irrigation Engineering Section as a leading body.

The Irrigation Engineering Section and the Land Husbandry Section undertake monitoring and evaluation during the supervisory works of the rehabilitation and construction works for the irrigation facilities, and the evaluation results shall be shared with other related agencies to review the project planning. ZARI has the role on technical service support for the farmers as a research institute in irrigation.

(5) Farmers' organization

In terms of strengthening farmers' organization during the implementation of the Project, the implementing body will be CEO/BEO, DACO officers. It is expected that these officers be trained to provide farmers of the targeted area technical training for conducting commercial farming. It is also

expected that they manage information for farmers and traders and conduct activities to establish linkage between farmers and markets. Especially, officers of the Department of Cooperative, such as Cooperative Inspector and District Cooperative Officer, will be a centre of the activities of the Project because appropriate management of Cooperative is a key factor to conduct successful commercial farming. The Table bellow shows proposed implementation body and main activities in terms of strengthening farmers' organization.

Table 7.1.1 Proposed Implementation Body and Role of Activities (Farmers' Organization)

| Implementation Body | Main Activities |
|---|---|
| CEO/BEO, DACO officers | - To be trainers for farmers.<br>- To conduct monitoring and evaluation of farmers' business plan.<br>- To manage information for farmers and markets to be used for marketing.<br>- To conduct activities to link farmers and traders, such as matching meeting.<br>- To conduct Study Tour, etc |

(6) Capacity development

During implementation of the Project, capacity development will be done targeting DACO officers and farmers' representative through trainers' training. The Implementation Body of the capacity development will be DACO/MACO officers who have knowledge and skill to be trainers for trainers' training. Experienced NGO officers who have ability are also expected to be involved in the Project as trainers. Assumed implementation body and main activities are listed below.

Table 7.1.2 Proposed Implementation Body and Role in Activities (Capacity Development)

| Implementation Body | Main Activities |
|---|---|
| DACO/MACO experts, NGO experts | - To be trainers in trainers' training.<br>- To make training curriculum and prepare training materials.<br>- To observe farmers' training and give trainers necessary advise, etc. |

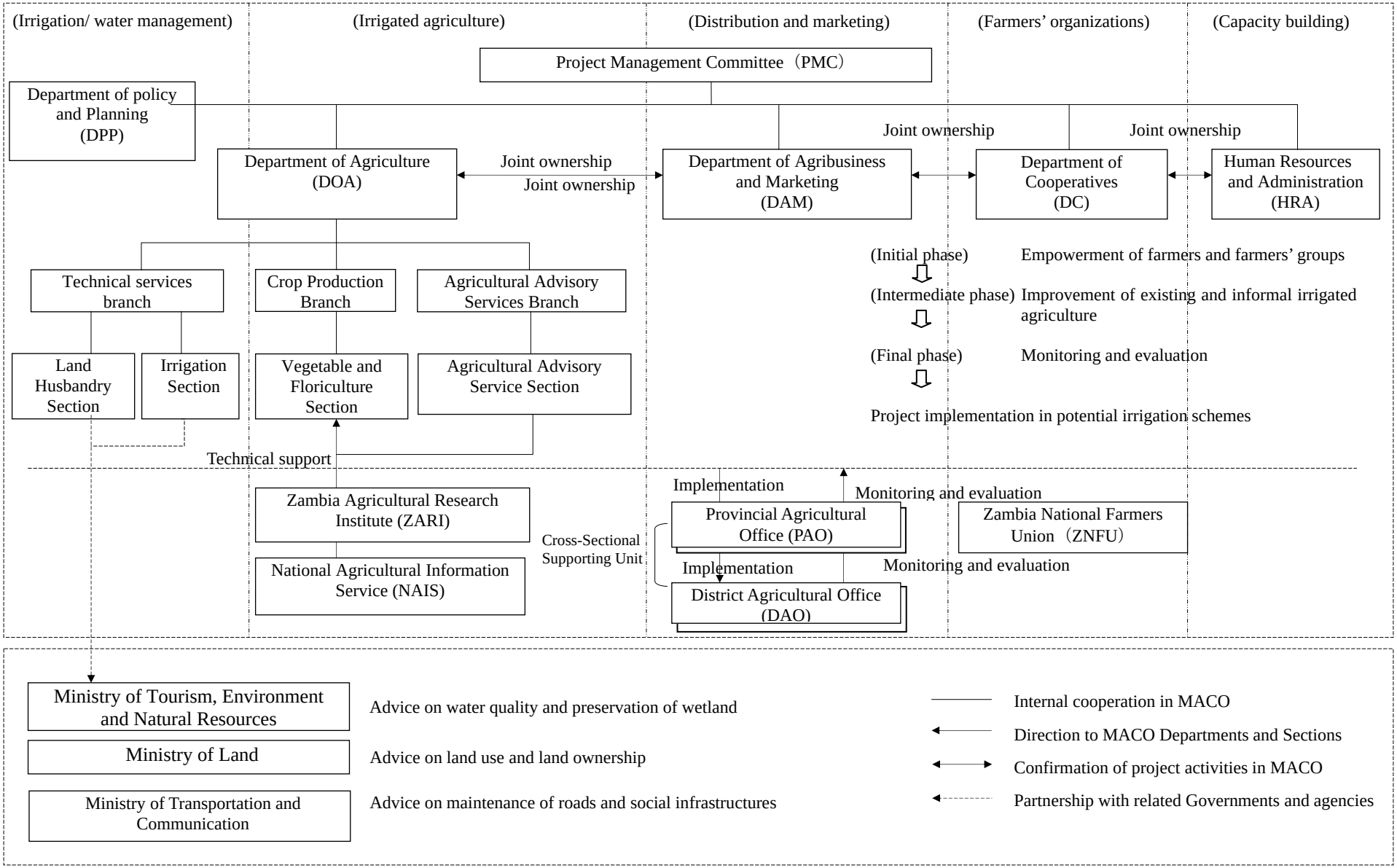



Fig. 7.1.1 Implementation Organization for the Master Plan

## 7.2 Implementation Plan

### 7.2.1 Implementation Flow of the M/P

As shown in Chapter 5, M/P directs nine years (2012-2020) development plan in the target area, which is composed of 3-phased development process.

(1) Preparation for pilot projects (early 2012)

- The initial phase of the M/P is A/P period that includes pilot project implementation. For preparation phase, a project management committee (PMC) shall be constituted in headquarter of MACO to establish a system required for project implementation. The committee follow TWG established in this study
- After that a supporting unit team shall be established in DACO related to the pilot project sites. The team shall be composed of engineers and extension officers of each area in DACO
- The supporting unit shall be in charge to support for farmers and monitoring activity with the expert team for technical assistance.
- In addition, at the same time a capacity development program for farmers at pilot project site and persons related to support unit which take a leading part of project implementation will be implemented.
- PMC will prepare a detailed plan for pilot projects implementation with supporting unit term and experts.

(2) Initial phase of M/P (2012-2015: A/P)

- In this phase, pilot projects shall target three to four schemes for implementation.
- Following projects shall be implemented in the consecutive M/P period on the basis of achievements, lessons learnt in the pilot projects in the A/P period. The achievements in the A/P shall be compiled as a guideline for further project implementation.
- “Capacity development program” is proposed as a pilot project in the A/P to transfer technical skills especially to the government staff. In line with the “Trainer’s Training” measure, the capacity development program will target government specialists and engineers of MACO in earlier period of the A/P. The experienced specialists and engineers will transfer their knowledge and technical skills to the Provincial and District staffs during the project period of the intermediate and final phases of the M/P.

(3) Intermediate phase (2016-2018: extension phase into similar zones)

- The intermediate phase of the M/P aims to disseminate the project into the other areas, by using the results and the extension tools obtained from the pilot project.
- For this phase, targets are 12 existing irrigation schemes shown in table 5.5.1 and 5.5.2.

(4) Final phase (2019-2020: self sustaining phase)

- Continuation of the extension activity into similar zones and monitoring of project implemented schemes
- For this phase, targets are 8 potential irrigation schemes shown in table 5.5.3 and 5.5.4.

(5) Monitoring, evaluation and report preparation

Monitoring method of pilot project is as follows.

- Support unit in DACO will prepare a monthly report of the responsible project site from preparation phase.
- The support unit responsible person will submit the monthly report by end of the month
- The support unit responsible person will evaluates the responsible project and submits a result to PMC.
- Project coordinator of PMC will prepares a quarterly progress report based on the monthly report
- Project coordinator of PMC will implement quarterly technical monitoring in the project site and prepares a report.
- The support unit's responsible person and project coordinator will prepare an annual report based on above mentioned reports.
- Project coordinator of PMC will conducts comprehensive evaluation at the end of the pilot project with the expert team, and prepares a technical package for extension composed of experiences and lessons learnt from the pilot project. At the same time, the coordinator will prepare a detailed plan for Zambian government led project implementation in final phase of M/P.

### 7.2.2 Sector Support Activities

Sector support activities will be conducted as per the schedule shown in Figure 7.2.1. Especially, as shown in the figure, the item "Support of farmers' groups", at point 5 entitled "Strengthening of farmers' organizations", and items "Capacity building of farmers", and "Improvement of extension services" at point 6 entitled "Capacity building of farmers and Government officials" will be started ahead of other programs and activities, because those are important activities for a smooth start-up and management of the pilot projects.

(1) Farm management and cropping

The following table shows main programs of farm training and demonstration activities in and around three to four selected A/P sites in the 4-year period. The pilot projects have verification purpose of the components, thus evaluation results and lessons learnt through the pilot projects shall be compiled as a planning and management package for further project implementation. The package is immediately utilized for proposed 20 irrigation projects in the intermediate and final phases of the M/P.

| | A/P period（4 years） | | The latter period of M/P（5 years） |
|---|---|---|---|
| 1. | Technical support for soil improvement for sustainable agricultural production at four model schemes and surrounding area. | ⇨ | Technical support for soil improvement for sustainable agricultural production at twenty model schemes (existing and proposed irrigation schemes) and surrounding area. |
| 2. | Technical support of strategic cropping plan to the areas mentioned-above. | ⇨ | Technical support of strategic cropping plan to the areas mentioned-above. |
| 3. | Improvement of farming skill for the area mentioned-above. | ⇨ | Improvement of farming skill for the area mentioned-above. |

(2) Distribution and marketing

During the A/P period (4 years), the support of target farmers' groups and the technology transfer to the district officers in charge are implemented, for two (2) major components (promotion of collective marketing and OJT for strengthening of practical marketing skill). During the Expansion Period (the latter 5 years in the M/P), the district officers, who have been technologically trained by the Japanese experts during the A/P period, will transfer the same to other districts' officers in addition to a successive support of the A/P model farmers' groups.

| | A/P period（4 years） | | The latter period of M/P（5 years） |
|---|---|---|---|
| 1. | Construction of MPS; Establishment of collective marketing system; Promotion of collective marketing (supported by the experts) | ⇨ | Implementation of the same component as the A/P, for the expansion target farmers' groups (supported by the district officers) |
| 2. | Implementation of OJT by experts for strengthening of practical marketing skill (supported by the experts) | ⇨ | Implementation of OJT for strengthening of practical marketing skill, for the expansion target farmers' groups (supported by the district officers) |
| 3. | Technology transfer from the experts to the district officers in charge | ⇨ | Successive support of the A/P model farmers' groups and technology transfer to other districts' officers (by the A/P model district officers) |

(3) Irrigation and water management

The irrigation rehabilitation work shall be formulated aiming at generating synergistic effect between proper water management, improvement of farming practices and marketing conditions. Since several irrigation schemes depend entirely on impounding water in the small dams, dam rehabilitation works shall be carried out in the M/P period.

| | A/P period（4 years） | | The latter period of M/P（5 years） |
|---|---|---|---|
| 1. | Rehabilitation works for three to four irrigation schemes to improve water management as a model project. | ⇨ | Extension of the rehabilitation works to existing and proposed schemes. |
| 2. | Equipment procurement to reduce labour force for uplifting of groundwater (Dambos) | ⇨ | Promotion of the ground water use in the dambo areas after the A/P. |
| 3. | Strengthening of farmers' groups (WUAs) | ⇨ | Providing government support to secure water sources |

(4) Farmers' organizations

In the Action Plan period, enhancement of organization management of farmers' groups and development of government support system for commercial farming will be conducted in 4 selected model sites. Then, in the late period of the Master Plan, the same activity will be expanded to new development sites applying the experience learnt from the Action Plan period.

| | A/P period（4 years） | | The latter period of M/P（5 years） |
|---|---|---|---|
| 1. | Strengthening of farmers' groups in 4 selected model sites. | ⇨ | Strengthening of farmers' groups in new development sites. |
| 2. | Developing support system of DACO offices in 4 selected model sites. | ⇨ | Developing support system of DACO offices in new development sites. |

(5) Capacity development

In the Action Plan period, capacity development will be conducted in selected 4 model sites through

conducting trainers' training targeting government officers and farmers' representatives. Then, in the Master Plan period, the same activity will be expanded to new development sites applying the experience learnt from the Action Plan period.

| | A/P period（4 years） | | The latter period of M/P（5 years） |
|---|---|---|---|
| 1. | Conducting trainers' training to CEO/BEO, DACO staffs, and | ⇨ | Conducting trainers' training to CEO/BEO, DACO staffs, and farmers' representatives in new development sites. |

Implementation schedule of the Master plan and the Action plan are indicated in Fig. 7.2.1 and 7.2.2, respectively.

### 7.2.3 Practical Use of the M/P

As shown in 7.1 Institutional Setup, it is assumed that the Project Management Committee (PMC) established in MACO will implement M/P with the department of policy and planning, department of agriculture, department of agribusiness and marketing, department of cooperatives etc. More practically, following patterns are considered.

Pattern 1: PMC implements M/P with related departments.

Average annual expenditure of budgets of the agricultural sector shown in the Sixth National Development Plan is about 80 billion ZMK (≒ US $ 160 million). Cost of M/P per year (4.0 billion ZMK) is equivalent to only 5% of the amount.

However, since in the initial phase of M/P the pilot projects include demonstration activities are conducted, it is recommendable to combine with technical assistance by domestic and foreign experts in order to contribute to smooth operations

Pattern 2: The department of cooperatives and department of agribusiness and marketing will implement a part of M/P

M/P will give priority to improvement of existing irrigation schemes which still have problem about irrigated agriculture. In this option mainly marketing capacity building of farmers and farmer's organization and improvement of farming techniques will be implemented without rehabilitation and construction of irrigation facilities. Project effect is less than pattern1. However early expression of the project effect can be expected with a small investment

Pattern 3: NGO such as ZATAC, C-FAARM leads implementation of M/P

ZATAC and C-FAAM have sufficiently experience of supporting small farmers on agribusiness and marketing of agricultural products. MACO should make approach to these NGOs for the project implementation or partnership.

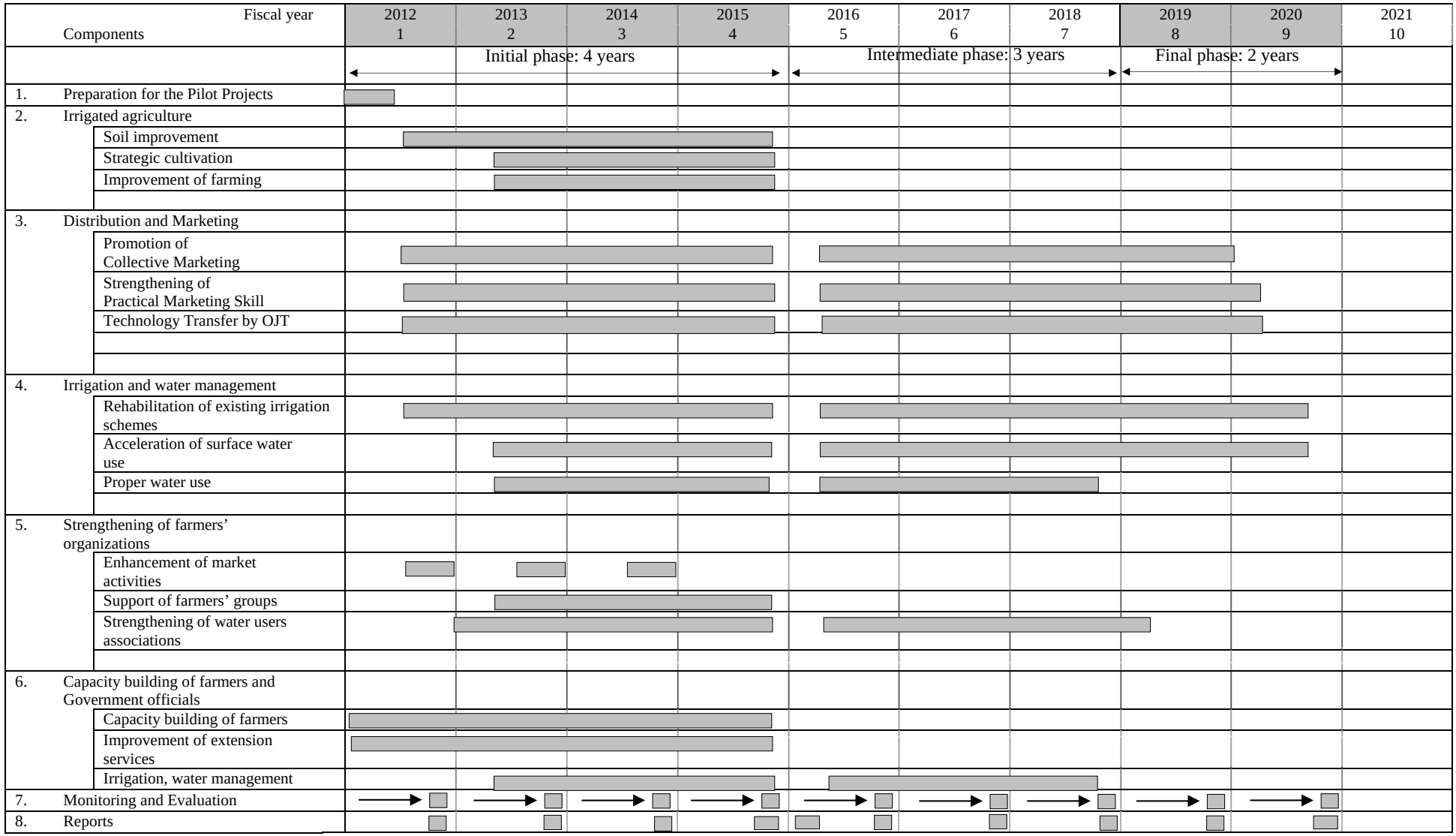



Fig.7.2.1 Project Implementation Schedule

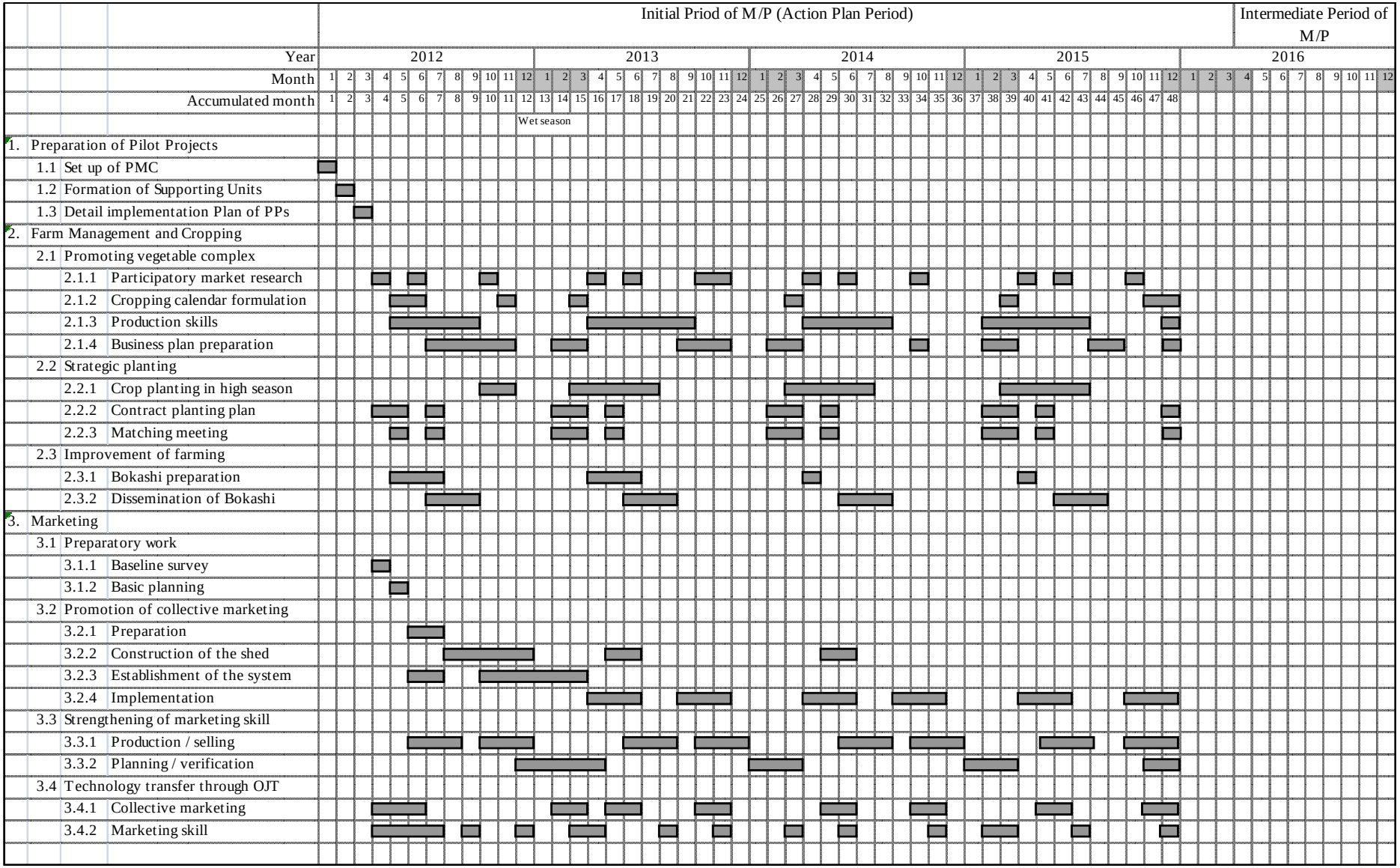



Fig. 7.2.2 Implementation Plan of the Action Plan (1/2)

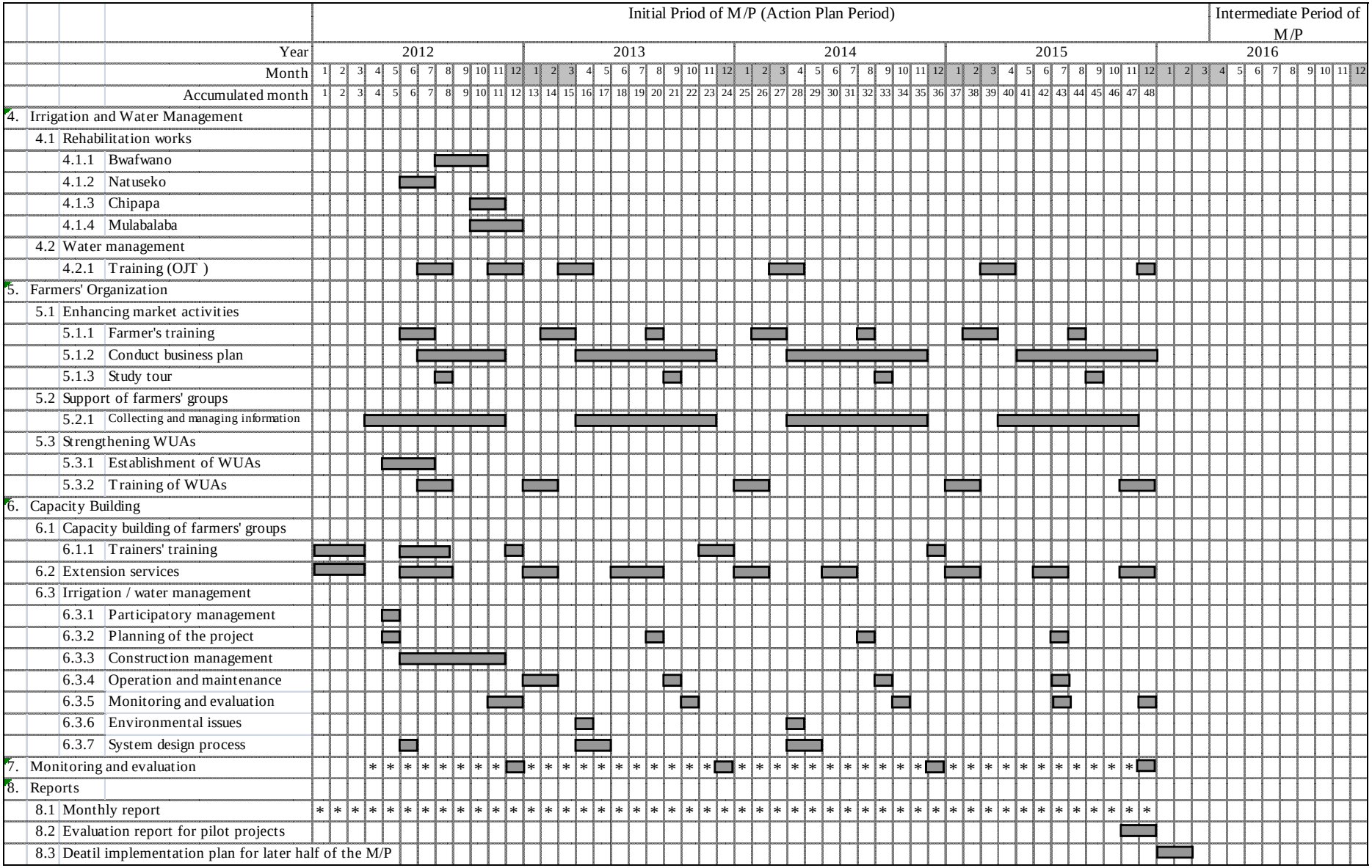



Fig. 7.2.2 Implementation Plan of the Action Plan (2/2)

## 7.3 Project Cost

### 7.3.1 Assumption

Project cost was estimated in 4-year A/P period and consecutive 5-year in the M/P. Project in each period is indicated as follows. The numbers of sites are 4 for the A/P and 20 for the latter half of the M/P.

### 7.3.2 Project Cost

Project cost is composed of 1) input cost for farm management and cropping, 2) seminar and training cost to improve market conditions, 3) rehabilitation cost for the existing irrigation facilities to enhance water management activities, 4) cost for establishment and training of the farmers' groups. In addition, 5) cost of capacity development of MACO, other related government staff. Project cost is summarized in Table 7.3.1. (Details are shown in Annex G)

Table 7.3.1 Details of the Project Cost

(Unit : ZMK million)

| | Phase / Year | Initial phase (Action plan) (4-year) | Intermediate and final phase (5-year) | Total |
|---|---|---|---|---|
| 1. | Employment cost | | | |
| 1.1 | International experts | 7,210 | | 7,210 |
| 1.2 | Local experts | 1,890 | 1,020 | 2,910 |
| 1.3 | Senior officer, irrigation engineer | 1,169 | 2,450 | 3,619 |
| 1.4 | Assistant officer, technical officer | 1,200 | 2,175 | 3,375 |
| | Sub-Total 1. | 11,469 | 5,645 | 17,114 |
| 2. | Operation cost | | | |
| 2.1 | Seminar opening | 108 | 135 | 243 |
| 2.2 | Training and matching meeting | 224 | 200 | 424 |
| 2.3 | Study tour | 160 | 200 | 360 |
| | Sub-Total 2. | 492 | 535 | 1,027 |
| 3. | Project input equipment and materials | | | |
| 3.1 | Farm input | 160 | 1,000 | 1,160 |
| 3.2 | Seminar, training tools | 80 | 500 | 580 |
| | Sub-Total 3. | 240 | 1,500 | 1,740 |
| 4. | Rehabilitation/ Construction cost | | | |
| 4.1 | Multi-Purpose Sheds (MPS)*1 | 278 | 0 | 278 |
| 4.2 | Irrigation facilities*2 | 3,446 | 12,765 | 16,211 |
| | Sub-Total 4. | 3,724 | 12,765 | 16,489 |
| 5. | Administration cost *3 | 71 | 140 | 211 |
| | Sub-Total 5. | 71 | 140 | 211 |
| 6. | Transportation machinery and consumable materials | | | |
| 6.1 | Vehicles (4x4) | 300 | 0 | 300 |
| 6.2 | Pickup trucks (4x4) | 480 | 1,200 | 1,680 |
| 6.3 | Motor bike | 60 | 300 | 360 |
| 6.4 | Fuel and maintenance cost | 176 | 295 | 471 |
| | Sub-Total 6. | 1,016 | 1,795 | 2,811 |
| 7. | Office equipment | | | |
| 7.1 | Computer | 35 | 70 | 105 |
| 7.2 | Printer | 10 | 20 | 30 |
| 7.3 | Copy machine | 25 | 125 | 150 |
| 7.4 | Maintenance of equipment | 44 | 510 | 554 |
| | Sub-Total 7. | 114 | 725 | 839 |
| Total Project Cost*4 | | 17,126 | 23,105 | 40,231 |

Note: *1 Breakdown of cost for Multi Purpose Shed is shown in Annex G / Appendix : Cost Estimate and the Basis of Multi-Purpose Shed (MPS)

*2 Breakdown of cost for irrigation facilities is shown in Annex D.
Cost of 20 schemes constructed in the intermediate and final phase of the Master plan is equally disbursed in its 5-year period.

*3 Administration cost is estimated by equation of: Employment cost of Government staff (1.3+1.4) x 3%

*4 Total project cost is not included price contingency.

## 7.4 Financial Plan

The project cost is categorized into employment cost for MACO specialists/ engineers and input materials and labour costs for project activities. The local budget of MACO is allocated to the extent possible to the employment cost for capacity development of MACO staff, technical transfer of farming skill to the farmers and capacity development for marketing acquirement.
Meanwhile, budget for other equipment and materials and labour cost is expected to be financially supported by donors. It is necessary to explain the project impact, effectiveness, relevance, etc. to obtain personnel and financial assistance from the donors.

Table 7.4.1 Project Cost (Unit: ZMK million)

| | Phase | Initial phase (A/P) | Intermediate/ final | Total |
|---|---|---|---|---|
| | Period | 4 years | 5 years | 9 years |
| 1. | Employment cost | 11,469 | 5,645 | 17,114 |
| | 1.1 International experts | (9,100) | (1,020) | (10,120) |
| | 1.2 MACO experts, engineers | (2,369) | (4,625) | (6,994) |
| 2. | Operation cost for seminar, etc. | 492 | 535 | 1,027 |
| 3. | Agricultural equipment, materials | 240 | 1,500 | 1,740 |
| 4. | Construction cost | 3,724 | 12,765 | 16,489 |
| 5. | Administration cost *2 | 71 | 140 | 211 |
| 6. | Transportation cost | 1,016 | 1,795 | 2,811 |
| 7. | Office tools, materials | 114 | 725 | 839 |
| Total cost | | 17,126 | 23,105 | 40,231 |

The employment cost of local staff is not additionally required since experts and engineers of the Provincial and District offices are assigned to the project. (Local employment cost is estimated at about ZMK 590 million per annum on average in four year A/P period. The cost is equivalent to about 2.5 % of total annual employment cost of ZMK 590 million in target four provinces in 2010 budget plan. In the intermediate and final phase of the M/P, required project cost of ZMK 930 million limitedly accounts for about 3.9 % of total cost of ZMK 23,760 million in 2010 budget plan. Therefore, the employment cost is allocated within the budget of the annual budget of MACO.
The construction cost is estimated at about ZMK 3,724 million (excluding price contingency) in the earlier A/P period. Comparing to the budget of irrigation rehabilitation cost of ZMK 1,800 million for three irrigation schemes in 2009 and that of irrigation rehabilitation cost of ZMK 4,960 million for eight irrigation schemes in 2010 budget plan, the construction cost is not excessively high, thus the budget can be allocated from the local budget. Meanwhile the budget for these construction works was disbursed from the loan project by the financial assistance of WB and AfDB. With no respect of fund resource of loan budget at recent years, it is necessary to request loan procurement to international organizations and donors. Referring to past financial assistance records of the Zambian Government, several donors, e.g., UNDP, USAID, FAO, JICA, and NGOs, such as Africare、International Development Enterprises Zambia (IDE), Plan Zambia (Plan International), Care

International Zambia, World Vision are expected for financial and technical assistances. (Detailed information of these organizations' activities is in Annex J Implementation) Assistance shall be requested to these donors for the A/P implementation as well as that for the M/P implementation after the A/P completion.

## 7.5 Prospected Benefits

### 7.5.1 Prospected Benefits

(1) Farm management and cropping

(a) Benefits from crop rotation and soil improvement

1) Land restoration
2) Protection from agricultural disease and pest
3) Reduction of farm input cost

(b) Benefits from strategic cropping

1) Reduction of sales loss by contract farming, stable sales
2) Production of specialty produces (Local brand)

(c) Benefits from improvement of farming practice

1) Stable productivity and quality improvement by improvement of farming skills
2) Origination of specialty produces by Stable productivity and quality improvement of produces

(2) Distribution and marketing

(a) Benefits from collective marketing

1) Farmers' labor for postharvest handling and shipment is reduced.
2) Farmers' cost for postharvest handling and shipment is reduced.
3) Marketeers' cost for handling and transportation is reduced by large-lots Distribution.
4) Farmers' products are upgraded in uniformity and quality, with improvement of production technology.
5) Markets' (consumers') confidence in the products is strengthened.
6) Farmers' bargaining power is increased, leading to fair price formation.
7) Linkage between farmers and marketeers is established and expanded, making a win-win relationship.

(b) Benefits from OJT for strengthening practical marketing skill

1) A fundamental cycle of marketing activities (forecast/ plan/ implement/ verify/feedback) is learnt through practical experiences, and eventually "produce to sell" pattern is realized.
2) Market-oriented production is attained.
3) Bargaining power is strengthened.
4) Marketing channels are secured and expanded.
5) District officers' extension ability is enhanced and farmers supporting system is strengthened.

(3) Irrigation and water management

(a) Benefits from rehabilitation of the irrigation facilities

1) Increase of farm production by sufficient water supply
2) Cost down of irrigation canal maintenance cost

(b) Benefits from surface water use

1) Increase of irrigable area by irrigation water supply
2) Reduction of workforce for water lifting
3) Increase of farm production by effects mentioned above
4) Promotion of initiative of collective management of farmers, i.e., joint use of equipment and maintenance of the irrigation facilities, etc.

(c) Benefits from improvement of water management skill

1) Increase of farm production accompanied with high irrigation efficiency
2) Capacity building on operation and maintenance skill of the irrigation system
3) Promotion of initiative of collective management of the Government staff and farmers' leaders (Increase of opportunity of farmers' requests to the Government for financial and technical needs, etc.)

(4) Farmers' organization

1) Farmers' incentive toward commercial farming will transfer from individual level to group level.
2) Farmers will be able to make decision and act as an organised group.
3) Cooperative will be recognised as a business entity, not as mean of receiving support from outside.
4) Farmers' groups which have not formed as cooperative yet will become registered cooperatives with support from the Project.
5) New or existing cooperatives' organization management skill will be improved.
6) Government support for commercial activity of smallholder farmers will be reinforced.

### 7.5.2 Simulated Economic Impact from the Smallholder Irrigated Agriculture

Direct beneficiaries are the small-scale farmers in peri-urban areas. With development of irrigated agriculture, small-scale farmers would increase vegetable production, become more efficient in land usage, and volume of sales and profits would finally increase by using countermeasures on marketing. In addition to those benefits, improvement of management ability for irrigated agriculture, diversification of crops by irrigation, creation of a business chance by an activity of the cooperative, and finally establishment of job opportunity by project activities are expected.

Pilot projects performed during the A/P have its main purpose in developing a model project by primarily providing it with technical supports. As listed in the following table, the farms which practiced a pilot project can expect an enhancement in the agricultural productivity.

The economic impact to agriculture income per household derived from the irrigated agriculture can be roughly simulated. Assuming the irrigated area by the labor force within a small farmer based on the result of survey for four candidates of pilot projects, the irrigated area per household is expected

0.4～1.0 lima for present situation and 0.6～1.2 lima for plan.

An economical impact to agricultural income per household of the four pilot projects was provisionally calculated as follows. However, it is necessary to analyze a detailed impact through the execution of the pilot projects.

Table 7.5.1 Summary for Impact to Agricultural Income per Household (four sites)

| | Present situation | Goal | Increases |
|---|---|---|---|
| Planting area（Lima） | 0.4～1.0 | 0.6～1.2 | 0.2 |
| Agricultural income （ZMK） | 2,000,000～ 5,800,000 | 5,000,000～ 8,000,000 | 2,200,000～ 3,000,000 |

Lima=0.25ha, ZMK 4,500≒US$ 1

Table 7.5.2 Impact to Agricultural Income per Household for Chipapa Irrigation Scheme

| Present situation | | | Goal | | |
|---|---|---|---|---|---|
| Type of crops | Planting area (lima) | New revenue (ZMK) | Type of crops | Planting area (lima) | New revenue (ZMK) |
| Green bean | 0.2 | 1,587,000 | Green bean | 0.4 | 3,174,000 |
| Rape | 0.2 | 448,000 | Rape | 0.2 | 1,836,000 |
| Total | 0.4 | 2,035,000 | Total | 0.6 | 5,010,000 |

Table 7.5.3 Impact to Agricultural Income per Household for Bwafwano Irrigation Scheme

| Present situation | | | Goal | | |
|---|---|---|---|---|---|
| Type of crops | Planting area (lima) | New revenue (ZMK) | Type of crops | Planting area (lima) | New revenue (ZMK) |
| Carrots | 0.4 | 1,685,000 | Carrots | 0.4 | 1,685,000 |
| Cabbage | 0.4 | 3,360,000 | Cabbage | 0.3 | 3,024,000 |
| Tomato | 0.2 | 762,000 | Green bean | 0.3 | 2,380,000 |
| | | | Tomato | 0.2 | 762,000 |
| Total | 1.0 | 5,807,000 | Total | 1.2 | 7,851,000 |

Table 7.5.4 Impact to Agricultural Income per Household for Natuseko Irrigation Scheme

| Present situation | | | Goal | | |
|---|---|---|---|---|---|
| Type of crops | Planting area (lima) | New revenue (ZMK) | Type of crops | Planting area (lima) | New revenue (ZMK) |
| Cabbage | 0.3 | 2,520,000 | Cabbage | 0.3 | 3,024,000 |
| Rape | 0.3 | 672,000 | Green bean | 0.3 | 2,380,000 |
| Okra | 0.2 | 620,000 | Okra | 0.2 | 620,000 |
| | | | Rape | 0.2 | 448,000 |
| Total | 0.8 | 3,812,000 | Total | 1.0 | 6,472,000 |

Table 7.5.5 Impact to Agricultural Income per Household for Mulabalaba Irrigation Scheme

| Present situation | | | Goal | | |
|---|---|---|---|---|---|
| Type of crops | Planting area (lima) | New revenue (ZMK) | Type of crops | Planting area (lima) | New revenue (ZMK) |
| Tomato | 0.2 | 762,000 | Tomato | 0.2 | 1,296,000 |
| Cabbage | 0.2 | 1,680,000 | Cabbage | 0.2 | 1,680,000 |
| Rape | 0.2 | 448,000 | Green bean | 0.2 | 1,587,000 |
| | | | Rape | 0.2 | 448,000 |
| Total | 0.6 | 2,890,000 | Total | 0.8 | 5,011,000 |

## 7.6 Risk Analysis

- **Risks on influential weather**

  Even on irrigated agriculture, productivity is largely influenced by weather. Diversification of crops and disintegration of planting and cultivation seasons must be implemented as a measure on such risks.

- **Risks on marketing**

  “Experience of good success” of a group can be copied by other organizations and thus there is a risk that a competitor may appear. The countermeasure is to de-concentrate the risk, i.e., diversification of marketing outlet and types of crops, disintegration of the periods for cultivation and sale, diversification of forms of the products (fresh or processed products)

- **Risks on the collective activities of farmers’ organization**

  There are many reported cases, which claim that the past irrigation development and collective activities did not help much to effectively function as collective activities of farmers’ organization. For the M/P, experience of a good success is vital to induce farmer’s interest. Therefore development of a good model, communication within farmers, visit to technically advanced sites and participatory training become important.

# Chapter 8 Conclusions and Recommendations

## 8.1 Conclusions

(1) While large scale farmers and enterprises in the suburbs are cultivating horticultural and industrial crops to sell in the urban area, the small scale farmers of the same area engaged in cultivation with usable irrigation facilities have low productivity with inconsistent production. The majority of small scale farmers are independently selling their products, and since there is less option of sale destination, the selling price is low.

(2) Two sections of the study such as “analysis on farmers’ organization” and “analysis on existing good practices made by cooperatives and farmers’ groups”, have shown that farmers considering agriculture as a business could be confirmed even in small scale farmers’ organizations, i.e., “an example which has achieved the merits on collective selling of agricultural products”, “an example of farmers with a business mind cooperated with their partnership farmers”, and “an example of farmers’ organization cooperated with marketers”.

(3) Additionally, an activity i.e. “Matching meeting between farmers’ organization and marketers” was conducted in this study. As per the results of the monitoring, the merits on both sides were recognized and most of them were willing to continue to exchange information.

(4) In the study area, there are many swamps, dambos and small to middle scale dams that have a high potential to secure water for irrigation during the dry season.

(5) Some small-scale irrigation schemes utilize rivers and dams as water sources and pump water (electric pumps). However, these schemes are currently not functioning as the majority of the beneficiary farmers are not able to afford electricity costs.

(6) The proposed M/P has a set vision: “realize a smallholder irrigated agriculture based on market needs by small scale farmers”. In order to fulfil the vision, the M/P proposes to apply countermeasures such as “Farm management”, “Marketing”, Irrigation and water management”, “Strengthening of farmers’ organization and “Capacity development”, in order to comprehensively support the existing irrigation areas as well as the ones with a high irrigation potential.

(7) During the first half of the M/P, appropriate and practical methodologies are to be established as models for the pilot projects, while in the second half, these models will be extended to similar areas

## 8.2 Recommendations

(1) The Government of Zambia highly values the initiative taken by the Agricultural Sector to promote irrigated agriculture through the assistance of small-scale farmers. Additionally, the Government considers important to solve the problems of small scale farmers through market-oriented farming and measures and policies geared toward strengthening farmers' association. Therefore, the content of the M/P proposed in the investigation is in line with the above. Thus, it is recommended to apply the M/P as a "small scale farmer assistance measure".

(2) The M/P indicates a direction for improving the productivity of small farmers who cannot fully take advantage of high market accessibility and irrigation potential. The M/P aims to promote small scale irrigated agriculture as a business model. In order to shift to irrigated agriculture as a business model, it is essential that farmers make decisions by themselves. Based on this consideration, referring to lessons learned and innovative activities obtained through research and analysis of outstanding farmers and farmers' organizations, capacity development training of farmers and farmers' organizations are taken in the M/P. Since vegetable production and distribution are left to market mechanisms namely competition, solution to improve productivity is not only one. Therefore, the M/P should focus on capacity development through training of farmers and farmers' organizations.

(3) The pilot projects to be implemented in the first half of the M/P aim in developing models of small-scale irrigated agriculture in different zones of the peri-urban area. Therefore, while rehabilitating the existing irrigation facilities, training farmers/famers' organization, developing capacity on marketing and providing technical assistances are essential activities to be undertaken in the pilot phase. Consequently, the Ministry of Agricultural and Cooperative needs to urgently request international technical assistances, especially for the activities which require technical supports related to capacity development.

(4) The M/P is drawn up from the views mentioned above. The followings should be considered when implementing the M/P.

1) The M/P seeks to achieve project benefits gradually and efficiently, focusing on the linkage of the comportments of the value chain such as production, transport and market etc. The government is required to provide the necessary assistances in capacity development as related to farming and irrigation technologies and market information to farmers' organization.
2) Members and non-members of cooperatives and water users' associations are mixed in the irrigation schemes. It is necessary to promote collective activities for sustainable development of the project. It is indispensable to trigger project benefits, making facility maintenances easy and promoting collective product selling in the pilot projects, to raise the farmers' motivation to participate in the farmers' organization.

3) Dams and intake weirs are related to the irrigation water source; however, the majority of these facilities are neither well maintained nor managed properly at present. To make the water resources sustainable, the Government is asked to provide financial and technical support, and also to apply maintenance and repair works.
4) Irrigation development, constrained by unstable water resources and traditional land utilization system, needs to provide farmers with guaranteed water for irrigation and land usage rights. The initiatives of agricultural industries and the development of markets by farmers are expected to rise, provided that secured water resources and guaranteed cultivation rights are enabled by government through the “Construction of agricultural complex”.

# Attachment

## Attachment 1 Scope of Work (S/W)

SCOPE OF WORK
FOR
THE STUDY
ON
THE MASTER PLAN FOR PROMOTION OF IRRIGATED AGRICULTURE FOR
SMALLHOLDERS IN THE PERI-URBAN AREA
IN
THE REPUBLIC OF ZAMBIA

AGREED UPON
BETWEEN

MINISTRY OF AGRICULTURE AND COOPERATIVES
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Lusaka, 24th March, 2009

Mr. Hirofumi Hoshi
Team Leader
JICA Detailed Planning Survey Team
Japan International Cooperation Agency
Japan

Mr. Bernard S. C. Namachila,
Permanent Secretary
(Agriculture and Cooperatives)
Ministry of Agriculture and Cooperatives
The Republic of Zambia

## I INTRODUCTION

In response to the request by the Government of the Republic of Zambia (hereinafter referred to as "GRZ") in June 2006, 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 Master Plan for Promotion of Irrigated Agriculture for Smallholders in the Peri-urban Area 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 GOJ.

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 contribute poverty reduction through the promotion of commercial irrigated agriculture among smallholders in the Peri-urban area.

The objectives of the Study are:

1. To formulate a Master Plan (hereinafter referred to as "M/P") with Action Plans (hereinafter referred to as "A/P") to promote commercial irrigated agriculture of smallholders in the Peri-urban area.
2. To carry out capacity development of Zambian counterpart personnel through on-the-job training in the course of the Study.

## III STUDY AREA

The Study area of the M/P shall cover the Districts which lie around the line of rail. The list of the target Districts is in ANNEX I.

## IV SCOPE OF THE STUDY

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

1. Phase 1: Formulation of the M/P

1-1. To clarify the existing small-scale* irrigation schemes' conditions in terms of overall scheme management and maintenance, farm management, marketing, and challenges and opportunities in the study area.

1

* Small-scale irrigation schemes mean approximately less than 250 ha in the Study.

1-2. To identify potential marketable crops by analyzing market access, trends of accessible markets, and value chain.

1-3. To collect and analyze environmental and natural conditions in the study area with a view to identify new potential sites.

1-4. To hold workshops to exchange views of stakeholders on environmental and social considerations such as water use, and conservation of the environment in the study area.

1-5. To collect and analyze data and information regarding service providers of agriculture such as agricultural extension and training institutions.

1-6. To compile a resource map incorporating information and analysis obtained through activities 1-1 to 1-5.

1-7. To collect and analyze data and information on operation and maintenance of small-scale irrigation schemes in the study area.

1-8. To collect and analyze data and information regarding social characteristics, and activities and functions of existing organizations/groups of smallholders in the study area.

1-9. To formulate a Master Plan for promotion of irrigated agriculture among smallholders in the study area including marketing, farm management, operation and maintenance of small-scale irrigation schemes, agricultural extension, and environmental and social considerations.

2. Formulation of A/Ps

2-1. To select different types of districts (expected to be three to four) in terms of marketing characteristics to formulate A/Ps.

2-2. To formulate A/Ps for the selected districts with respect to the strategies of:

Rehabilitation of existing irrigation schemes;

Development of new irrigation schemes;

Operation and maintenance of irrigation schemes;

Institutional capacity building of water users' association;

Farm management;

Agribusiness and marketing;

Agricultural extension of marketable crops; and

Environmental and social considerations.

## V STUDY SCHEDULE

The Study will be carried out in accordance with the tentative schedule in ANNEX II.

## VI REPORTS

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

| | |
|---|---|
| Inception Report: | Forty (40) copies at the commencement of the Study |
| Interim Report: | Forty (40) copies at the middle of the Study |
| Progress Report: | Forty (40) 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 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. The 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 communication 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, the 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

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

ANNEX I: List of Target Districts
ANNEX II: Tentative Schedule

**ANNEX I: List of Target Districts**

Southern Province:
1) Livingstone
2) Kazungula
3) Kalomo
4) Sinazongwe*
5) Choma
6) Gwembe*
7) Monze
8) Siavonga*
9) Mazabuka

Lusaka Province:
1) Kafue
2) Chongwe
3) Lusaka

Central Province:
1) Chibombo
2) Kabwe
3) Kapiri Mposhi

Copperbelt Province:
1) Masaiti
2) Luangshya
3) Ndola
4) Kitwe
5) Mufulira
6) Kalulushi
7) Chingola
8) Chililabombwe

* These districts are outside the Peri-urban area, however, they are included as target districts considering their water resource and marketing potential.

5

**ANNEX II**

## Tentative Study Schedule

| MONTH | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PHASE | Phase 1 | | | | | | | | | | | | | Phase 2 | | | | | | |
| WORK IN ZAMBIA | | | | | | | | | | | | | | | | | | | | |
| WORK IN JAPAN | | | | | | | | | | | | | | | | | | | | |
| REPORT | | ① | | | | | ② | | | | | | ③ | | | | | ④ | ⑤ | |

① Inception Report
② Progress Report
③ Interim Report
④ Draft Final Report
⑤ Final Report

## Attachment 2 Minutes of Meeting on S/W

MINUTES OF MEETING
ON
SCOPE OF WORK
FOR
THE STUDY
ON
THE MASTER PLAN FOR PROMOTION OF IRRIGATED AGRICULTURE FOR
SMALLHOLDERS IN THE PERI-URBAN AREA
IN
THE REPUBLIC OF ZAMBIA

AGREED UPON
BETWEEN

MINISTRY OF AGRICULTURE AND COOPERATIVES
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Lusaka, 24th March, 2009

Mr. Hirofumi Hoshi
Team Leader
JICA Detailed Planning Survey Team
Japan International Cooperation Agency
Japan

Mr. Bernard S. C. Namachila,
Permanent Secretary
(Agriculture and Cooperatives)
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 Detailed Planning Survey Team (hereinafter referred to as "the Team") headed by Dr. Hirofumi Hoshi was sent to the Republic of Zambia by the Japan International Cooperation Agency (hereinafter referred to as "JICA") from 9th to 25th March, 2009 for the purpose of discussing and confirming the Scope of Work for the Study on the Master Plan for Promotion of Irrigated Agriculture for smallholders in the Peri-urban Area 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 APPENDIX.

# II RESULTS OF DISCUSSION

## 1. Title of the Study

Both sides agreed to the title of the Study as Master Plan for Promotion of Irrigated Agriculture for Smallholders in the Peri-Urban Area .

## 2. Organization of the Study

The Director of the Department of Policy and Planning shall take responsibility for management of the the Study in MACO. The counterpart departments of the Study are the Department of Agriculture, the Department of Agribusiness and Marketing, and the Department of Cooperatives.

## 3. Counterpart Personnel

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

1) Irrigation planning;
2) Marketing;
3) Farm management;

4) Crops;

5) Extension;

6) Cooperatives; and

7) Policy analysis.

JICA shall cover travel expenses of the counterpart personnel until January 2010. MACO shall try to secure the budget to fund travel expenses of the counterpart personnel afterward.

**4. 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 organize members of the Technical Working Group.

**5. JICA Guidelines for Environmental and Social Considerations**

The Team explained the main point of JICA Guidelines for Environmental and Social Considerations, and MACO understood it.

**6. Necessary Equipment and Facilities for the Study**

MACO agreed to provide the Study Team with suitable office space, furniture, and exclusive use of communication facilities in headquarters of MACO during the term of the Study and DACO offices during formulation of A/Ps.

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

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

1) Copy machine and supplies;

2) Fax machine;

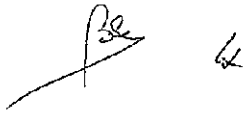
3) Personal computer(s) and accessories;

4) Printer(s); and

5) Other equipment necessary for smooth implementation of the Study and for ensuring output of the Study.

The Team promised to convey the request to GOJ.





7. Reports

Both sides agreed that all the reports of the Study shall be made available to stakeholders and open to the public. MACO agreed to make sure of distributing the reports especially to the target Districts.

ANNEX: List of Participants

**ANNEX: List of Participants**

Ministry of Agriculture and Cooperatives

| | |
|---|---|
| Mr. Bernard S. C. Namachila | Permanent Secretary (Agriculture and Cooperatives) |
| Mr. Julius J. Shawa | Director, Department of Policy and Planning |
| Mrs. Mary M. Chipili | Director, Department of Agriculture |
| Mr. Green Mbozi | Director, Department of Agribusiness and Marketing |
| Mrs. Mulemwa Akakandelwa Sitwala | Director, Department of Cooperatives |
| Mr. Henry Sichembe | Deputy Director, Department of Agriculture |
| Mr. Alick Daka | Deputy Director, Department of Agriculture |
| Mrs. Kezia M. Katyamba | Deputy Director, Department of Agribusiness and Marketing |
| Mr. George Sikuleka | Chief Irrigation Engineer, Technical Service Branch, Department of Agriculture |
| Mr. Cornelius Sitali | Principal Engineer, Technical Service Branch, Department of Agriculture |

JICA Detailed Planning Survey Team

| | |
|---|---|
| Mr. Hirofumi Hoshi | Team Leader |
| Mr. Hirotaka Nakamura | Farming system / Farmers' Organization |
| Mr. Kenichiro Kondo | Irrigation Planning |
| Mr. Shoji Masumura | Farm Management/ Marketing |
| Mr. Hiroyuki Doi | Environmental and Social Considerations |
| Ms. Keiko Mizoe | Study Planning |

JICA Zambia Office

| | |
|---|---|
| Mr. Shiro Nabeya | Chief Representative |
| Mr. Yuichi Matsushita | Representative |
| Mr. Patrick Chibbamulilo | Senior Program Officer |