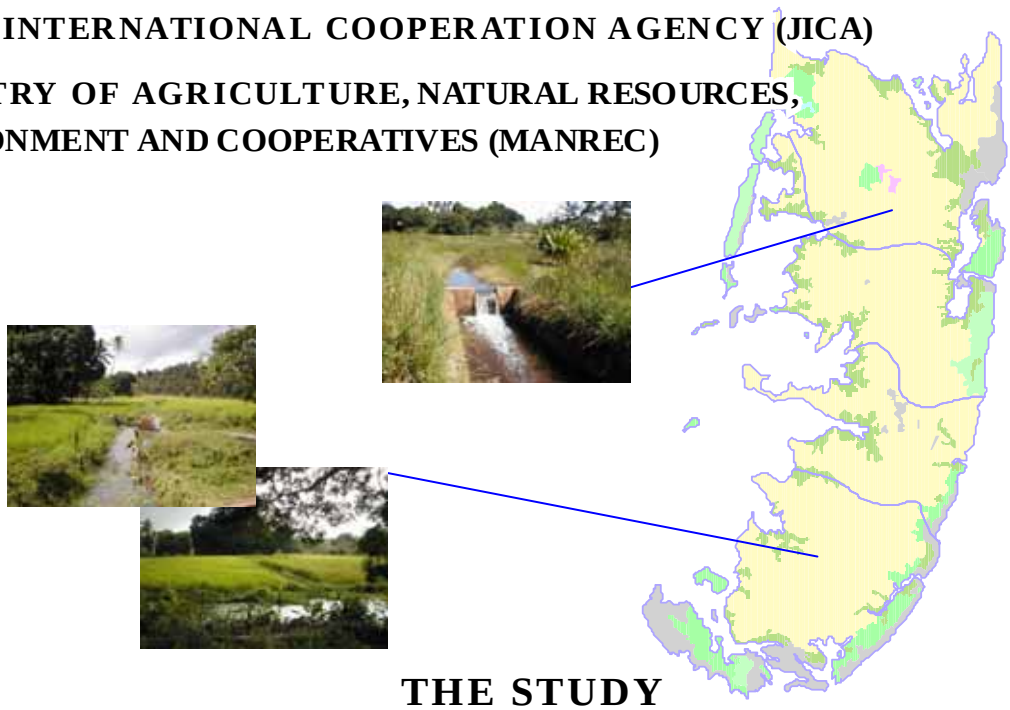
No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF AGRICULTURE, NATURAL RESOURCES, ENVIRONMENT AND COOPERATIVES (MANREC)



THE STUDY

ON

THE ZANZIBAR IRRIGATION MASTER PLAN

IN

THE UNITED REPUBLIC OF TANZANIA

ACTION PLAN REPORT

VOLUME-I: MAIN REPORT

SEPTEMBER 2003

NIPPON KOEI CO., LTD.
NIPPON GIKEN INC.

AFA
JR
03-57

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF AGRICULTURE, NATURAL RESOURCES,
ENVIRONMENT AND COOPERATIVES (MANREC)

THE STUDY
ON
THE ZANZIBAR IRRIGATION MASTER PLAN
IN
THE UNITED REPUBLIC OF TANZANIA

ACTION PLAN REPORT

VOLUME-I: MAIN REPORT

SEPTEMBER 2003

NIPPON KOEI CO., LTD.
NIPPON GIKEN INC.

Exchange Rate
US$1.0 = J¥118.23 = Tsh. 1,063.70 US$ = United State Dollars J¥ = Japanese Yen Tsh. = Tanzania Shillings As of July 4, 2003

LIST OF REPORTS

EXECUTIVE SUMMARY

VOLUME-I: MAIN REPORT

VOLUME-II: APPENDIXES

Appendix A: Project Proposal and Project Design Matrix for Priority Programmes

Appendix B: Project Proposal and Project Design Matrix for Model Irrigation Schemes

Appendix C: Analysis of Model Irrigation Schemes

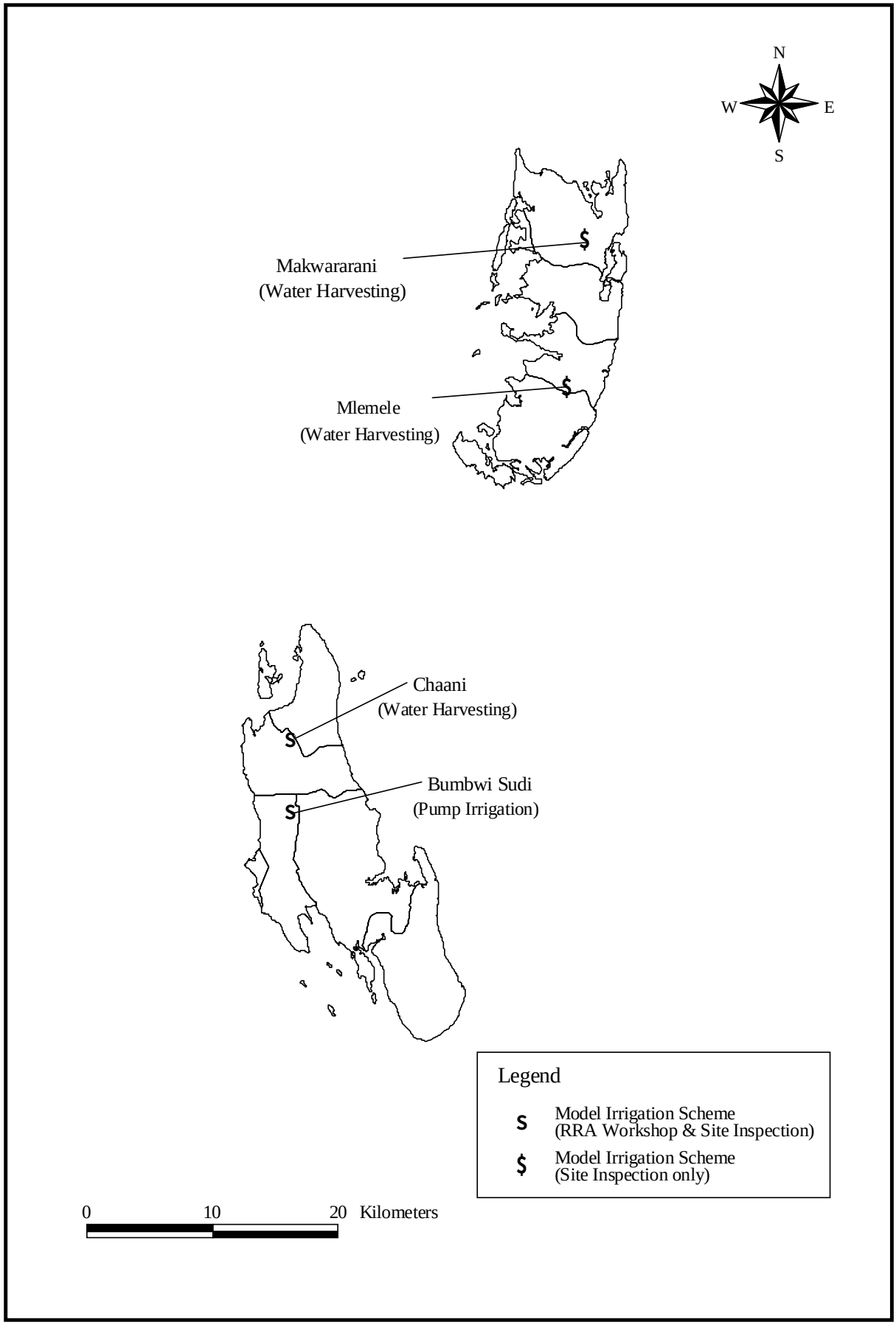
Appendix D: Economic and Financial Evaluation for Model Irrigation Schemes

Appendix E: Project Cycle Management

Appendix F: Rapid Rural Appraisal Reports for the Selected Model Irrigation Schemes

Appendix G: Report on Preliminary Environmental Assessment

MAP OF ZANZIBAR
ZANZIBAR
PEMBA ISLAND
UNGUJA ISLAND
TANZANIA
ZANZIBAR
UGANDA
KENYA
RWANDA
BURUNDI
CONGO
ZAMBIA
MALAWI
MOZAMBIQUE
DODOMA
Dar es Salaam
INDIAN OCEAN
WETE
CHAKE CHAKE
MKOANI
Konde
Finya
Wesha
Kengeja
PANGANI
Kwasani
Saadani
Mkwaja
Sadani
BAGAMOYO
Zinga
Kerege
Banda Kuu
Mkokotoni
Pwani Mchangani
Uroa
Chwaka
Mchamvi
Bweju
Paje
Jambiani
Makunduchi
Kizimkazi
ZANZIBAR
Mbweni
Chukwani
Fumba
LEGEND
Road
Railroad
River
Capital
City
Village
0 5 10 20 25 km



Model Irrigation Schemes in Zanzibar

THE STUDY
ON
THE ZANZIBAR IRRIGATION MASTER PLAN
IN
THE UNITED REPUBLIC OF TANZANIA

Action Plan Report

Table of Contents

Tables

Figures

Attachments

ABBREVIATIONS

ADB	African Development Bank
ASP	Agricultural Sector Policy
ASPS	Agriculture Sector Programme Support
BOT	Build-Operate-Transfer
BTO	Build-Transfer-Operate
CARE	Commission of Agriculture, Research and Extension
DARI	Division of Agriculture, Rice Cultivation and Inputs
DADO	District Agricultural Development Officer
DBO	Design-Build-Operate
DITS	Division of Irrigation and Technical Services
EIRR	Economic Internal Rate of Return
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GIS	Geographical Information System
GOJ	Government of Japan
GOZ	Government of Zanzibar
IA	Irrigators' Association
ICS	Irrigators' Cooperative Society
IDA	International Development Agency
IFAD	International Fund for Agricultural Development
IG	Irrigators' Group
JICA	Japan International Cooperation Agency
KATI	Kizimbani Agricultural Training Institute
LGA	Local Government Authority
MAFS	Ministry of Agriculture and Food Security
MANREC	Ministry of Agriculture, Natural Resources, Environment and Cooperatives
NGO	Non-Government Organization
NIMP	National Irrigation Master Plan
PDM	Project Design Matrix
PFI	Private Finance Initiative
PPP	Public Private Partnership
RADO	Regional Agricultural Development Officer
RBMSIIP	River Basin Management and Smallholder Irrigation Programme
SACCOS	Savings and Credit Cooperatives
UN	United Nations
UNDP	United Nations Development Programme
WB	World Bank
WUA	Water Users Association
WUCS	Water Users Cooperative Societies
WUG	Water Users Group
ZIDP	Zanzibar Irrigation Development Programme/Plan
ZIMP	Zanzibar Irrigation Master Plan

MEASUREMENT UNITS

Extent

cm^2 = Square-centimeters (1.0 cm x 1.0 cm)
m^2 = Square-meters (1.0 m x 1.0 m)
km^2 = Square-kilometers (1.0 km x 1.0 km)
a = Are(100 m^2 or 0.01 ha.)
ha = Hectares (10,000 m^2)
ac = Acres (4,046.8 m^2 or 0.40468 ha.)

Volume

cm^3 = Cubic-centimeters (1.0 cm x 1.0 cm x 1.0 cm or 1.0 m-lit.
m^3 = Cubic-meters (1.0 m x 1.0 m x 1.0 m or 1.0 k-lit.)
lit l = Liter (1,000 cm^3)
MCM = Million Cubic Meter

Length

mm = Millimeters
cm = Centimeters (cm = 10 mm)
m = Meters (m = 100 cm)
km = Kilometers (km = 1,000 m)

Weight

gr = Grams
kg = Kilograms (1,000 gr.)
ton = Metric ton (1,000 kg)

Currency

US$ = United State Dollars
US$1.0 = J¥118.23 = Tanzanian Shillings 1,063.70
(as of July 4, 2003)
J¥ = Japanese Yen
Tsh = Tanzanian Shillings

Time

sec = Seconds
min = Minutes (60 sec.)
hr = Hours (60 min.)

THE STUDY
ON
THE ZANZIBAR IRRIGATION MASTER PLAN
IN THE UNITED REPUBLIC OF TANZANIA

ACTION PLAN REPORT

CHAPTER 1 INTRODUCTION

1.1 Authority

This Action Plan Report was prepared in accordance with the Scope of Work for the Study agreed between the Ministry of Agriculture, Natural Resources, Environment and Cooperatives (hereinafter referred to as "MANREC"), in accordance with the Minutes of Meeting for the Study signed between MANREC and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on May 9, 2002 (Attachments 1 and 2). The Report presents the results of problem analysis and special study on major issues identified through problem analysis, and the Action Plan for the 14 selected Priority Programmes and 4 Model Irrigation Schemes. The report also shows the possible results of application of the verification study.

1.2 Objectives of the Study

The Study is to be executed phase-wise in three stages. The objectives of each phase are as follows:

Phase 1

- Formulate the Zanzibar Irrigation Master Plan with target year of 2020.

Phase 2

- Prepare the Action Plan for selected Priority Programmes and Model Irrigation Schemes.

Phase 1 and Phase 2

- Carry out the technology transfer for counterpart personnel through field inspection and report explanation in the course of field works.

The Action Plan Report is the product of the Phase 2 activities.

1.3 Technology Transfer

In succession to the Phase 1 Study, the following staff of MANREC was assigned as counterpart personnel:

Counterpart Personnel Assigned

JICA Study Team	Position	Counterpart Personnel
Mr. H. Shimazaki	Team Leader/Development Policy	Mr. S. Abdulmalik*
Dr. S. Matsushima	Irrigation Drainage Plan/Water Management	Mr. S. M. Shaame
		Mr. M.A. Mchenga
Mr. H. Ohnuma	Farm Management	Mr. M.V. Pandu
		Mr. A.M. Omar
Dr. M. Osada	Institution/Organization/Management	Mr. J.A. Juma
Mr. T. Igawa	Irrigation and Drainage Facilities	Mr. A.S. Mbinga
Mr. T. Kuroda/Y.Ishikawa	Coordinator/Agro-economist	Not Assigned

** : Chief Counterpart Personnel*

The technology transfer was carried out mainly through the on-the-job training such as site inspection, PCM and RRA workshops, and also the regular meetings. In particular, a focus in technology transfer during this reporting period was given to the preliminary planning of the selected four Model Irrigation Schemes. The counterpart personnel prepared the preliminary planning of the selected four Model Irrigation Schemes by themselves in advance, and then technical discussion was made item by item between them and the Study Team, to deepen understanding and their technical knowledge on the planning.

1.4 Steering Committee Meetings

The Steering Committee meeting was held for the Inception Report 2 for Phase 2 on December 20, 2002. The meeting was attended by staff of the Ministry of Water, Ministry of Finance and Foreign Affairs, and MANREC. Mr.H.Fujiie, JICA Headquarters, Dr.J.Nozaka, Irrigation Advisor, and Mr.A.H.Simba, MAFS attended at the meeting. In the Meeting, the Inception Report 2 was, in principle, agreed to by the Steering Committee (Attachment 3).

On August 7, 2003, the Steering Committee meeting was held for the Draft Action Plan Report presenting the Action Plan for the Priority Programmes and Model Irrigation Schemes, results of special study on major issues identified in problem analysis, and possibility of Verification Study. After discussion on them, the Draft Action Plan Report was accepted by the Steering Committee (Attachment 4).

CHAPTER 2 DEVELOPMENT PROGRAMME FOR THE YEAR 2020

2.1 General

In the formulation of the Master Plan, the development programmes of the Subject-wise Improvement and Scheme-wise Development were studied and elaborated based on the results of inventory surveys, and review on relevant policy, plans and projects. This chapter presents the outline of the development programme which was prepared in the Master Plan study, since it is closely related to the preparation of the Action Plan.

2.2 Development Scenario

The ASP states the need for structural reform of the agricultural sector to promote private sector involvement in production, marketing and processing. The ASP also states that the government shall give effort only to the provision of public services that can not be provided by the private sector, and shall promote and support initiatives of the private sector including farmers' associations and NGOs under the government's ownership.

The Master Plan aims to implement sustainable irrigation development through effective use of national resources resulting in an increase of agricultural productivity. The sustainable irrigation development requires a successful three-way partnership comprising the government's ownership, the co-operation and participation of the farming community and involvement of the private sector. The development programme to implement the Master Plan, targets the establishment of a sustainable irrigation development system by 2020 in the following staged timeframe: Short Term (2003 – 2007), Medium Term (2003 – 2012), and Long Term (2003 – 2020).

The basic plan for agricultural development in the Master Plan, as well as the ZIDP, proposes an irrigation development emphasizing an increase of rice production as the preferred option, from the economical and financial viewpoints, but also considering the beneficial effects of improvements to staple food and cash crops.

In due consideration of these viewpoints, necessary interventions, full use of possibly available financial resources and phasing, the stage-wise development scenario for the Subject-wise Improvement and Scheme-wise Development focusing on improvement in quality and expansion in area are worked out as figured on the next page:

Stage-wise Irrigation Development Scenario

	Short Term (2003 -2007)	Medium Term (by 2012)	Long Term (by 2020)
Development Target	**To Establish Sustainable Irrigation Development System by 2020**		
Key Issue for each Term	**Reform**	**Ownership**	**Self-reliance**
Subject-wise Improvement			
Strategic Approach	- Reform of environment for creation of government's ownership and involvement of private sector - Establishment of appropriate technologies on irrigation development in cost-effective concept - Arrangement of environmental issues on irrigation development	- Establishment of irrigation development system under government's ownership - Application of appropriate technologies on irrigation development in cost-effective concept - Eatablishment of environmental protection method on irrigation	- Establishment of self-reliant irrigation development by private sector and publicsector partnership - Establishment of easy access system from farmers on technical support - Spread of environmental protection method established
Activities	Prepare and apply tailor-made improvement programme for project sustainability		
Scheme-wise Development			
Strategic Approach	Expand the irrigated area through development of irrigation schemes in effective use of national		
Activities	Give priority to construction of small-scale irrigation and water harvesting schemes		
Expected Annual Growth Rate of GDP	**5.0 %**	**7.0 %**	**9.0 %**

2.3 Subject-wise Improvement Programme

2.3.1 Objectives

The main objective of the Subject-wise Improvement Programme is to contribute to improvement of agricultural productivity and profitability by (i) supporting scheme implementation, (ii) enhancing effect by irrigation, (iii) sustaining irrigation efficiency, and (iv) improving irrigation practices when hindered.

2.3.2 Preparation of Subject-wise Improvement Programme

"Demand driven" and "Consistency in all undertakings" are put as the basic principles for the preparation of the Subject-wise Improvement Programme. In consideration of these basic principles, the Subject-wise Improvement Programme is prepared through the process of; (i) identifying the problems and constraints of irrigation development, (ii) classifying the problems and constraints thus clarified, (iii) integrating problems and constraints into themes in consideration of their characteristics, (iv) preparing subject programmes so that signified problems and constraints are reflected without unnecessary omissions. Following this process, 31 programmes were chosen.

2.3.3 Implementation of Subject-wise Improvement Programme

(1) Concept

The Subject-wise Improvement aims at creation of a foundation for establishment of self-reliant irrigation development by a public sector and private sector partnership. This programme will be mostly executed in the Short Term and Medium Term since it is required prior to the next stage target. In the Short Term, the executed programme will focus on fundamental themes such as institutional aspects and technical aspects for the central government and farmers. In the Medium Term consideration is to be given to the further strengthening of the government and farmers ownership on irrigation development.

(2) Stage-wise Development

Thirty-one programmes will be implemented step by step based on the following aspects:

- Cross-cutting programmes for all irrigation schemes,
- Fundamental issues for irrigation schemes,
- Harmonization with the Stage-wise Development Scenario,
- Sound linkage with proposed styles of the scheme implementation in the future, and
- Orderly relation of each programme in consideration of whole context of the Subject-wise Improvement Programme

As a result, 27 programmes will be executed or started in the Short Term, and the remaining 4 programmes in the Medium Term as shown below:

List of Subject-wise Improvement Programme in Short Term

No.	Ref.	Programmes
1	I-1	DARI,RADO and DADO Institutional Improvement Programme
2	II-1	DARI Working Mandate Formulation Programme
3	II-2	Regulatory Networking System Establishment between RADO/DAD and DARI
4	II-3	NGO's Intervention in Irrigation Development Encourage Programme
5	II-4	Cooperation Channeling within Irrigation-Sector Establishment Programme
6	II-5	Sub-sectors Coordination System Establishment
7	III-1	Survey and Investigation Guideline Establishment Programme
8	III-2(1)	Planning Guideline Establishment Programme
9	III-2(2)	Design Guideline Establishment Programme
10	III-3(1)	O&M Guideline Establishment Programme
11	III-3(2)	Monitoring & Evaluation Guideline Establishment Programme
12	III-4	Farmers' Participation in Irrigation Development Programme
13	III-5	Village Irrigation Development Guideline Establishment Programme
14	III-6	Farmers' O&M Manual Establishment Programme
15	III-7	Establishment of DADP Formulation Guideline for Irrigated Agriculture Development
16	IV-1	Technical Manuals Handling Guideline Establishment Programme
17	IV-2	Information and Database Improvement Programme

18	IV-3	Irrigation Development Contractors and Consultants' Listing Programme
19	IV-5	Existing-scheme Monitoring System Establishment Programme
20	V-1(1)	Irrigation Technology Research Center Establishment Programme
21	V-1(2)	Perennial Irrigation Method Improvement Programme
22	V-1(4)	Small Dam Technology for Irrigation Development Establishment Programme
23	V-1(5)	Environmental Assessment Study for Irrigation Practice in Tanzania
24	V-1(6)	Study of River-Basin Approach in Irrigation Development
25	V-3	Farmers' Participation Training Programme
26	V-4(1)	Irrigated Agriculture Training Programme for Rice Production Increase
27	V-4(2)	Irrigated Agriculture Training Programme for Cash Crops Production Increase

List of Subject-wise Improvement Programme in Medium Term

No.	Ref.	Programmes
1	IV-4	LGA Networking System Establishment Programme
2	V-1(3)	Flood Irrigation Development Programme
3	V-2	Hydraulic Experimental Center Establishment Programme
4	V-5	Integrated Irrigation Development Model establishment Programme

2.4 Scheme-wise Development Programme

2.4.1 Concept

A development programme for irrigation schemes was prepared based on the results of priority ranking of inventorized irrigation schemes and review on possibly available financial sources. This development programme was, however, finally expressed for each term on the development area basis, not the scheme basis mainly considering the changeable circumstances around irrigation development and the flexibility of scheme selection.

2.4.2 Classification of Inventorized Irrigation Schemes

The inventorized irrigation schemes were classified by irrigation scheme type as tabulated below.

Classification of Inventoried Schemes by Type of Irrigation

Islands	Type of Scheme	Nos. of Schemes	Potential Area (ha)
Unguja	Gravity by Dam	4	1,200
	Gravity by Diversion weir	5	505
	Pump by Groundwater	9	4,924
	Sub-total	18	6,629
Pemba	Gravity by Dam	39	1,892
	Gravity by Diversion weir	-	-
	Pump by Groundwater	-	-
	Sub-total	39	1,892
Zanzibar Total	Gravity by Dam	43	3,092
	Gravity by Diversion weir	5	505
	Pump by Groundwater	9	4,924
	Total	57	8,521

Source: Inventory survey conducted by Master Plan

2.4.3 Priority Grouping of Inventorized Schemes

(1) Criteria for Prioritization of Inventorized Schemes

In due consideration of five elements for sustainability of the irrigation development: *Economically Sound, Technically Appropriate, Sociologically sustainable, Environmentally Friendly and Institutionally Reliable*, prioritization of the inventoried irrigation schemes was carried out based on the following criteria:

Criteria for Scheme Prioritization

Factors	Items to be Evaluated
(1) Technical Factor (20 points)	Slope, Salinity/Alkalinity of soil, Damage by flood, Drainage problems
(2) Economic Factors (40 points)	Size of potential area, Water abstraction method, EIRR, Financial viability
(3) Environmental Factors (10 points)	Sedimentation, Water-borne disease, Water quality
(4) Ease of Implementation (5 points)	Accessibility to site
(5) Social Factor (20 points)	Organizational set-up, Establishment of O & M committee, Linkage with village, Operation body of schemes, Training for O & M, Maintenance of scheme, Existence of water rights, Average farm size
(6) Regional Conditions (25 points)	Development ratio, Self-sufficiency ratio of food crop, Poverty index (BHN)

Source: JICA Study Team

(2) Results of Priority Grouping

Based on the criteria mentioned above, all the inventoried irrigation schemes were evaluated. The results are given below:

Summary of Priority Grouping

Grouping	Points	Nos.	Potential Areas (ha)
(1) "A" Group	Over 70	4	810
(2) "B" Group	61 - 70	11	1,237
(3) "C" Group	51- 60	29	3,320
(4) "D" Group	Below 50	6	3,154
Total		**57**	**8,521**

Source: JICA Study Team

2.4.4 Development Programme for the Year 2020

Based on the results of prioritization of irrigation schemes and possibly available development budget, the irrigation development areas for three terms are estimated as follows:

Accumulated Irrigation Development Area

Development Target at each Term	Short Term 2003 - 2007	Medium Term by 2012	Long Term by 2020
(a) Surface by dam reservoir	356 ha	756 ha	1,349 ha
(b) Surface by diversion weir	90 ha	132 ha	432 ha
(c) Groundwater by pump	178 ha	178 ha	602 ha
Total	**624 ha**	**1,066 ha**	**2,383ha**

Source: JICA Study Team

2.5 Cost Estimate of Implementation and O & M

Total cost for implementation is estimated at US$ 5.23 million, consisting of US$ 0.46 million for the Subject-wise Improvement, and US$ 4.77 million for the Scheme-wise Development. The required O&M cost for 18 years is US$ 1.07 million for the government. The farmers' contribution is also estimated at 1.29 million for 18 years on the monetary basis. The breakdown of these costs is tabulated below:

Breakdown of Implementation and O & M Cost

Year	Government Budget	Government				Balance	Farmers' Contribution
		Subject	Scheme	O & M	Total		
'03	166	48	10	57	115	51	6
'04	176	63	19	57	139	37	9
'05	187	63	69	57	189	-2	21
'06	202	66	119	57	242	-40	34
'07	218	74	119	57	250	-32	34
'08	235	74	110	57	241	-6	32
'09	254	49	110	57	216	38	32
'10	275	23	129	57	209	66	37
'11	302		209	57	266	36	57
'12	332		289	57	346	-14	77
'13	366		297	57	354	12	79
'14	402		350	57	407	-5	92
'15	442		401	58	459	-17	107
'16	487		401	58	459	28	108
'17	535		451	58	509	26	121
'18	589		492	67	559	30	131
'19	648		557	74	631	17	148
'20	712		642	74	716	-4	169
Total	**6,529**	**460**	**4,774**	**1,073**	**6,307**	**222**	**1,294**

Unit : Thousand US$

CHAPTER 3 OBJECTIVES AND BASIC CONCEPT OF ACTION PLAN

3.1 Objectives

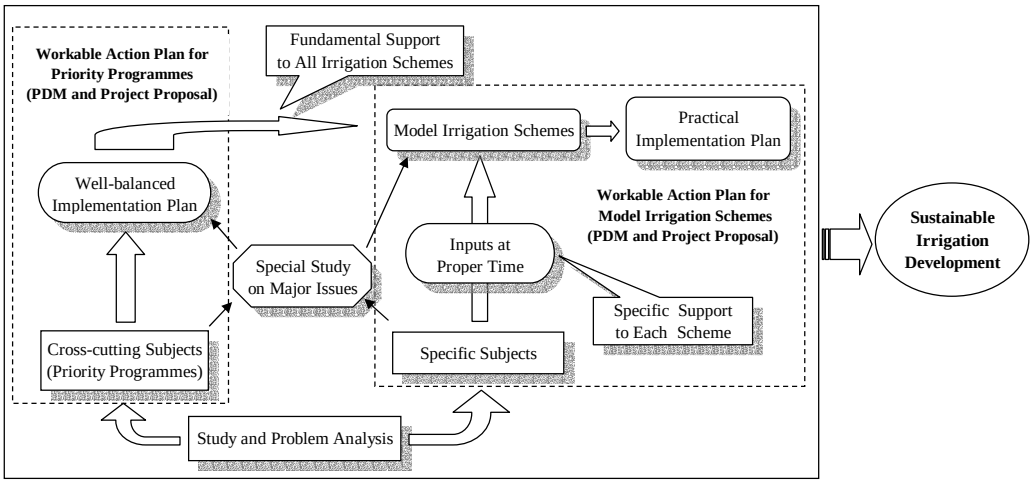
The purpose of the Action Plan is to clarify 5W1H (Who, Why, When, Where, What, How) on implementation of the selected Priority Programmes for the Subject-wise Improvement Programme and Model Irrigation Schemes for Scheme-wise Development.

The Action Plan also clarifies the proper combination among the selected Priority Programmes in implementation, which are the most fundamental issues and cross-cutting to almost all irrigation schemes, and the appropriate input time of specific subjects in the implementation of each Model irrigation Scheme.

3.2 Basic Concept

The workable Action Plan for the selected Priority Programmes and Model Irrigation Schemes shall be worked out based on the following basic concept:

Basic Concept of Action Plan



(1) Action Plans are prepared for the selected Priority Programmes from the Subject-wise Improvement Programme and for the selected Model Irrigation Schemes from the Scheme-wise Development Programme.

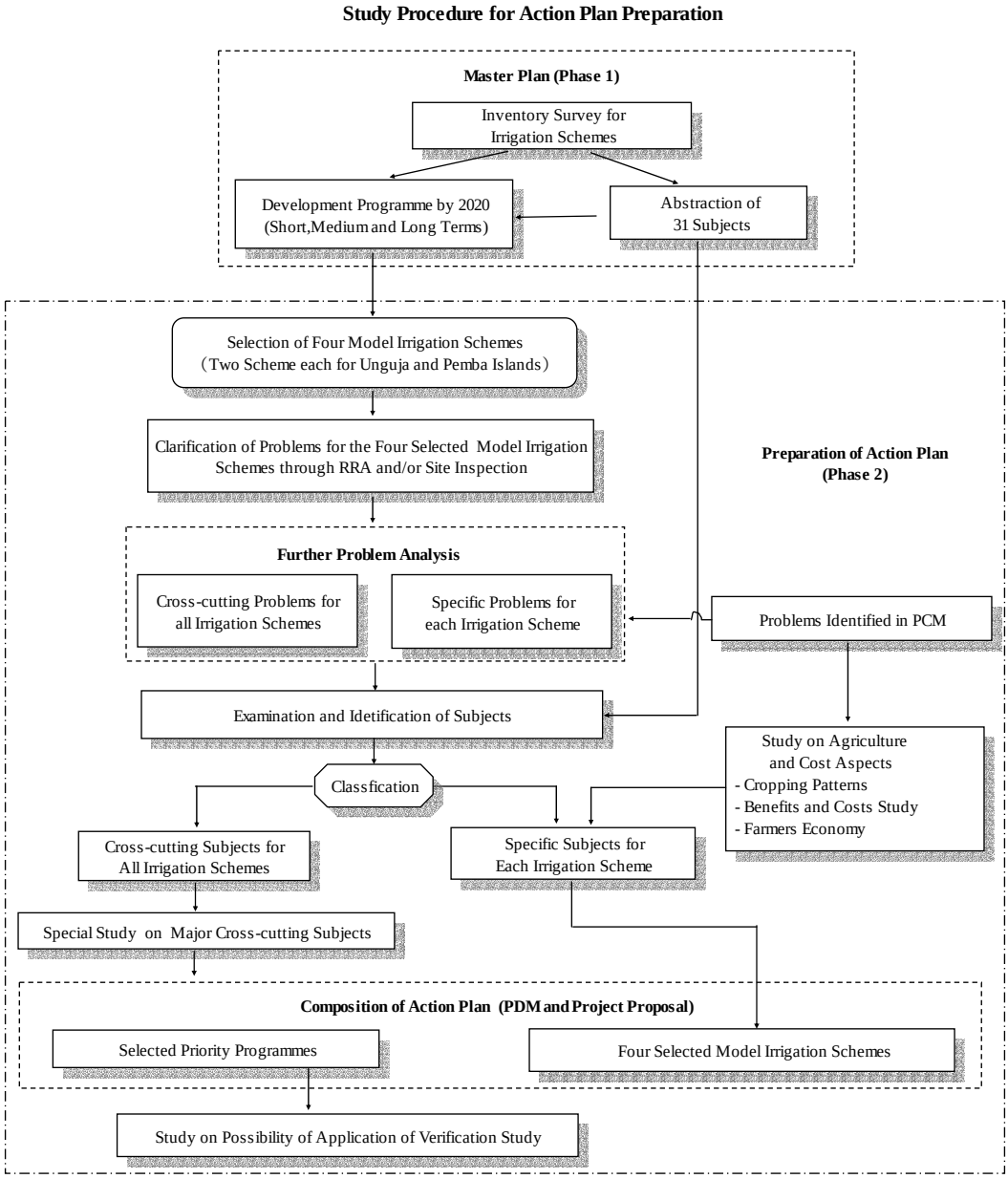
(2) The selected Priority Programmes are many in number, and have close relation with each other. Implementation order of each Programme should thus be carefully determined, to heighten the effect of each Programme and finally to strengthen the support to the scheme development.

(3) Four Model Irrigation Schemes are selected from different irrigation categories by MANREC, to come up against specific problems. In preparation of the implementation plan for the selected Model Irrigation Schemes, therefore, care

should be paid to timely inputs of supporting programmes to settle the specific problems.

3.3 Study Procedure for Action Plan Preparation

Based on the said basic approach, the Action Plan for the selected Priority Programmes of the Subject-wise Improvement Programme and Model Irrigation Schemes of the Scheme-wise Development Programme were prepared in the following study procedure:



3.4 Selection of Model Irrigation Schemes

3.4.1 Selection Purposes of Model Irrigation Schemes

The “Model Irrigation Schemes” to be selected in the Action Plan study does not mean a priority irrigation scheme but rather a standard irrigation scheme for

irrigation categories prevailing in Zanzibar. Purposes of the Model Irrigation Schemes are to show the workable Action Plan for representative irrigation types taking into account suitable application time of the specific subject, and to confirm the appropriateness of the programmes of the Subject-wise Improvement Programme proposed in the Master Plan, based on the results of RRA and/or site inspection.

3.4.2 Selection Criteria

In the Master Plan Study, 16 schemes were selected from the inventorized 57 schemes, which will be implemented by 2020. Then, the four Model Irrigation Schemes are selected from 16 schemes based on the following conditions and criteria:

(1) Two each from Unguja and Pemba islands

(2) Selection Criteria

- High demonstration effect to other similar schemes
- Different category of required works (rehabilitation or new construction)
- No overlapping with other donors'/agencies' projects
- No concentration on specific districts
- Good access to the site
- Adequate data and information from the past study

3.4.3 Selected Model Irrigation Schemes

Based on the said conditions and selection criteria, the MANREC finally selected the following Model Irrigation Schemes:

Finally Selected Model Irrigation Schemes

Irrigation Type	Region	District	Scheme Name	Expected Effect as Model
Unguja				
Pump Scheme	Urban-west	West	Bumbwi Sudi	Effective approach to pump scheme in conjunctive use with surface water
Gravity	North	North A Unguja	Chaani	Typical new scheme with small dam
Pemba				
Gravity	South	Chake-Chake	Mlemele	Typical new scheme with small dam
Gravity	North	Micheweni	Makwararani	Rehabilitation of traditional scheme at low cost

Table 3.4.1 shows the scheme profiles for the four selected Model Irrigation Schemes. The existing development plans for them, which were prepared by the MANREC, are also mentioned in the same table.

CHAPTER 4 ANALYSIS ON MODEL IRRIGATION SCHEMES AND SELECTION OF PRIORITY PROGRAMMES

4.1 Analysis of Model Irrigation Schemes

4.1.1 General

(1) Site Inspection

Site inspection was performed for the four selected Model Schemes consisting of the Mlemele Irrigation Scheme and Makwararani Irrigation Scheme in Pemba Island, and the Bumbwi Sudi Irrigation Scheme and Chaani Irrigation Scheme in Unguja Island.

(2) Rapid Rural Appraisal

The Rapid Rural Appraisal (RRA) was conducted for the Bumbwi Sudi Irrigation Scheme and Chaani Irrigation Scheme in Unguja Island, to collect the necessary data and information for preparation of the Action Plan.

The purposes of RRA in the Study are:

- To clarify operation and maintenance on the selected irrigation schemes including water management, operation, maintenance, and cost for maintenance,
- To grasp present activities of farmers' organizations including Irrigators Associations and their relation with government authorities, and
- To collect data and information regarding agriculture, such as land use, agricultural production, farm inputs, production cost, and so on.

Two days were allocated for each RRA with the following procedures:

1st Day	2nd Day
- Opening and ice breaking.	- Continuation of the group discussion
- Group works for five groups, such as mapping, custom related to irrigation, farming calendar by gender, gender issues, and farming calendar.	- Presentation of the group discussion results
- Presentation of the group discussion results by representatives of the farmers.	- Venn diagram to identify present situation and constraints of linkage between the farmers and the government officials
-Group discussion for institution, operation and maintenance, and agriculture and land use.	- Closing

All of the RRA sessions were executed by two facilitators according to the above-mentioned programme. The number of farmer-participants were some 20 including committee members of the farmers' groups. Irrigation technicians of the schemes, as well as the counterparts in the MANREC, were also present as observers of RRA. All results of RRA are presented in Appendix F.

(3) Problem and Objective Analysis

Based on the results of the site inspection and RRA in the ten schemes, problem analysis and objective analysis were carried out by the JICA Study Team, creating common core problems and objectives as shown below:

- Core Problems : Unstable irrigation water supply to field
- Core Objectives : Realization of stable irrigation water supply to field

The problem trees and objective trees in the Model Irrigation Schemes were presented in the proceeding sections. The following pointes are commonly highlighted from the analysis carried out in all schemes:

- Deterioration of irrigation infrastructures
- Insufficient maintenance works by farmers
- Lack of farmers' skills for water distribution
- Insufficient management skill of IA, such as financial management, leadership, and decision making.

The objective analysis are carried out on the basis of the problem analysis and the observation of the field investigation by the JICA Study Team.

(4) Development Approaches

Based on the results of the objective analyses, identified development approaches are (i) strengthening of IA management capacity, (ii) construction, rehabilitation and improvement of irrigation infrastructures, and (iii) enhancement of farmers' skills for operation and maintenance of irrigation infrastructures. These approaches would be the main components of the projects. Details of the analysis for each model scheme are shown in Appendix C.

4.1.2 Mlemele Irrigation Scheme

(1) Site Description

The scheme area comprises most of Chake Chake District in the southern part of the South Pemba Region on Pemba Island. It includes seven villages, namely, Matele, Tondooni, Mitamani, Dodo, Kumvini, Kitokame and Pogwa. Access to the scheme area in the Matele village is by an unmetaled feeder road from the town of Chake Chake, about 10 km distant. Annual rainfall of the scheme area is relatively abundant and observed at approximately 1,700 mm with a single maximum peak in April. In the scheme area, an expanse of fertile cultivated lands, extends along two tributaries. Both tributaries are ephemeral rivers, and would be a valuable water source for irrigation to the presently rainfed area.

As for paddy production, there is a crop failure at a probability of 75% and water shortage during flowering stage is considered as the main cause. The effect of

irrigation is therefore considered to be very important for the stabilization of paddy production as a supplementary water supply during rainy season. Vegetables are also grown by utilizing the residual soil moisture immediately after paddy. Since there is a competition with the products from Tanga, however, the marketing condition should be improved.

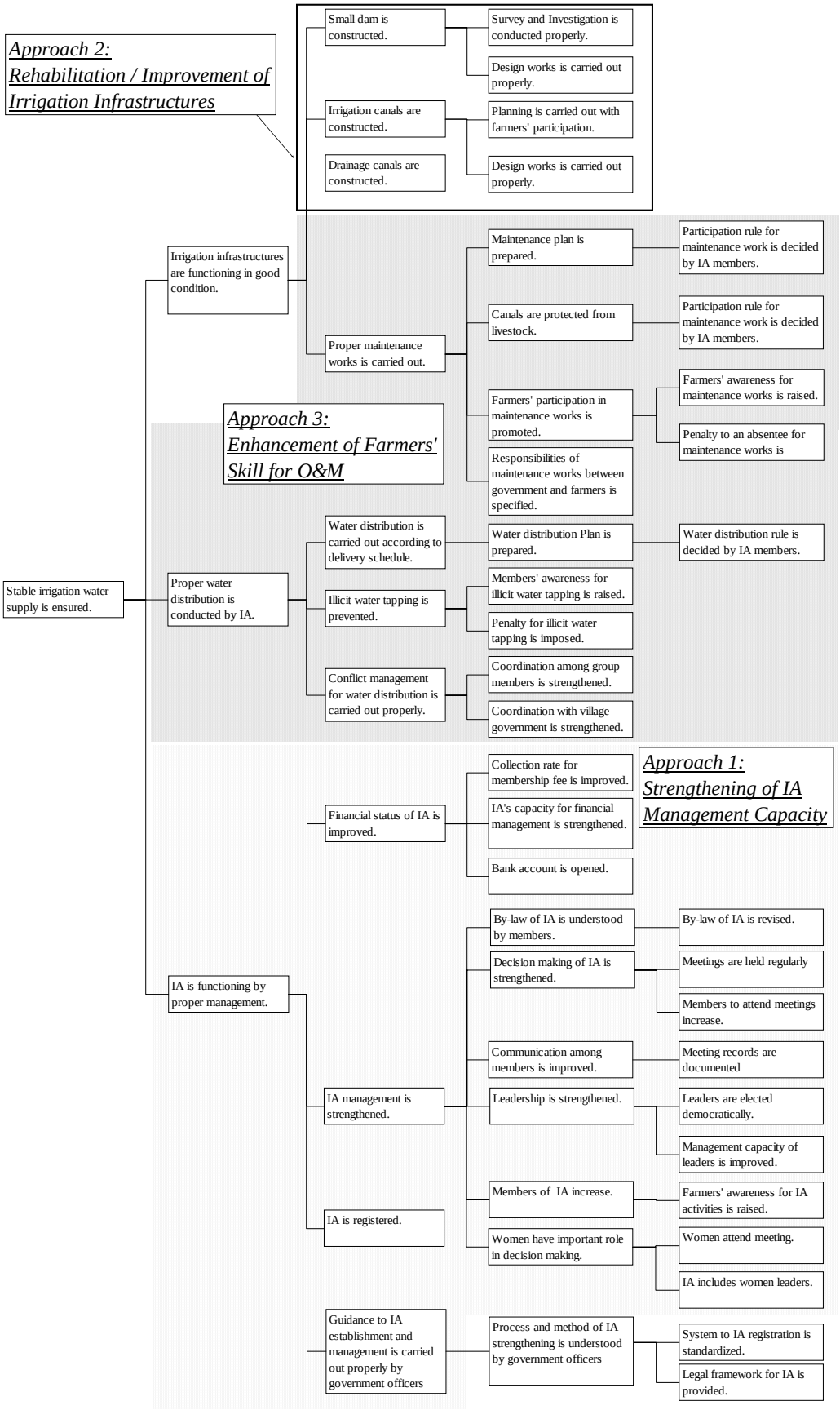
(2) Summary of Problems and Issues

Description	Problems and Issues
Institutional	No IA. The farmers don't have any experience managing a IA.
	Weak ownership and financial base of farmers
Irrigation and Drainage	No irrigation and drainage infrastructure at present.
	No experience of irrigated farming among farmers.

Source: JICA Study Team

(3) Objective Analysis and Development Approach

Results of objective analysis with three development approaches are as follows:



Mlemele Irrigation Scheme - Objective Tree

4.1.3 Makwararani Irrigation Scheme

(1) Site Description

The scheme area occupies most of Micheweni District lying in the eastern part of the North Pemba Region on Pemba Island. It administratively covers 6 villages, namely, Mtakao, Kivugo, Kichangani, Michungani, Njuguni and Mapofu. Access to the scheme area in the Mtakao village is good because of availability of an asphalt-paved road from the town of Chake Chake, about 30 km distant.

Annual rainfall of the scheme area is recorded at about 1,800 mm having a single peak in April. Makwararani river has perennial flow though that in the dry season becomes low. Along the river course, fertile cultivated lands extend over both sides due to affluent moisture gushing out from the river.

Paddy is produced mainly for self-consumption under rainfed condition. Main cash crops are coconut, mango, cassava, banana and spice crops such as cinnamon, chilli and black pepper. Due to transportation problems of fruit crops and price fluctuation of spice crops, the production of such cash crops are not directly connected to cash income. In addition to the irrigation development for paddy and vegetables, proper arrangement is needed to increase the farm income through the better marketing of other cash crops such as fruits and spices.

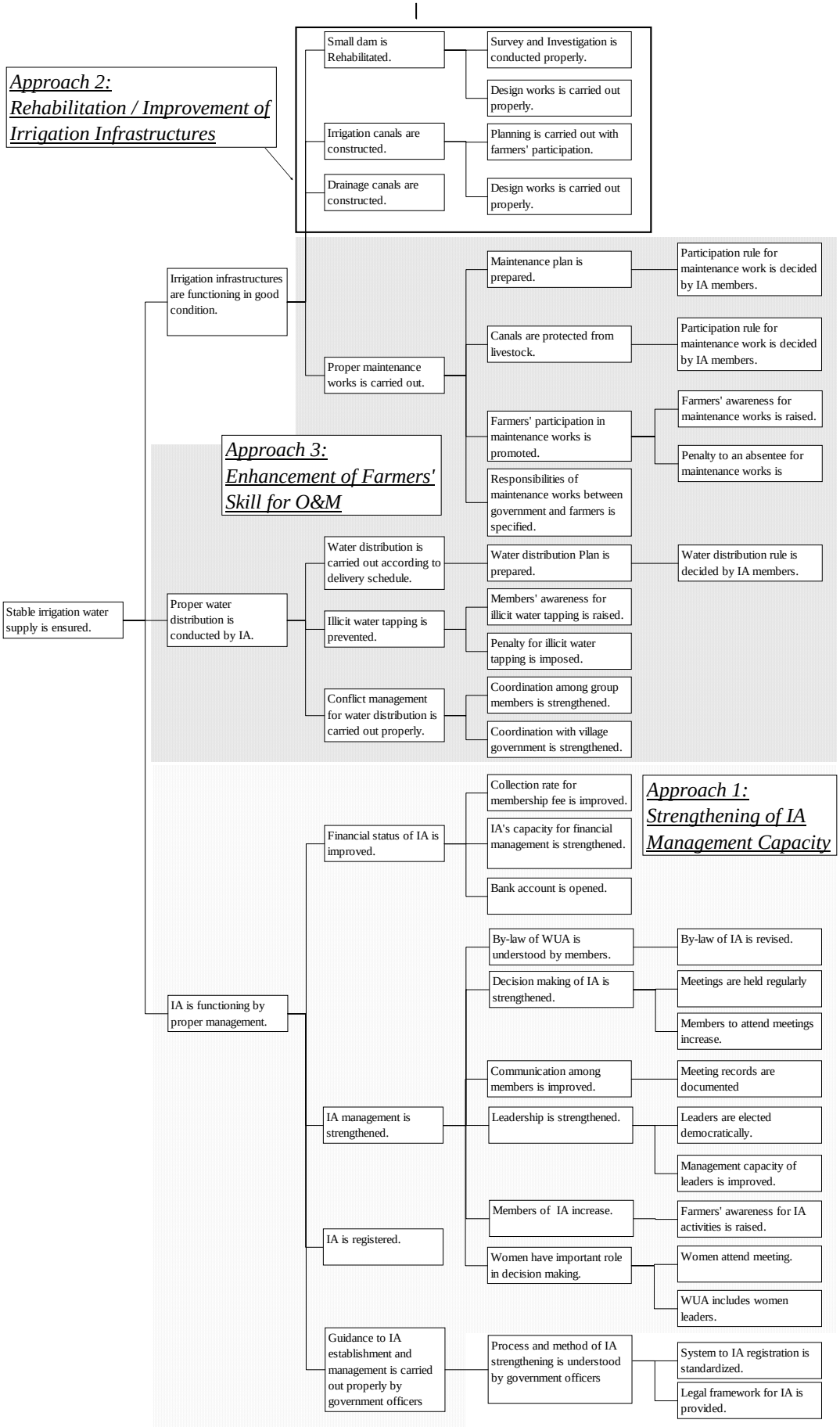
(2) Summary of Problems and Issues

Description	Problems and Issues
Institutional	No IA. The farmers don't have any experience managing IA.
	Weak ownership and financial base of farmers
Irrigation and Drainage	Deterioration of small dam before operating scheme due to lack of technical considerations during planning and design periods.
	Suspension of irrigation canal construction.
	No experience of irrigated farming among farmers.

Source: JICA Study Team

(3) Objective Analysis and Development Approach

Results of objective analysis with three development approaches such as (i) strengthening of IA management capacity, (ii) construction, rehabilitation and improvement of irrigation infrastructures, and (iii) enhancement of farmers' skills for operation and maintenance of irrigation infrastructures, are indicated below.



Makwararani Irrigation Scheme - Objective Tree

4.1.4 Bumbwi Sudi Irrigation Scheme

(1) Site Description

The Bumbwi Sudi Irrigation Scheme is characterized as a pump irrigation scheme. The scheme area occupies most of the area of the West District located in the northern part of Urban West Region on Unguja Island. Administratively, it includes 11 villages Mwache-Alale, Dole, Bumbwi-Sudi, Mguzuni, Kitundu, Ndagaa, Mwakaje, Kiboje, Mfenesini, Kizimbani and Miwani. Access to the scheme area in the Bumbwi Sudi village is via an all weather road connecting it with the centre of Zanzibar about 20 km distant.

The scheme site forms expansive flat lands being used as paddy fields among the range of hills. As there exists a rather plentiful underground aquifer, groundwater has been extracted for various purposes including irrigation since old times. Flush water flows into the scheme area from surrounded hilly areas during floods, however no stable watercourses exist because of the irregularity of the flowing period and flowing direction.

Annual rainfall of the scheme area is relatively abundant and ranges from 1,600 mm to 1,800 mm with a single maximum peak in May. Although having rather abundant precipitation in a year, irrigation is definitely essential for crop cultivation in the dry season and also in the rainy season for supplemental purposes.

Farmers are not keen on the quality of the products because paddy is currently produced only for their own consumption. The purchasing price of surplus paddy by the middlemen consequently becomes extremely low due to such low quality. In addition to the introduction of paddy double cropping through the improvement of pump irrigation, various arrangements are urgently needed such as production and distribution system of quality seeds, group purchasing of inputs and group selling of products in order to increase the farm income through the marketing of surplus paddy products.

(2) Summary of Problems and Issues

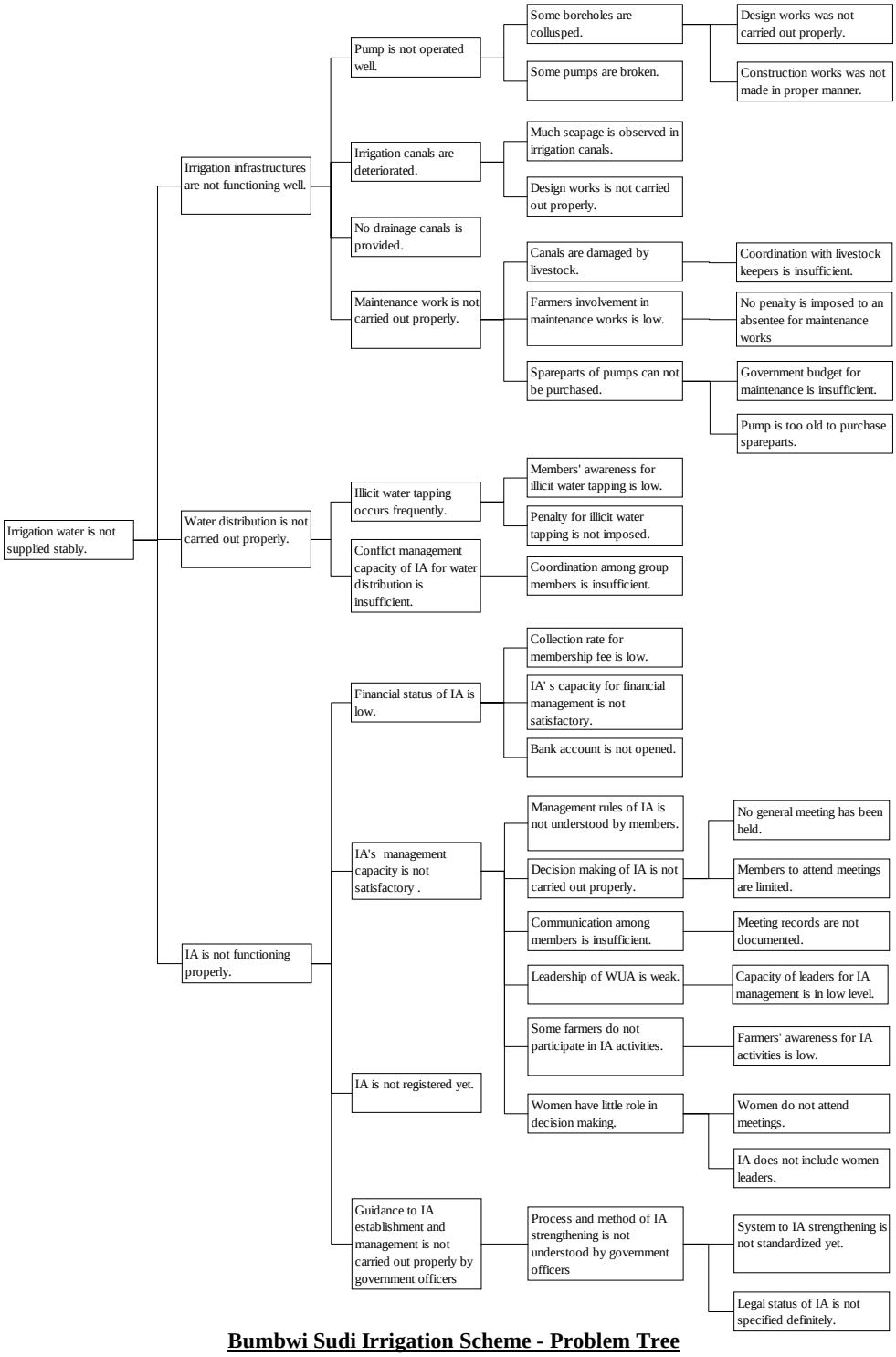
Description	Problems and Issues
Institutional	The IA is not yet registered. The farmers don't have a concrete future plan for registration. Neither cooperative nor association is necessarily an optimum organizational form for the IA. The differences between the cooperative and the association including their application procedures are not clearly understood by them.
	The management of IA is still insufficient. There is no general meeting. The bylaws and the regulations are not well understood by the members.
	Poor participation of members in the IA activities like operation and maintenance activities of irrigation facilities and meetings.
Irrigation and Drainage	Collapse of some existing boreholes.
	Deterioration of some pumping equipment and irrigation canals.
	Farmers' low awareness for O&M.

	Insufficient capacities of farmers for O&M
	Frequent water distribution conflict among farmers accompanied with illicit water tapping.
	Damage of canals by livestock.
	Lack of O&M fund.

Source: JICA Study Team

(3) Problem Analysis

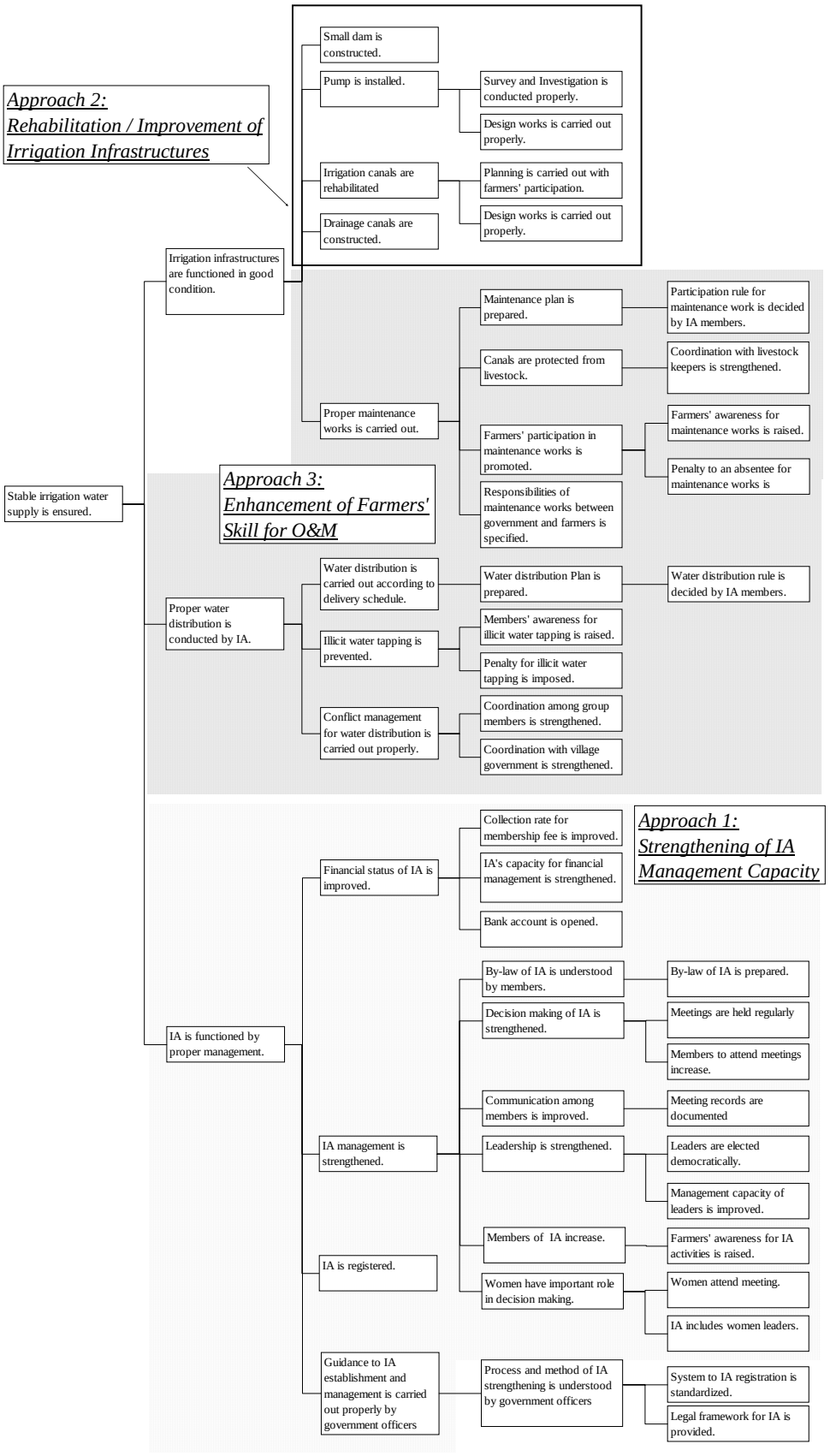
Problem tree of Bumbwi Sudi Irrigation Scheme is shown below.



Bumbwi Sudi Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Results of objective analysis with three development approaches mentioned above are indicated below.



Bumbwi Sudi Irrigation Scheme - Objective Tree

4.1.5 Chaani Irrigation Scheme

(1) Site Description

The scheme area covers most of the North-A District situated in the southern part of the North-Unguja Region on Unguja Island. It administratively includes seven villages: Chaani, Kentwa, Mbuzini, Gamba, Kandwi, Kivunge and Mkwajuni. Access to the scheme area in the Chaani village is by an asphalt-paved road from the town of Zanzibar, about 35 km distant.

Annual rainfall of the scheme area is observed at about 1,200 mm having a distinctive peak with a maximum in April. The Bwabwaja River, which is one of the rivers of Unguja North originating in Kilombero of the Donge ridge, is a water source of irrigation for the scheme area. Though the Bwabwaja River has an undersized catchment area of 3.6 km^2, it has a relatively long flowing period due to gushing out of sub-surface water flow. Low plain suitable for rice cultivation extends to the mouth of the gorge of the Bwabwaja River. The river runs into the fertile cultivable land from west to east. The river course tends to disappear into the peripheral coral rags and Miocene limestone called "Pokezi". The scheme area is bounded on the south by the command area of the Kibukwa irrigation scheme.

Since paddy and cowpea produced are fully consumed, there is usually no cash income from those crops. It seems farmers believe that they can increase their income through double cropping of paddy when irrigation system is introduced. According to the result of preliminary cost and benefit analysis, however, the current paddy production is not feasible. It might be necessary to produce better quality of paddy to be sold in higher price and also to introduce vegetable production immediately after paddy in order to utilize the residual soil moisture effectively.

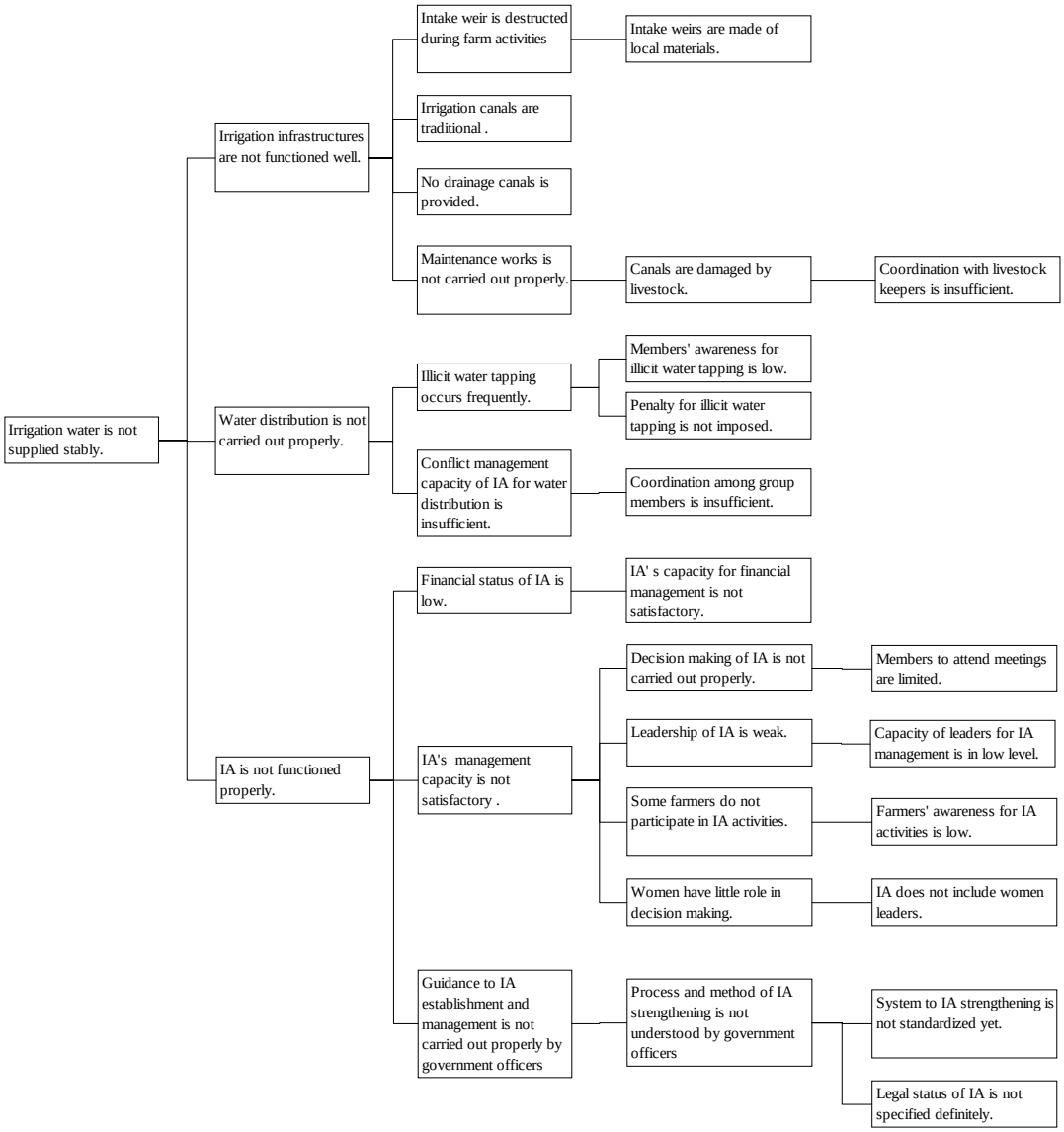
(2) Summary of Problems and Issues

Description	Problems and Issues
Institutional	The IA is a registered association. However, it is not an optimum legal form for the IA.
	The bylaws and the regulations are not well understood by the members.
	Poor participation of members in the IA activities such as operation and maintenance activities of irrigation facilities and meetings.
Irrigation and Drainage	Fragile diversion weir to abstract water stably.
	Little experience for irrigated farming among farmers.
	Water conflict between present irrigators' groups.
	Damage of canals by livestock.

Source: JICA Study Team

(3) Problem Analysis

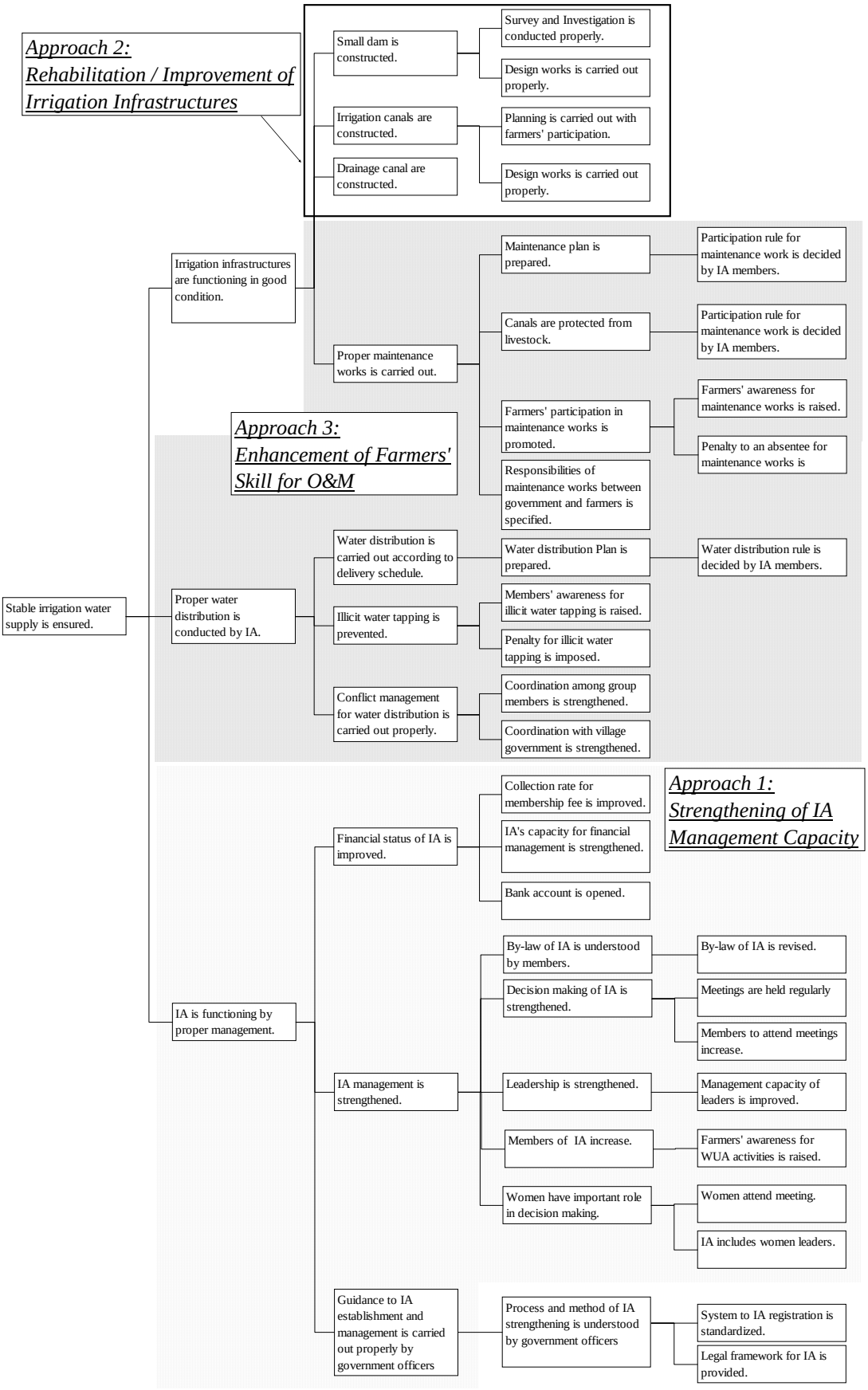
Problem tree of Chaani Irrigation Scheme is shown below.



Chaani Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Results of objective analysis with three development approaches such as (i) strengthening of IA management capacity, (ii) construction, rehabilitation and improvement of irrigation infrastructures, and (iii) enhancement of farmers' skills for operation and maintenance of irrigation infrastructures, are indicated below.



Chaani Irrigation Scheme - Objective Tree

4.2 PCM Workshop

4.2.1 Purpose

The JICA Study Team organised two separate PCM workshops; one for the irrigation staff of MANREC and the other for the selected farmers and representatives of the IAs from both Unguja and Pemba Islands.

Both PCM workshops have two similar objectives as below, and the purpose is to approach these objectives from both the government side and the farmers' side:

- To obtain the details of the current problem situation on irrigation farming in terms of irrigation support, infrastructure and farming practices.
- To develop feasible strategies to alleviate the problem situation in order to foster and sustain the development of irrigation farming.

4.2.2 Methodology and Concept of PCM Workshop

(1) Methodology

The methodology adopted in both workshops was of a participatory approach. In each case the participants to the workshops were accorded equal opportunities to write their inputs on cards, which were then displayed on board to allow for meaningful discussions until a consensus was reached.

In order to allow for inputs which are focused, the discussions were conducted in groups for specified topics and the results presented in the plenary for endorsement.

(2) Concept

The concept of PCM workshop is to identify the developmental intervention from one outset situation (unfavourable) to a future condition (desirable).

4.2.3 Identified Problems and Feasible Strategies/Activities

(1) Key Actors

In the implementation of ZIMP, MANREC and farmers are the key actors. To change the outset situation to the future condition, it is necessary for both of them to take change processes. Their characters and function in irrigation can be described as follows:

MANREC:

In order that irrigation farming receives adequate support from the GOZ, the irrigation support services under MANREC have to be strengthened from its current problem situation.

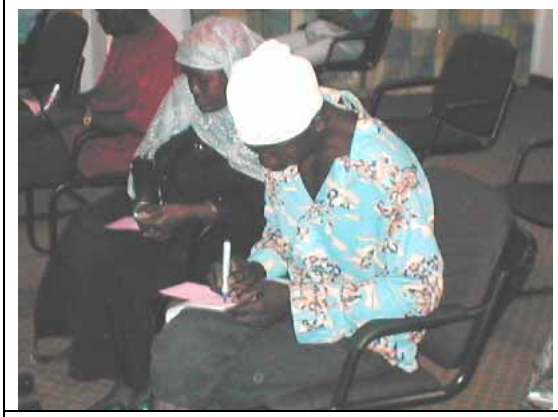
Photographs: PCM Workshops

Introduction of PCM (MANREC)

Group work (MANREC)

Presentation of results (MANREC)

Core problem identification (IA)



Input writing (IA)

Presentation of results (IA)

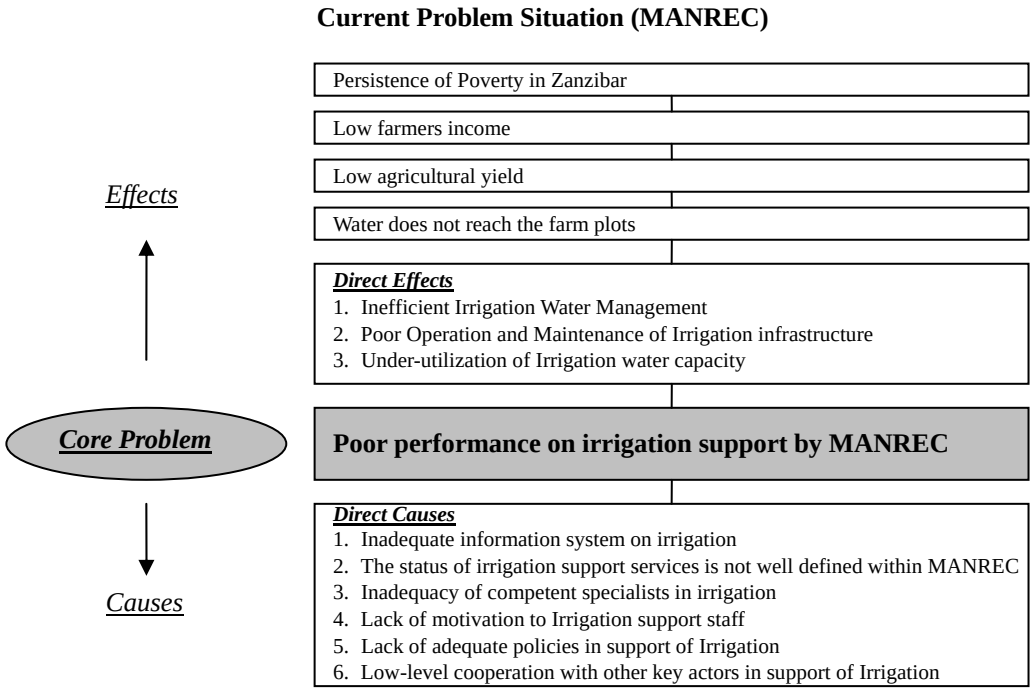
Farmers/IAs:

They are the ones to sustain the management and operations of the irrigation infrastructure and undertake appropriate farming practices with the ultimate goal of increasing the agricultural yield.

(2) MANREC

Among the participants, identification of core problem was carried as the first step of the PCM workshop. The identified core problem for MANREC was ***"poor performance on irrigation support by MANREC"***.

After the identification of the core problem, six direct causes and three direct effects of the core problem were identified. The current problem situation of MANREC in irrigation was figured as shown below:

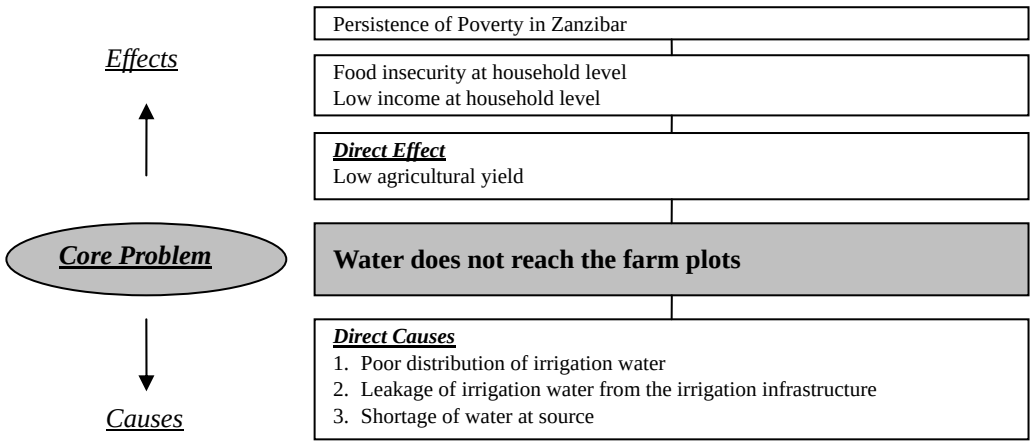


In succession with the identification of these items, analysis of each direct cause was carried out among the participants. In Figure 4.2.1, the left part shows the results of problem analysis at the workshop, and the right part shows the countermeasures contemplated by the JICA Study Team against the identified problems. The programmes at the far right side in Figure 4.2.1 are the corresponding Subject-wise Improvement Programmes of the Master Plan, which are explained in Clause 4.4, and these shall be the feasible strategies/activities against the outset situation.

(3) Farmers/IAs

As with MANREC, the core problem was identified as ***"water does not reach the farm plots"***. Further discussions among farmers/IAs from both islands revealed the effects and causes of the core problem. The results are shown as follows:

Current Problem Situation (Farmers/IAs)

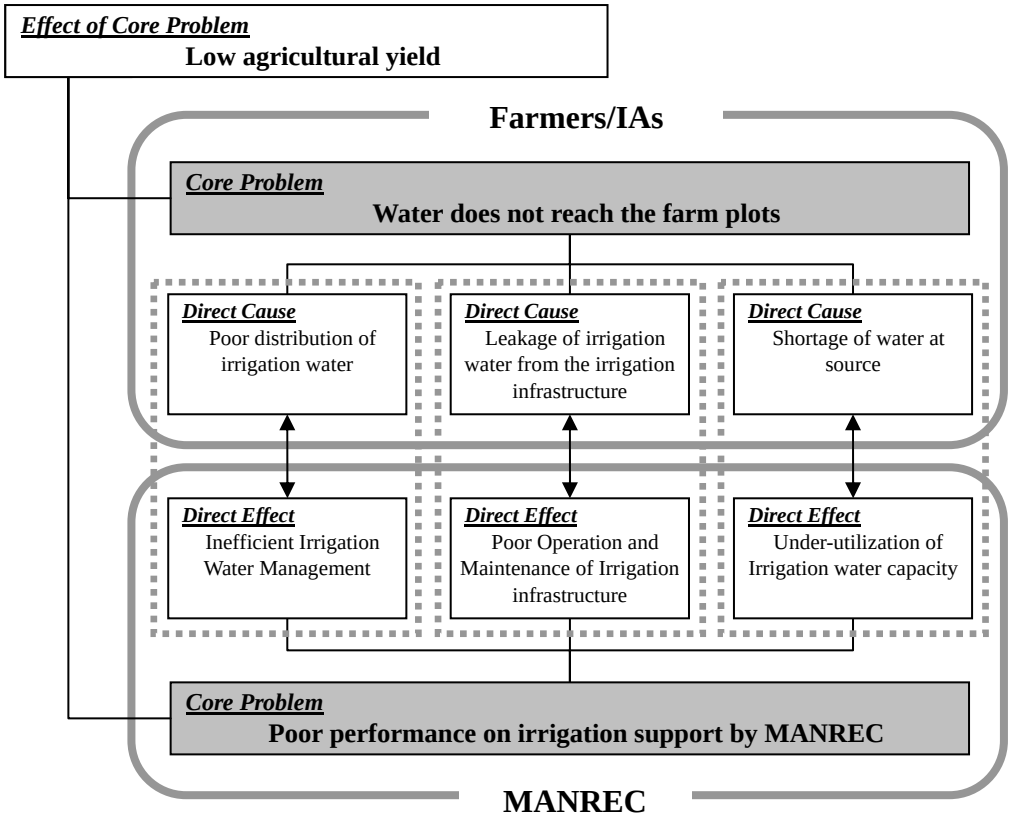


The analysis of each direct cause among farmers/IAs and the contemplation of countermeasures by the JICA Study Team were carried out in the same manner as for MANREC, of which the results are given in Figure 4.2.2.

4.2.4 Interlocking of Two PCM Workshop Results

In comparison between the two PCM workshop results, some interesting relations were identified. In both workshops, in spite of the fact that the core problem was different because the situation is different between the outset level and impact level, ***"low agricultural yield"*** was identified as one of the effects from each core problem. Furthermore, the direct effects from the core problem of the MANREC are very similar to the direct causes to the core problem of farmers/IAs. Taking into consideration these relations, it was deemed that two workshop results could be interlocked, illustrated as follows:

Interlocking of Workshop Results



From the illustration above, it is obvious that both the output level (MANREC) and impact level (Farmers/IAs) have a similar relation to the outset situation of irrigation in Zanzibar. This result should be taken into account carefully at the implementation of the ZIMP as well as in preparation of the Action Plan.

4.3 Linkage of Identified Issues from Field Survey and Subject-wise Development Programme

4.3.1 General

As mentioned in Clause 4.1, many problems on the four selected Model Irrigation Schemes were clarified through the PCM workshop, RRA and site inspection, and then appropriate countermeasures were discussed for respective fields of institutional, agricultural and engineering.

On the other hand, 11 programmes of the Subject-wise Improvement Programme were provisionally selected as the fundamental and cross-cutting subjects for all irrigation schemes in the Master Plan study. In this Clause, these 11 programmes were preliminarily examined as to whether further sub-programmes are necessary or not using the results of appropriate countermeasures. In addition, a linkage among problems, countermeasures and programmes of the Subject-wise Improvement Programme was clarified based on the results of analysis and study

executed.

4.3.2 Institution

Based on RRA and the site inspection, the following problems have been identified:

- Insufficient legal framework of IA (Irrigators Association)
- Farmers' insufficient ability or lack of experiences of IA management
- Weak ownership and financial base of farmers, and necessity of farmers' initiative strengthening
- Necessity of efficient support for the farmers' bottom up movement by the government
- Necessity of efficient technical training services for the farmers

The preliminary analysis on the problems clarified through RRA and site inspection led to the following appropriate countermeasures:

Summary of Countermeasure for each Scheme

Countermeasure	Scheme			
	Mlemele	Makwararani	Bumbwi Sudi	Chaani
Support for organizing IA	○	○	-	-
Support for IA registration	-	-	○	-
Technical training services for farmers	○	○	-	-
New legal framework for IA	-	-	○	-
Introduction of competitive bottom up approach	○	○	-	-
Technical training of IA management	-	-	○	○
Backstop for bottom up movement by the government	○	○	○	-

Source: JICA Study Team

From this table, it is obvious that the most cross-cutting issue for the four selected Model Irrigation Schemes is in the institutional aspect, the "Support for bottom up movement by the government".

On the other hand, an examination was made for the 11 Programmes of the Subject-wise Improvement Programme, which were provisionally selected as early executed subjects in the Master Plan study.

Consequently, Program I-1(DARI, RADO and DADO Institutional Improvement Programme) should consist of the following programmes based on the identified problems from the RRA and site inspection.

- DARI Reform Sub-programme
- Capacity Building of Government Staff Sub-programme
- IA Strengthening Sub-programme

The first two Sub-programmes are primarily for the governments including the central and the local. However, the third Sub-programme (Irrigators Association

Strengthening Sub-programme) is a cross-cutting issue. Therefore, it is divided further into the three Sub-programmes.

- IA Organizing and Registration Support Manual Establishment Sub-programme
- New Legal Framework for IA Establishment Sub-programme
- IA Management Training Programme for Farmers Sub-programme

These study results are summarized below.

Linkage of Countermeasures with Programmes of Subject-wise Improvement Programme

Original Programme	**Programme I-1(DARI, RADO and DADO Institutional Improvement Programme)**				
Additional Sub-programme	**-**	**-**	**IA Strengthening Sub-programme**		
Sub-programmes Added / **Countermeasure**	DARI Reform	Capacity Building Government Staff	IA Organizing & Registration Support Manual	New Legal Framework for IA Establishment Study	IA Management Training Programme for Farmers
Support for organizing IA	-	-	○	○	-
Support for IA registration	-	-	○	-	-
Technical training services for farmers	-	-	-	-	○
New legal framework for IA	-	-	◎	◎	-
Introduction of competitive bottom up approach	-	-	-	-	◎
Technical training of IA management	-	-	-	-	○
Backstop for bottom up movement by the government	◎	○	-	-	-

Source: JICA Study Team

Remarks: ◎: Priority in execution

4.3.3 Irrigation and Drainage System including Water Management and O & M

Through the field surveys for the four selected Model Schemes, thought-provoking problems and issues have been identified in the field of irrigation and drainage. Concrete solutions and measures for solving these problems would be given in each Scheme Proposal, which is a definitive plan as an irrigation scheme. Moreover the lessons learned from these problems are being reflected to the related programmes proposed under the Subject-wise Improvement Programme.

On the preparation of the Project Proposal for the selected subject programmes of the Subject-wise Improvement Programme, the problems and issues identified through the field survey have to be fully considered so as to make the proposal realistic and more useful.

The appropriate countermeasures for each scheme are worked out and summarized as follows:

Summary of Countermeasure for each Scheme

Countermeasure	Scheme			
	Mlemele	Makwararani	Bumbwi Sudi	Chaani
Establishment of proper technical manuals	○	○	○	○
Strengthening roles of MANREC and LGA	-	○	-	-
Continuation of governmental subsidy for pump operation cost	-	-	○	-
Utilization of contractors in proper manner	-	○	-	-
Strengthening roles of LGA	-	-	-	○
Preparation of necessary provisions on IA	-	-	-	○
Establishment of proper O&M manuals	○	○	-	○

Source: JICA Study Team

This table shows that the most cross-cutting issue for the four selected Model Irrigation Schemes in the irrigation and drainage aspect is the "Establishment of proper technical manuals". In addition, linkage of these countermeasures with the originally selected subject programmes is given below:

Linkage of Countermeasure and Originally Selected Programmes

Countermeasure	Programmes of Subject-wise Improvement Programme						
	I-1	II-1	III-1	III-2(1)	III-2(2)	III-3(1)	IY-3
Establishment of proper technical manuals	-	-	○	○	○	-	-
Strengthening roles of MANREC and LGA	-	○	-	-	-	-	-
Continuation of governmental subsidy for pump operation cost	-	○	-	-	-	-	-
Utilization of contractors in proper manner	-	-	-	-	-	-	○
Strengthening roles of LGA	-	○	-	-	-	-	-
Preparation of necessary provisions on IA	○	-	-	-	-	-	-
Establishment of proper O&M manuals	-	-	-	○	○	○	-

Source: JICA Study Team

Note: Contents of Programmes (: Cooperative components with MAFS, Mainland)*

I-1 : DARI, RADO and DADO Institutional Improvement Programme
II-1 : DARI Working Mandate Formulation Programme
*III-1 : Survey and Investigation Guideline Establishment Programme**
*III-2(1) : Planning Guideline Establishment Programme**
*III-2(2) : Design Guideline Establishment Programme**
*III-3(1) : O & M Guideline Establishment Programme**
IV-3 : Irrigation Development Contractors and Consultant' Listing Programme

4.4 Selection of Priority Programmes

Based on analysis in Sub-clause 4.3.2, the number of modified subject-wise improvement programmes amounts to 33, adding three programmes in relation to strengthening IA. The programmes are prioritized according to the cross-cutting

countermeasures identified in the field investigation and the short-term development scenario presented in the Master Plan as shown below.

- Reform of environment for creation of government's ownership and involvement of private sector,
- Establishment of appropriate technologies on irrigation development in a cost-effective concept, and
- Arrangement of environmental issues on irrigation development.

The selected priority programmes are shown in the following table with bold character.

Selected Priority Programmes among Subject-wise Improvement Programme

No.	Ref.	Programmes	Cross-cutting Countermeasures	Strategic Targets for the Short Term Development		
				Government's ownership and Private Sectors	Appropriate Technologies	Environmental Issues
1	**I-1**	**DARI,RADO and DADO Institutional Improvement Programme**	◎	◎		
2	**I-2**	**IA Organizing and Registration Support Manual**	◎	◎		
3	**I-3**	**New Legal Framework for IA Establishment Study**	◎	◎		
4	**I-4**	**IA Management Training for Farmers**	◎	◎		
5	**II-1**	**Regularization of Irrigation Administration and DARI Working Mandate Formulation Programme**	◎	◎		
6	II-2	Regulatory Networking System Establishment between RADO/DADO and DARI		○		
7	II-3	NGO's Intervention in Irrigation Development Encouragement Programme		○		
8	II-4	Cooperation Channeling within Irrigation-Sector Establishment Programme		○		
9	II-5	Sub-sectors Coordination System Establishment		○		
10	**III-1**	**Survey and Investigation Guideline Establishment Programme**	◎		◎	○
11	**III-2(1)**	**Planning Guideline Establishment Programme**	◎		◎	○
12	**III-2(2)**	**Design Guideline Establishment Programme**	◎		◎	
13	**III-3(1)**	**O&M Guideline Establishment Programme**	◎		◎	
14	III-3(2)	Monitoring & Evaluation Guideline Establishment Programme			○	
15	**III-4**	**Farmers' Participation in Irrigation Development Programme**		◎		
16	III-5	Village Irrigation Development Guideline Establishment Programme		○	○	
17	III-6	Farmers' O&M Manual Establishment Programme		○	○	
18	**IV-1**	**Technical Manuals Handling Guideline Establishment Programme**	◎		◎	
19	**IV-2**	**Information and Database Improvement Programme**	◎	◎		

20	**IV-3**	**Irrigation Development Contractors and Consultants' Listing Programme**	◎		◎	
21	IV-4	LGA Networking System Establishment Programme			○	
22	IV-5	Existing-scheme Monitoring System Establishment Programme			○	
23	V-1(1)	Irrigation Technology Research Center Establishment Programme			○	
24	V-1(2)	Perennial Irrigation Method Improvement Programme			○	
25	V-1(3)	Flood Irrigation Development Programme			○	
26	V-1(4)	Small Dam Technology for Irrigation Development Establishment Programme			○	
27	**V-1(5)**	**Environmental Assessment Study for Irrigation Practice in Tanzania**				◎
28	**V-1(6)**	**Study of River-Basin Approach in Irrigation Development**			○	◎
29	V-2	Hydraulic Experimental Center Establishment Programme			○	
30	V-3	Farmers' Participation Training Programme		○		
31	V-4(1)	Irrigated Agriculture Training Programme for Rice Production Increase		○		
32	V-4(2)	Irrigated Agriculture Training Programme for Cash Crops Production Increase		○		
33	V-5	Integrated Irrigation Development Model establishment Programme			○	

Remarks: ◎*Programme closely related to the issues*
○*Programme related to the issues*

CHAPTER 5 SPECIAL STUDY ON MAJOR ISSUES IDENTIFIED IN PROBLEM ANALYSIS

5.1 General

Many problems and constraints hindering sustainable irrigation development have been clarified through review of relevant reports and execution of inventory surveys, PCM, RRA and site inspections for the existing irrigation schemes. The results of analysis on these problems and constraints, found some key issues which largely influence successful irrigation development.

This Chapter presents the results of a preliminarily study on proper approaches to solutions or countermeasures for these issues. Also, this Chapter discusses needs of further study on some issues in the agricultural aspects which are essential to heighten the irrigation effect by inter-sectoral cooperation.

These special study results are incorporated into the Action Plan for the selected Priority Programmes of the Subject-wise Improvement Programme and the Model Irrigation Schemes of the Scheme-wise Development Programme.

5.2 Scheme Implementation Process

(1) General

Recently, special attention has been given to small-scale irrigation schemes mainly due to easy management, so that there is a tendency that most of the implemented schemes are small-scaled ones rather than like others in Tanzania as well as other developing countries. In addition to this local tendency, internationally, the method for scheme implementation has been renovated drastically. Scheme implementation by force account of the government has been discontinued under the wave of privatization in most of the developing countries in Africa. Instead, contract basis implementation is on the rise.

Even in Zanzibar, a new modality of irrigation scheme implementation unlike the current centralized procedure is to be sought so as to suit the movement of strengthening District Offices and privatization stated in the development policy.

(2) Improvement Direction in the Scheme Implementation Process

According to the experiences in other countries, the following points are stressed on the improvement of the implementation process of irrigation schemes:

- Irrigation schemes should be implemented on a contract basis considering involvement of private sectors.
- Beneficiaries should participate in whole scheme implementation process with

certain initiatives.

- Strengthening of District Offices should be incorporated into the implementation process.
- Tendering and contract award should be done in a fair and transparent manner.

In Zanzibar, these points are applicable for improvement of scheme implementation process although the priorities among them are slightly different.

Until now, irrigation schemes were implemented under strong intervention of donors, so that their intentions were very influential for decision making through almost all processes of scheme implementation. Scheme implementation had been done by force account without employing any contractor. The investigation, studies and also design for the schemes have been carried out by government officials. General flow of the implementation process can be as shown below:

General Flow of Present Implementation Process

Stakeholders	Scheme implementation process				
	Scheme selection	Site survey and planning	D/D	Implemen-tation	O&M
Donors/NGOs					
DARI					
District Office					
District staff					
Farmers					
Legal entity*					
*Contractor***					

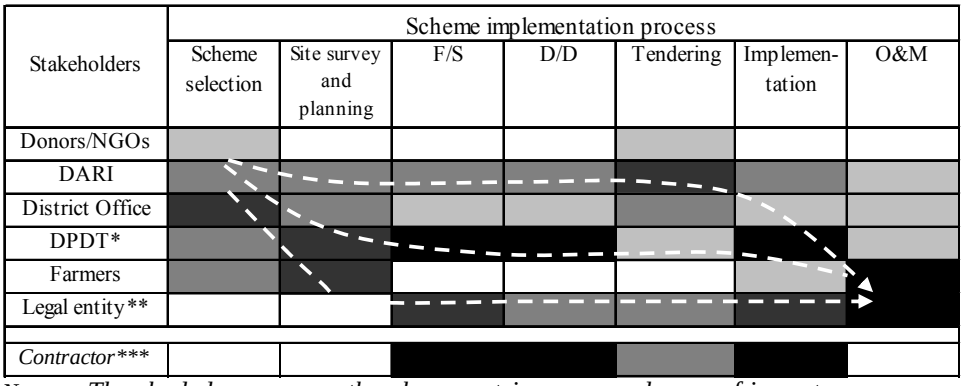
Note: The shaded squares on the above matrix means a degree of importance among relevant stakeholders in each implementation process(Strong shade indicates the more important role.).

** : "Legal entity" means a farmers' group which is in force as a legal unit*

***: "Contractor" includes contractors who engage in construction works, and consultants who engage in consulting services*

On the contrary, the new process should require involvement of District staff, farmers and legal entities of farmers more, and the activation of outsourcing the private sectors. Taking into consideration the above, the proposed new approach on scheme implementation process in Zanzibar was conceived. General features of the proposed new implementation process with respective leading actors at each stage of implementation, could be drawn as follows:

General Feature of Proposed New Implementation Process



Note: The shaded squares on the above matrix means a degree of importance among relevant stakeholders in each implementation process (Strong shade indicates the more important role.).

** : "DPDT" means District Project Development Team which is established assigning LGAs staff when scheme is projected*

*** : "Legal entity" means a farmers' group which is in force as a legal unit*

****: "Contractor" includes contractors who engage in construction works, and consultants who engage in consulting services*

The above figure indicates that the mainstream of leading actors is to be divided into three courses from the thick singular flow consisting of donors in the present implementation process. The proposed three courses show a local people branch, District branch and DARI's branch. In addition to this change of leading actors, it is proposed to shift the implementation method from a force account to a contract basis.

(3) Giving Attention to the Participatory Approach

In order to generalize the guidelines for every eligible candidate scheme to meet the circumstances in Zanzibar, some modifications should be made to the current process. The most important modification is to make the farmers (local people) play a more leading role. In this sense, it is essential to strengthen the farmers' participation in the implementation process. RRA workshops held in Zanzibar, as mentioned in Chapter 4, bore useful data for this participation. Farmers' participation is discussed in Clause 5.3.

(4) Proposal of New Scheme Implementation Process

Taking experiences in other countries and possible mainstream of irrigation scheme implementation into consideration, a new process is proposed on the basis of the models executed in the other developing countries. Major points in the new proposed implementation process are enumerated from the following three aspects:

(a) Strengthening of Institution and Organization

- Districts should participate in the process of planning, designing and construction of the scheme.

- Procedures of scheme preparation are to be done in collaboration with DARI and local parties.
- Formation and registration of a legal entity for the farmers' organization should be commenced as soon as possible after confirming the scheme outline.
- A sound tendering and award system should be introduced for proper contractor selection.
- It is pre-conditioned that a tender board consisting of experienced personnel is to be established prior to tendering.
- Monitoring processes are to be systemized for operation and maintenance after construction works completed

(b) Promotion of Farmers Participation

- Farmers participate in the scheme implementation at any stage as satisfying a demand.
- The routines of participatory cycle management are applied to the implementation process.
- Farmers contribution has to be considered for any scheme implementation.
- Farmers contribution should be considered for any scheme implementation through allowable ways of contribution.

(c) Activation of Private Sector

- Proper F/S and D/D are carried out by engagement of competent consultants.
- Engagement of a contractor for the construction works of the scheme is pre-conditioned for scheme implementation instead of force account management.

Figure 5.2.1 shows a proposed new scheme implementation process, and outline of the processes is tabulated below:

Tentative Plan of Small Irrigation Scheme Implementation Process

Steps	Activities	Leading Stakeholders	Remarks
Step1	Preliminary scheme selection	District, Villages, DARI	
Step 2	Selection of implementing irrigation schemes	District, DARI	Verified by MANREC
Step 3	Participatory action planning	District, Villages	
Step 4	Registration as Legal Entity(LE) and Letter of Understanding	District, Villages	
Step 5	Participatory diagnostic study	District, SMS*	
Step 6	Participatory design and feasibility study	DARI, SMS, LE**, District	Consultants are hired
Step 7	Joint investment decision and financing agreement	DARI, SMS, LE, District	Donors and Central Gov. may be involved.

Step 8	Detailed designs and tender documentation	DARI, SMS, LE, District	Consultants are hired
Step 9	Tendering and contract award	DARI, SMS, LE, District	Donors will be presented if applicable.
Step 10	Implementation	DARI, SMS, LE, District	Contractors are hired
Step 11	Completion certificate	DARI, SMS, LE, District	
Step 12	Operation and maintenance	LE supported by District and DARI	Starting project cycle management

SMS: Subject Matter Specialist
LE: Legal entity of farmers

(5) Indicatable Issues on the Proposed Implementation Processes

In the proposal on the implementation processes there remain some subjects to be settled and discussed further. In order to clear up the problems without delay, the following approaches are recommendable:

Remaining Problems and Recommendable Approaches

Remaining Issues	Recommendable Approaches
Farmers' legal entities are proposed to be established before execution of the feasibility study. The feasibility study may occasionally reject scheme implementation by showing the proposal to be unfeasible. The organized entity may still remain active without scheme implementation.	Time of organization of the farmers' legal entity may not be fixed exactly before execution of feasibility study. If scheme selection is done properly, scheme implementation is hardly ever denied through a feasibility study. Scheme selection process is more important in this sense.
On the proposal, DPDT shall play an important role in scheme implementation. Is it possible for every District to organize active DPDT for each candidate irrigation scheme?	It is not necessary to form DPDT for each scheme. One DPDT may handle more than one scheme. In addition, capacity building and staff recruitment is required according to the situation of the District.
Work outsourcing encourages consultants and contractors. For scheme planning, F/S, and so on, it is proposed to adopt the private sector. Who can bear the cost of them?	This should also be budgeted from governmental sources the same as construction works for scheme implementation.
As to encouragement of outsourcing, contractors as well as consultants are scarcely available within Zanzibar. How can reliable contractors and consultants be found for the scheme implementation in Zanzibar?	Contractors and consultants in the Mainland are very promising partners. As far as fair tendering and payment are performed, they are keenly interested in joining the contract works in Zanzibar.
Farmers' contribution in scheme implementation is essential to feed farmers ownership. However, contractors feel it troublesome because special arrangements are sometimes required for the care of the farmers' works.	Generally, farmers' contribution will be made separately from the contractors' contract.
As a form of farmers' contribution, farmers may participate in construction works as labors. Who must supervise farmers working and who is responsible for the results of farmers' works?	It is ideal to have farmers' supervise their works by themselves. However, it is unpromising. District staff should play such roles and nurture mutual relations with farmers groups.

5.3 Irrigators' Association

The IA is a basic private organization and a principal actor for irrigation development. A well-organized IA is one of the crucial factors for its own success because of the IA's following functions.

- To operate and maintain the irrigation facilities by itself.
- To be a legal entity to be able to access to formal rights such as the water right, the land tenure and public services from the governments such as development assistance, technical advice, training programmes, and so forth.

Presently the IAs are generally classified into the following three categories, (i) irrigators' association registered under the Cooperative Act (IAC), (ii) irrigators' association registered under the Societies Act (IAS), and (iii) non-registered association (NIA). According to the inventory survey, there are 21 IAs in 57 irrigation sites in Zanzibar. However, only 11 IAs of the 21 IAs are registered groups: seven as cooperatives and four as associations. The status of the others is not clear.

Based on the master plan study including the RRA and the site inspection the following problems of the IA have been identified:

- Insufficient legal framework of IA
- Farmers' insufficient ability or lack of experiences of IA management
- Need for efficient technical training services for IA member farmers

5.3.1 Insufficient Legal Framework of Irrigators' Association

The DADO, in some cases together with the DARI, has guided farmers (irrigators) in organizing and registering the IA. However, the importance and roles of the IA have not been fully understood by farmers yet. Furthermore, neither cooperative nor association is necessarily an optimum organizational form for the IA.

The primary role of the IA is to operate and maintain the irrigation facilities by itself. However, the cooperative is primarily a business-oriented organization whose main interest is generally marketing, not operation and maintenance. Besides, farmers still have some negative images of the previous cooperative's activities in the country. The association can be applicable to any type of social activities. The rights and duties of the IA members cannot be always clearly and uniformly defined under the present legal framework, whichever cooperative or association is chosen. For instance, although a compulsory participation of all irrigators in the IA is quite crucial to the successful management of irrigation, there is presently no legal basis for it. Only the bylaw and the regulations can define and impose the compulsory participation on the irrigators in the irrigation scheme without any legal basis.

Comparison of Registered Irrigators' Associations

	Irrigators' Association registered under the Cooperative Society	Irrigators' Association registered under the Society Act
Legal Ground	Registered under the Cooperative act No. 4 of 1986 and amended in 1998, with the Department of Cooperatives, MANREC. -It must have a capital shared by the members, but the share can depend on the members' request. -It must be monitored by a specific cooperative officer from the district or the central office after registration. -It must have an executive committee of between 5-10 members including chair person, secretary and treasurer.	Registered under the Society Act No.6 of 1995, with Ministry of State, President Office, Constitution and Good Governance - It must have a management committee with a chairperson. Organization structure depends on the wish of members. - The registration office monitors the association if necessary.
Major Necessary Conditions/Requirements for Registration	Founders should not be less than 5.	Founder members should not be less than 10.
	The bylaw should be first prepared by the members themselves and the draft is sent to the registrar for approval.	The constitution should be prepared. Two copies of constitution and application letter should be sent to the registrar general Zanzibar.
	Two copies of application should be sent to the Department of Cooperatives, MANREC for registration.	The bylaw, local rules or regulation also should be prepared based on the constitution.
	Recommendation starts from the district cooperative level to the apex level. At all levels there is a cooperatives officer and a registrar.	Registration fee: Tsh. 15,000. Annual fee to the registrar general office is Tsh. 3,000 for the annual progress and annual auditing report.
	Registration fee: Tsh. 15,000.	
	An economic viability report is necessary. Before registration, the team of experts investigates its economic entity and reports the possibility of cooperative's sustainability to the registrar.	
Other Features	The cooperative is primarily a business-oriented organization whose main interest is generally marketing, not operation and maintenance.	The association can be applicable to any type of social activities, if the approval is given by the related authority.
	The cooperative is a legal entity which can get access to formal rights (land, water) and services (bank account, technical advice, business advice and so forth). Generally the social credibility is higher than that of the association. The cooperative may be able to get a credit from financial institutions more easily than the association.	The association is a legal entity which can get access to formal rights (land, water) and services (bank account, technical advice, business advice and so forth). The social credibility is lower than that of the cooperative.
	The organizational structure can not be so flexible as the association.	Annual fee to the registrar is less than that of the cooperative.
	The registration fee is paid at the application. The audit fee is normally paid once in a year and is 2% of the cooperative present value. The minimum audit fee is Tsh. 7,000.	
	There may be some intervention from the cooperative officers which is not always positive to the members.	

Source: DARI

A new legal framework exclusively for the IA should be established, as it is necessary for securing their ownership and self-reliant irrigation development. At least, the following issues should be clearly included and defined in the new framework:

- The IA is not a marketing- or business oriented organization. Its main activities are operation and maintenance of the irrigation facilities. In that sense, the IA is a non-profit organization.
- The compulsory participation of all irrigators in the IA is a prerequisite of irrigation development.
- MANREC must become a competent authority of the IA, that is to say, the registrar of the IA. Otherwise irrigation development can hardly be implemented consistently and smoothly. In that sense, other ministries shouldn't become the registrar of the IA.

A reliable legal framework is a prerequisite for successful farmers-oriented irrigation development. It should provide a secure legal environment for farmers and other private stakeholders to participate and invest in irrigation development.

Legal status of the IA, land tenure and water right, as well as ownership of and responsibility for irrigation facilities should be clearly defined for irrigation development through the new legal framework.

For the time being, however, registration of IA as cooperative or association should be promoted, until the new legal framework has been established. A registered IA is essentially much preferable to non-registered one even in the present situation, because a legal status as cooperative or association may bestow social credibility to the IA filled with the prerequisites for the registration and may make the management of IA more smooth and easy for the farmers. In particular, the cooperative may get credit more easily from the financial institutions than non-registered IA. Registration of IA can be regarded as the necessary initial step toward the self-reliant irrigation development.

Therefore, the DADOs need to provide the farmers with sufficient information on the application procedures, the differences between cooperative and association and other necessary relevant issues, such as standard organizational charts for IAs, model bylaws and regulations and etc., so that the farmers can select properly an appropriate organizational form based on their needs. At the same time, the Central Government, namely DARI, needs to prepare the standard guidelines and manual for the DADOs to encourage the farmers to properly organize and to register the IA without biased intervention of the government officials.

5.3.2 Farmers' Insufficient Ability of IA Management

Judging from the RRA, the management of existing IAs should be improved. The following problems have been identified:

- Poor participation of members in the IA activities such as operation and maintenance activities of irrigation facilities, meeting and etc.
- Lack of leadership of the IA executive committee and necessity of leadership training
- Poor awareness of the IA's importance and roles by farmers for self-reliant irrigation development and necessity of enlightenment of farmers for better understanding of the IA
- Insufficient financial management ability

As for the countermeasures for the above problems, preparation of a management manual of the IA and training program of the leaders (chairperson, secretary and treasurer) is necessary. The manual should include a model bylaw and regulations, so that each IA can establish its own bylaw and regulations by modifying the model according to its local conditions and needs. Besides, the manual should cover financial management subjects such as budget planning, bookkeeping, preparation

of financial report, and etc. Public awareness of the IA also should be strengthened through the DADOs.

5.4 Farmers' Participation and Bottom-up Approach

5.4.1 Lack of Farmers' Ownership and the Existence of High Farming Risk

Farmers themselves are the main actors for successful farmers-oriented irrigation development. However, the present situation may be far different from that and the farmers' initiative seems rather weak. Their attitudes toward irrigation development are still passive and tend to be dependent on the governments, in other words, they tend to wait for assistance from outside.

Possible reasons for that are: (i) previously the irrigation facilities were mainly constructed and maintained by the government and farmers' contributions were relatively small, (ii) farmers still do not have sufficient technical experiences for irrigation development including operation and maintenance, (iii) their own financial resources are unfortunately lacking for investment at present.

In addition, the high risk of farming does exist as the more fundamental reason for the farmers' passive or defensive attitudes toward a new investment including irrigation development. The high risk has been brought about by several interactive causes, which can be categorized into the following two: (1) the hardly manageable factors by the government and (ii) the policy factors.

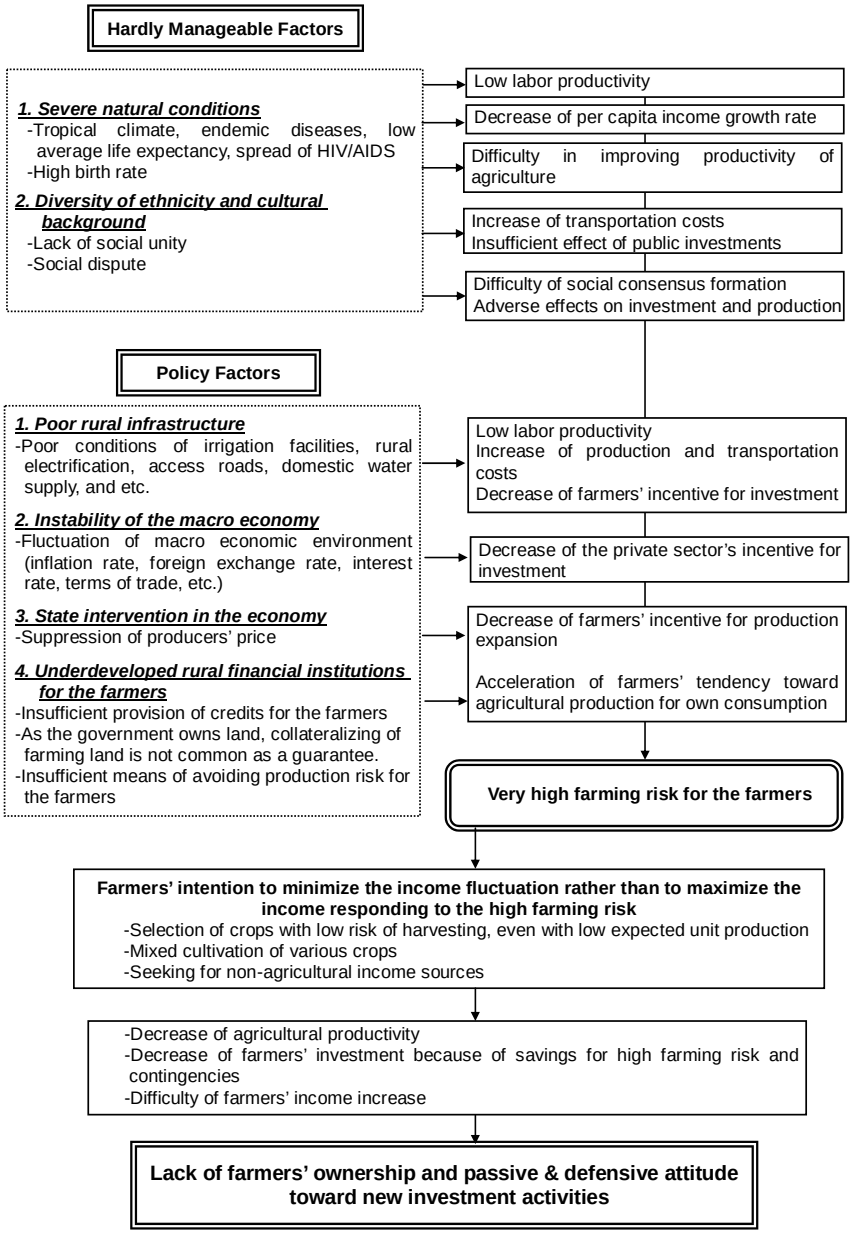
The hardly manageable factors include the followings:

- Natural conditions: severe tropical climate, endemic diseases such as malaria, schistosomiasis, sleeping sickness and etc., relatively low average life expectancy, and the spread of HIV/AIDS.
- Diversity of ethnicity and cultural background.

The policy factors include the followings:

- Poor rural infrastructure: poor conditions of irrigation facilities, rural electrification, access roads, domestic water supply, etc.
- Instability of the macro economy: fluctuation of macro economic environment (inflation rate, foreign exchange rate, interest rate, terms of trade, etc.)
- State intervention in the economy: suppression of producers' price, etc.
- Underdeveloped rural financial institutions for the farmers: insufficient provision of credits for the farmers, no collateralizing of farming land as a guarantee because of land ownership system, insufficient means of avoiding the high production risk for the farmers

Problem Structure of Lack of Farmers' Ownership and Passive & Defensive Attitude toward New Investment Activities



Source: JICA Study Team based on the RRA, the Site Inspections and Hirano, K. ed. [2003] "Afrika Keizaigaku Sengen (Toward the Economics of Sub-Saharan Africa), IDE Research Series, No. 529

Interaction of those factors eventually has brought about the very high farming risk for the farmers. Responding to the high risk, the farmers consequently intend to minimize the income fluctuation rather than to maximize the income. Under such circumstances, it has been very hard for the farmers to increase the agricultural productivities. The lack of farmers' ownership and passive & defensive attitude toward new investment activities may be natural results of the high farming risk.

5.4.2 Necessity of Efficient Harmonization of Relevant Governmental Organizations

Therefore, alleviating their high farming risk is a prerequisite for successful promotion of farmers' participation and strengthening of their ownership. Although the non-policy factors can not be easily manageable, the governments should manage the policy factors properly and their adverse effects on farming should be decreased as much as possible. However, the task is beyond the mandate of the irrigation sub-sector itself. Therefore, the inter-ministerial approach and coordination is quite necessary for the management of the policy factors.

DARI should initiate the coordination and its mandate for coordination should be properly defined within the DARI institutional improvement programme as mentioned hereinafter. In addition, a new harmonization mechanism of relevant governmental organizations and major stakeholders of the irrigation development should be established at the inter-ministerial level for realization of sustainable self-reliant irrigation development.

Within the irrigation sub-sector, DARI should try to enlighten all stakeholders on the socio-economic benefits of irrigation development and to promote it as important means, not only to alleviate the farming risks mentioned above, but also to improve the farmers' incomes and to eradicate the poverty. Furthermore, DARI should focus on the following existing problems and countermeasures concerning farmers' participation, which can or should be managed in the irrigation sub-sector:

- Introduction of a new method for bottom-up and competitive project formation and selection
- Necessity of farmers' initiative strengthening
- Necessity of efficient backstop for the farmers' bottom up movement by the government

5.4.3 Introduction of Bottom-up and Competitive Project Formation and Selection

A new method of project formation and selection focusing on farmers' initiative and based on competitiveness among candidate projects should be introduced. It means an introduction of new selection criteria and procedure of irrigation project. The project should be appraised and selected on competitive base through not only technical point of view but also strength of farmer's will and intention, in other words, the degree of preparation for self-reliance. Their will and intention to develop the irrigation facilities can be evaluated by readiness for organizing an IA, preparation of own contribution, own operation and maintenance plan, and etc. Without the farmers' strong will and intention any irrigation project cannot be sustainable. The competitive bottom-up approach should be prepared, introduced

and established successfully.

5.4.4 Necessity of Farmers' Initiative Strengthening

The rather passive attitudes of farmers toward irrigation development and the possible reasons are already discussed above. In order to adopt them properly to the self-reliant and competitive bottom-up approach, extension services for farmers through the DADO have an important role. The following components should be put emphasis on in the training programs for them.

- Strengthening of irrigation facility operation and maintenance skills
- Strengthening of administrative, financial and technical management skills

"Strengthening of farmers' access to micro credit and finance mechanism" is also regarded as an important component of farmer supporting activities. The coordination among the relevant organizations is necessary for this component.

5.4.5 Necessity of Efficient Backstop for the Farmers' Participatory Bottom-up Movement by the Government

The bottom-up approach on competitive base of farmers should be strengthened further. However, the farmers cannot be easily adopted themselves to the bottom-up approach without appropriate technical and financial support and guidance of the government. First of all, therefore, the government should adopt institutionally and technically itself to the new bottom-up approach for the successful realization of farmers' self-reliant irrigation development.

For that purpose, first, the institutional strengthening of the DARI should be given a higher priority than others. The following three components are crucial to the institutional strengthening:

- Reform of the DARI with strengthening of monitoring function
- Active utilization of Kizimbani Agricultural Training Institute (KATI)
- Quick capacity building of the existing technical staffs

Presently a possible reform plan is informally under consideration in the CARE. It is to promote the DARI to a new department, i.e. the Department of Irrigation. Strengthening of the DARI including this idea should be given serious consideration.

The second sub-component, "Active Utilization of Kizimbani Agricultural Training Institute (KATI)" should be regarded as one of main pillars for capacity building of the governmental staffs in the future. The present curriculum including irrigation farming, programmes for senior and junior technical staffs of the governments should be reviewed and revised responding to the bottom-up approach. The government staff including the DARI, the RADO and the DADO should be

reeducated and well prepared for the new bottom-up approach.

The third sub-component, "Quick Capacity Building of the Existing Technical Staffs" is a short-term programme to respond urgent necessity of upgrading the technical level of existing technical staffs of the DARI, the RADO and the DADO. It should be implemented immediately. In the DARI presently only two of 29 technical staffs hold master's degrees and eight staffs hold Bachelor of Science, Post Graduate Diploma or Advanced Diploma, which are almost equivalent degrees one another. The others hold only National Diploma, which is generally granted to completion of two-year technical education after senior high school.

5.4.6 Farmers' Roles in Scheme Implementation

Now, the farmers play important roles for all stages of scheme implementation. The required farmers' roles in scheme implementation are discussed below, focusing on three stages of scheme implementation; planning and design stage, construction stage and operation and maintenance stage.

The farmers' participation in the planning and design stage is crucial toward the construction and operation and maintenance stages. The farmers' participation in the planning and design stage is to take part in meetings, workshops and surveys and investigations initiated by the government, and to manifest their intentions for the development plan. In the planning stage, an important issue is to ensure the farmers' will on contributions to investment costs and on payment for operation and maintenance costs for irrigation schemes to be implemented.

One of effective ways to raise the farmers' will is for the government to prepare and present several irrigation development plans with different development levels to the farmers and explain the required farmers' roles to the respective plans. In this case, an important point is to make them select the acceptable development plan for themselves.

There are competent guidelines on the participatory approach to scheme implementation in the Mainland, which were prepared under the Agricultural Sector Support Programme (ASPS) in May 2003. The guidelines propose the application of "participatory action planning", "participatory diagnostic study" and "participatory design and feasibility study". The participatory design and feasibility study includes the following sessions:

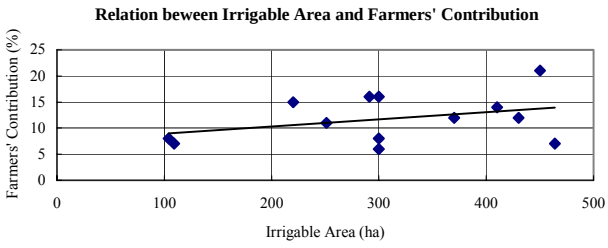
- Guidance on participatory planning for the farmers before commencement of the field investigation.
- Survey and Investigation in cooperation with farmers.
- Workshop with farmers to formulate rehabilitation and improvement plans.

- After design works, workshops with farmers to discuss final development plan with farmers' cost sharing.
- Agreement on implementation of work with farmers and farmers' contribution to construction work.

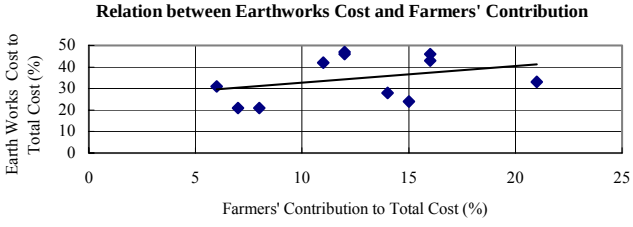
The meetings held several times during the survey, investigation and design period are featured by the workshops, in which project works, along with its cost, will be discussed and decided. All farmers are entitled to attend the meetings so as to express their intentions for the works. The decisions should be documented and presented in the public area to ensure the transparency of the process of the works.

The survey and investigation will be conducted by the government staff in co-operation with the farmers as much as possible. The farmers' intentions for construction, rehabilitation and improvement of the facilities shall be collected throughout the survey and the workshops, and these will be incorporated in the plan. Once the basic consent of the farmers to the plan is obtained, the design, with cost estimate, will be carried out and discussed in the workshop, where a decision will be made for how to share the total cost between the government and farmers.

There are lots of arguments on farmers' contribution to investment costs in irrigation development. The guidelines present a higher possibility of farmers' contribution in kind than that in cash, considering the shortage of cash resources and surplus of labour. The guidelines also show the expected minimum contribution from farmers of at least 100% of the unskilled labour and 100% of locally available construction materials. As for the farmers' contribution, unfortunately there are limited data in Zanzibar. The data of the River Basin Management and Smallholder Irrigation Improvement Programme financed by the World Bank indicate that the farmers' contribution ranges from 5 to 20% of total construction cost as shown in the on the right figure. It indicates a rough tendency between the irrigable area and rate of farmers' contribution to total construction cost.



As the farmers' contribution is mostly related to canal earth works, their relation is also examined. Although the derived graph does not show a



distinct tendency between them, it might be used for preliminary planning stage to indicate a rough figure of farmers' contribution from the ratio of canal earth works cost to total construction cost.

As mentioned above, the expected farmers' contribution is to provide unskilled labour, and to procure locally available materials. With regard to use of unskilled labour, two ways are viable. One way is that farmers devote themselves to excavation of minor canals and drains and procurement of locally available materials, completely separated out from the contractor's works. In this case, the government should provide careful supervision for them from viewpoints of time schedule and work quality. In particular, the materials collected by farmers, should be checked cautiously because these will largely influence the contractor's works in time and quality. Another way is that farmers are employed as unskilled labour by the contractor. In this case, a certain part of wages should be forcedly deposited as project operation cost at the initial stage of operation and maintenance. This aims to make the farmers feel a sense of ownership to the project by the motivation of paying in cash. For both cases, however, it is essential to organize farmers' groups prior to commencement of construction works and also to give some incentives to actively participating farmers.

The farmers' contribution to the project at the construction stage is crucial toward the next stage of operation and maintenance, which is the most influential for project sustainability. The government should monitor and analyze the conditions of farmers' contribution, and establish the rules to be mentioned in the Irrigation Regulations discussed in Clause 5.7 of this report.

Now, the government is transferring all duties on operation and maintenance for irrigation and drainage facilities to the beneficiary farmers' groups concerned. The most irrigation schemes, however, show a regrettable fact that the operation and maintenance works are not properly conducted by farmers groups, say IAs, in spite of the fact that these are indispensable activities for sustainability of irrigation schemes. According to the results of the problem analysis, the main reason for such unsatisfactory operation and maintenance activities by farmers' groups is lack of farmers' ownership as discussed in Sub-clause 5.4.1. This would result in weak farmers' groups and a low collection rate of water charges, so that less funding is available for operation and maintenance of facilities. In order to avoid or improve such situation, it is necessary to promote farmers' participation from the planning stage, to grow their ownership as discussed previously. And also, the government support is essential for the above as a matter of course.

A preliminary farm budget analysis was conducted for typical households in land

holding size for the 4 selected Model Irrigation Schemes. The results are as follows:

O & M Cost Share to Net Reserve with Condition

Scheme	Without Project Condition Net Reserve (Tsh.1000/Household)	With Project Condition Net Reserve (Tsh.1000/Household)	Annual O & M Cost/House Hold (Tsh.1000)*	O & M Cost Share to Net Reserve "With Condition"(%)
(a) Mlemele	30	227	3	1
(b) Makwararani	267	373	2	1
(c) Bumbuwi Sudi	12	412	*23	6
(d) Chaani	167	568	6	1

Source: JICA Study Team

**: Annual O & M cost/ha for Bumbuwi Sudi(Pump Scheme) is estimated at Tsh.57,000/ha subject to electrification of pump equipment .*

This preliminary estimate relates that annual O & M cost would be within an affordable extent for the households. As stated frequently in the Master Plan, the irrigation by itself could not produce a remarkable increase of agricultural production without assistance from other sub-sectors for agricultural inputs, extension services, marketing and micro finance. The above estimate is made provided that these other sub-sectors' assistance is developed together. Therefore, a comprehensive approach should be made in close coordination with other sub-sectors, to increase farm income and to pay annual O & M cost as planned.

Even under the comprehensive approach, the full benefits will be accrued after a build-up time, say 2 to 4 years in the case of the Model Irrigation Schemes. During this period, the farmers might not have adequate funds, therefore the government support would be required. Or, instead of government support, the funds deposited by the farmers being employed as unskilled labour by the contractor, which was discussed previously, will be applied for operation and maintenance work during this build-up time.

5.5 Agricultural Inputs Supply and Marketing of Farm Products

5.5.1 Background

Based on the survey results of the four Model Irrigation Schemes, it was revealed that "Ensuring of Inputs" and "Establishment of Proper Approach to Marketing" are the most cross-cutting issues as conceivable countermeasures to solve the major problems of farmers in agricultural aspects. As for ensuring of inputs, insufficient supply and low affordability should be improved with approaches from the supply side and from the demand side. Supply of inputs such as improved seeds of paddy, fertilizer and agro-chemicals, together with procurement of tractors needs to be improved in order to promote the effect of irrigation development. Although paddy is the major target crop to be grown under the irrigation condition, this crop is mainly cultivated for the farmers' own consumption. Vegetable production is therefore recommended under the Master Plan in order to increase the income level

of farmers. Proper arrangements should be made for developing new marketing routes for such perishable products. Farmers can thus make a better monetary contribution to the irrigation development by increasing their income level through effective inputs supply and better marketing.

The government has pursued a policy of subsidizing farm input and credit to combat the prevailing situation. Even after liberalization of the economy, the government has continued to subsidize the agriculture inputs, justifying this on the basis that farmers are in narrow circumstances and need to be assisted. In fulfilling this policy objective, subsidies have been provided on the supply of agro-chemicals, farm mechanization, irrigation and credit services. Between 1994/1995 and 1998/99, 25% of the government budget allocation to the agriculture sector was geared towards subsidies. This is the great contrast with the Mainland where such subsidies have completely been withdrawn. This has, however, worked against increased private sector involvement in the agriculture inputs market as they cannot compete with the subsidized supplies and consequently there is an inadequate supply of agricultural inputs and services.

It was thus decided to carry out the special study on the present situation of input supply and marketing with particular attention on a certified seed distribution system, tractor procurement system and marketing system for vegetables. The present situation on a symbiotic partnership between tourist hotels and local farmers that would involve the hotels pre-financing the supply of inputs and purchasing farm products together with possibilities for the future were also investigated. Recommendations and suggestions were accordingly prepared as a part of the Action Plan on proper input supply and marketing in relation to the irrigation development.

5.5.2 Present Situation on Inputs Supply and Marketing

(1) Input Supply

One of the prevailing problems of inputs is unavailability of tractors in due time and consequent late sowing/transplanting with the result of poor yield. Since manual ploughing is highly laborious in some soil types, procurement of tractors in proper timing is indispensable. The government mechanization service is being carried out under a subsidized system in which farmers need to pay only the fuel cost for machinery operation. But this service is inadequate and the number of government tractors has decreased from 40 in 1988 to 14 in 2003. Some of the private tractor owners have started to provide hire services for land preparation in rice growing areas but the number is extremely limited. The government is now recommending the group purchasing and utilization of tractors by promoting the role of farmers

groups such as associations and co-operatives.

Another input problem is the weak distribution system for a promising variety of paddy. There are various reasons behind low yield and low quality of paddy products under the prevailing conditions. First of all, farmers are not keen on the quality of the products because paddy is currently produced, not for sale, but for their own consumption. Furthermore, farmers' palatability is always for aromatic varieties that are generally low in yield and medium to long term maturing varieties. Even where farmers are using improved varieties, seeds are deteriorated in most cases due to no renewal. The government strategy is therefore, to distribute the improved variety to increase the yield for the food security of farmers and also to improve the quality to allow better marketing in case of surplus. The government carried out a rice variety trial in which Supa is considered as the local control variety that is most palatable but low in yield. Some varieties brought from the Mainland such as Katrin, Afaa and Kihogo provided a high yield. Other varieties developed under an FAO project such as Sabarmati, Columbia and BKN also provided high yields with better palatability and those are considered suitable for distribution. The seed multiplication system employed by the MANREC is based on contract farming. This system has been practiced by the seed unit since 1997 especially for rice. The foundation seeds are produced in the MANREC seed farms and the contract farmers produce distribution seeds under the full technical support from district seed supervisors. This system is economical for seed propagation and also useful for the technical training of contract farmers. This system should therefore, be reinforced by strengthening the MANREC seed farm for sufficient production of foundation seeds and also through capacity building of the technical staff for the training of contract farmers. Produced seeds for distribution should be stored and then processed properly. Although there is a central store in Kilombero and a seed processing unit in Bambi, neither of them are functioning satisfactorily. These facilities should be rehabilitated in order to activate the efficient seed distribution system.

The government has been the primary agent for the import and distribution of fertilizer, seed and tractors. Quantities of fertilizer and seeds imported have fluctuated over the years, depending on government budget and in kind grants by donors. In case of fertilizer, for example, imports have ranged from nil to 3,785 tones during the last 20 years. Due to the decrease of the subsidy, fertilizer price has been increased and this was aggravated by the devaluation of Tanzanian shillings. There has been a consequent decline in fertilizer use for crop production in general. The provision of credit facilities seems to be a conceivable means to support producers in this case. Subsidized credit has been justified in the belief that small

farmers are unable to obtain bank loans because of inadequate collateral. Subsidized interest rates combined with low loan recovery rates forces the institution involved to depend on their parent ministries to recover administrative expenses and they are not sustainable. In the Mainland, the government is recommending that farmers establish SACCOS (Savings and Credit Cooperatives) in order to apply for various funds and also to perform group buying of inputs and group selling of products. Provision of a sustainable credit system together with the establishment of farmers' groups should be promoted also in Zanzibar.

(2) Marketing

Marketing is the common problem, not only for cereal crops, but also for vegetables, fruits and other crops such as spices. As for paddy, it is recommended for farmers to produce marketable quality using certified seeds in order to sell their products at a better price in case there is surplus. Furthermore, it is important to arrange rice mills in order to sell rice instead of paddy. The government purchased several two-stage rice milling machines that were installed at various rice development areas. They are small-scaled and easy to operate at low cost. Such small mills are more attractive than large-scaled mills because they can provide milling services to the farmers even for very small quantities. Since all such rice mills are used for service only, it is proposed to operate such mills by the farmers' group in the future.

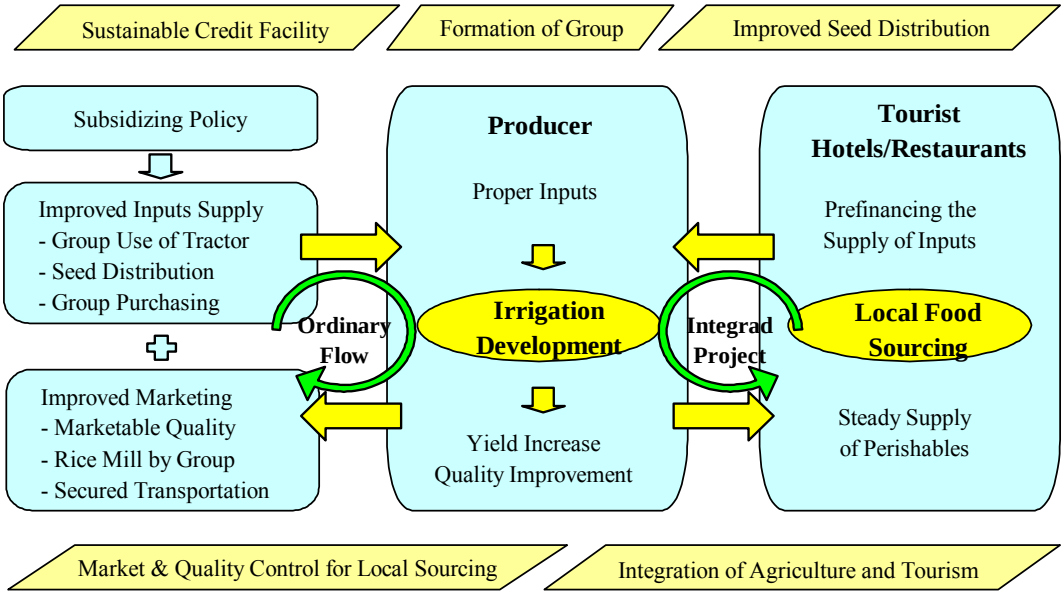
The marketing of perishable products such as fresh vegetables should be carefully considered under irrigation development, because irrigation development makes dry season cultivation possible and various types of vegetables are introduced as dry season crops due to better profitability. In case of pump schemes, especially, vegetable production is indispensable to cover the rather high operation and maintenance cost as was clarified through capacity to pay analysis under the current study. When vegetables are intended to be introduced in the irrigation scheme, proper arrangements should be made for securing transportation means to bring the products to the market within a short period of time. Although 80% of fruit crops are sourced in Zanzibar, only 20% of the vegetables are locally sourced and there is a bulk of supply from the Mainland and Kenya. In fact, farmers are complaining that there is competition with cheap fresh vegetables brought from Tanga. Market control might be needed, at least to increase the local vegetable sourcing in case local supply is available. Quality control together with improved processing and packaging are also needed to compete with imported products. As for the symbiotic partnership between local producers and the tourist hotels and restaurants recommended in the Master Plan, no action is being carried out except some deals on dairy products. Since the major constraint to local food sourcing is the unreliable supply, mainly due to unavailability during dry season, there is a great

opportunity for irrigation development to improve the situation. The model trial should be performed under the strong initiative of MANREC by selected hotels/restaurants and small irrigators groups for verification.

5.5.3 Recommendations and Suggestions

The present interrelation between input supply/marketing flow and related support services is summarized in the figure shown below.

Present Interrelation between Input Supply/Marketing Flow and Related Support Services



In order to strengthen and/or promote this present interrelation, the recommendations and suggestions so far conceived are as follows:

- Policies and guidelines should be formulated to safeguard the input supply and marketing issues.
- Formation of farmers groups should be promoted for the effective procurement of farm machineries, group purchasing of agricultural inputs and group selling of farm products.
- In order to improve the distribution system of promising varieties of paddy, (i) seed farms should be strengthened for the production of foundation seeds, (ii) capacity building of technical staff should be carried out for the training of contract farmers and (iii) the storage and processing facilities for certified seed should be rehabilitated.
- Sustainable credit facilities for small holders should be provided together with the establishment of farmers' groups.
- Marketing and quality control should be carried out in order to increase the local sourcing of fresh vegetables according to the availability of local supply.
- Integrated agriculture and tourism projects should be promoted by

implementing the model trial of the business partnership between producers and tourist hotels/restaurants.

5.6 Environmental Consideration

5.6.1 Background

The results of a preliminary environmental assessment for the four Model Irrigation Schemes did not clearly show the focal points that need environmental consideration for the irrigation development. For example, there are various types of environmentally sensitive areas in or near model schemes, including wetlands, erodible land and other socio-economically sensitive areas. According to the scoping and screening checklists for the 4 Model Irrigation Schemes, various social economic issues such as involuntary resettlement, substantial changes in the way of life, impacts on native people and population increase were pointed out as important issues to be considered. According to the summary of potential environmental impacts in the Model Irrigation Schemes as shown below, on the other hand, the most cross-cutting issues are natural environmental issues including soil erosion due to clearing perennial vegetation and increasing habitat of water borne diseases vectors. The only social environmental issue identified was population increase.

Summary of Potential Environmental Impacts in each Model Irrigation Scheme

Potential Environmental Impacts	Unguja		Pemba	
	Bumbwi Sudi	Chaani	Mlemele	Makwar--arani
Physical Conditions				
Siltation of dams		○	○	○
Flooding of farm land			○	
Soil erosion due to clearing perennial vegetation	○	○	○	○
Loss of arable land due to inundation		○	○	○
Change in Ecosystems				
Decreasing habitat of migratory birds	○	○		
Negative impacts on mangrove stand and coral reef			○	
Increasing habitat of water borne diseases vectors	○	○	○	○
Disappearance of specific flora			○	○
Disruption of faunal communities with the increase of destructive animal and birds	○	○	○	○
Agriculture				
Frequent eruption of rats		○		
Land use conflict between crop producers and livestock keepers	○	○		○
Others				
Population increase	○	○	○	○

Source: JICA Study Team

Based on the discussions with counterpart personnel on the focal points of the environmental consideration, proper watershed management is regarded as the

most important issue to secure water resources for irrigation purposes. Watershed management is closely related with the sensitive areas of steep slope, erodible, devastated lands and also with soil erosion due to clearing perennial vegetation. The expansion of slash-and-burn farming and the urbanization by the local inhabitants are further accelerating the deterioration of watershed area and this is related to the complication of land ownership in Zanzibar. The shortage of water resources, due mainly to the deterioration of watershed area, is becoming a serious problem for the irrigation development in many parts of the world, especially in semi-arid areas. Since irrigation development should be carried out in harmony with the proper management of watershed area for the conservation of water resources, it was decided to carry out the special study on irrigation development and watershed management with particular attention on the erosion control and the relation with land ownership.

5.6.2 Present Situation on Watershed Management

Evergreen forest is the predominant vegetation that can be found in many watershed areas of western sides of both Unguja and Pemba islands. In contrast, low scrub and thickets is the only vegetation on the eastern side of the islands and probably of all coral rag areas. The wetland areas, including Bumbwi Sudi and Chaani, are considered as important sites for migratory birds and also have a high potential for domestic water supply. Wetland areas around Chaani are accumulating the run off water from the catchment area that is now under cultivation. Bumbwi Sudi catchment controls two annual flows that supply water to the on-going irrigation schemes of Mtwango and Mwera. Those areas are, however, under high probability of settlement encroachment. Clearing of natural vegetation in and around catchment areas due to agricultural development together with settlement encroachment is thus the major reason for watershed deterioration in many areas. In fact, a diverse range of multi-level cropping systems are being carried out in the catchment areas and various agricultural produce products are provided for near by towns. Following are other important points of the current catchment characteristics in Zanzibar.

- Excessive livestock being kept around irrigation development areas within the Bumbwi Sudi and Chaani catchment is disturbing the natural vegetation and this is resulting in the poor water resources management.
- Poor farm management on the upstream area of the catchment causes siltation of dams located in the downstream and this is negatively affecting the irrigation project.
- Human activities such as bush clearing and tree cutting reduce the efficiency of

the hydrological cycle within the catchment and this is also affected by the rainfall intensity and distribution that is also influencing the soil erosion of the area.

- Misuse of agricultural land for settlement has significant effects on the desired catchment characteristics, for example, many natural streams have reduced flow capacity due to settlement up to and including complete desiccation.
- Improper water ponding within the catchment area provides a breeding area for various bacteria and other related vectors.

As already mentioned in the Master Plan Report, the land tenure system strongly affects the crop production and land degradation in Zanzibar. Since all land basically belongs to the government, many farmers have no interest in conservation of the land resources. This is thus causing the accelerated erosion of good soil layers and land degradation. It is simultaneously subjecting the permanent tree crops on upper and mid slopes to severe moisture stress. This is finally reflected in the gradual decline of yields of such tree crops during the last decade. Proper watershed management is thus needed for agriculture, both in the catchment area and in the low lands where the recharged water is utilized. Watershed management is, however, currently being carried out poorly due mainly to the following reasons;

- Lack of proper policies or guidelines on the land use and the land tenure system,
- Inefficient water resources management and water rights policy,
- Lack of an effective Land Act,
- National Land Use Plan is not yet put into practice,
- Lack of settlement structure plan,
- Agricultural Sector Policy does not emphasize the Land and Water Resources Management, hence no catchment development is under practice, and
- Roles and responsibilities of various institutions are not clearly established.

In order to carry out the proper watershed management, the government is now trying various activities and the Bumbwi Sudi Scheme was selected as one of the sites for a sustainable watershed management study to be conducted under the assistance of FAO. A thorough investigation on this watershed will be carried out under this study and useful suggestions and recommendations will be prepared for the future direction of the sustainable watershed management.

Although the negative impacts of irrigation development on the environment such as drying-up of stream flow, water-logging, water borne diseases and lowering of ground water level are often pointed out, such problems can be controlled through

appropriate management of irrigation schemes. On the other hand, various positive impacts of irrigation development can be expected on the prevention of watershed deterioration as already emphasized in the Master Plan Report. The effect of the integrated soil and water management such as erosion control, prevention of salt accumulation, flood protection and the augmentation of ground water resources will prevent the watershed deterioration. Stable production and improvement of yield per unit area that will be attained through irrigation development can contribute to reducing the expansion of cultivated area and improve the access to alternative energy sources that can also prevent the watershed deterioration. The prevention of watershed deterioration can thus be achieved through the effective utilization of positive impacts of irrigation development.

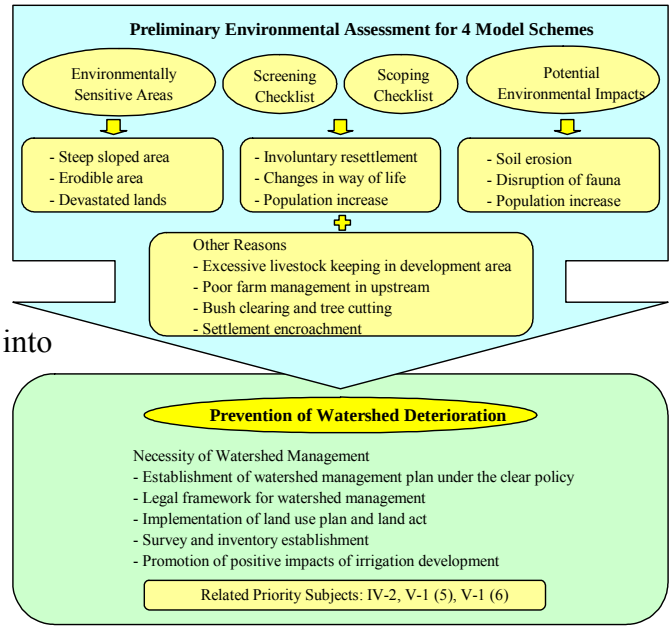
5.6.3 Recommendations and Suggestions

Recommendations and suggestions so far conceivable are as follows;

- Provision of a clear policy and guidelines for watershed management is urgently needed.
- Plan for watershed management including institutional strengthening and capacity building should be established urgently.
- Review, formulation and improvement of legal framework are highly needed for the better coordination between related agencies at the level of farmers groups, village governments and district councils.
- Legal frame work for watershed management should take various factors such as environmental conservation, land tenure, water rights and land use types into consideration.
- The present land use plan and land act must be put into practice.
- All watershed areas must be properly surveyed and inventory records must be available for planning purposes.
- Communities must be involved in the process of decision-making on the use and conservation of their catchment. The community is also required to prepare bylaws on any development activities in the catchment.
- The positive impacts of irrigation development on the prevention of watershed deterioration should be promoted through appropriate management, operation and maintenance of irrigation schemes.

The result of this special study is summarized in the figure on the next page.

5.7 Irrigation Regulation



The Irrigation Regulation is essential for optimum management of irrigation schemes. On commencement of the ZIMP implementation, it should be prepared urgently. The articles of Irrigation Regulation are largely divided into two parts. One is for the government and the other for the private sector. The role of the government in irrigation development is to be changed from an active participant to a facilitator playing a regulatory role as providing support services and technical support. The private sector is classified into two parts: IAs and private companies. The IAs, which are direct beneficiaries, are now expected and encouraged to play a much greater part in all stages of irrigation development. The private companies will play important role for irrigation development, especially for realizing self-reliant irrigation development. The Irrigation Regulations are therefore required to concretely mention the functions and duties of them for irrigation development.

(1) Government

The government agencies relevant to irrigation development, are DARI of MANREC, RADO and DADO. In the Master Plan, functions and duties of these agencies are studied and proposed as follows:

CARE, DARI and RADO

The CARE and the DARI are basically responsible for formulating and reviewing policy, laws, procedures, regulations and guidelines on irrigation development. The RADO has, basically, supervision functions for the DADOs and inter- and intra-regional coordination, in particular to coordinate irrigation development with other development activities. The proposed specific functions and duties of CARE, DARI and RADO are as follows:

Proposed Functions and Duties of CARE, DARI and RADO

Agency	Functions and Duties
CARE	- Supervise formulation of irrigation schemes. - Review, coordinate and prepare reports on irrigation development and give guidance needed.
DARI	- Interpret and give advice on the policy of irrigation development. - Investigate and identify areas suitable for irrigation development. - Set criteria for sound/appropriate irrigation schemes. - Coordinate and evaluate irrigation schemes. - Prepare guidelines for formation of groups that intend to use water for irrigation development - Coordinate identification of suitable land for irrigation development. - Give advice on how to undertake evaluation of irrigation schemes.
RADO	- Coordinate use of resources in irrigation areas. - Coordinate projects that promote irrigation development through cooperation with DARI.

DADO

The DADOs' role is of critical importance for actualization of self-reliant irrigation development. One of their main roles is based on the guidance from the Central Government to provide technically and financially feasible and replicable models and/or methods of irrigation development to the irrigators' organizations (farmers) and, in addition, to assist and encourage the irrigators' organizations to operate and maintain the irrigation schemes by themselves. Major proposed roles of DADO are given below:

- Implement policy of irrigation development,
- Investigate and specify areas suitable for irrigated agriculture,
- Evaluate irrigation projects,
- Ensure that irrigation techniques and practices are properly carried out,
- Ascertain proper use of resources in irrigation areas,
- Involve NGOs and donors in planning and execution of irrigation projects,
- Supervise construction of irrigation projects,
- Give advice to beneficiaries in irrigation development,
- Mobilize and advise farmers in the formation and management of IAs,
- Prepare reports on progress of irrigation development,
- Maintain resources that sustain irrigation projects in general,
- Mobilize farmers to contribute resources in planning and implementing irrigation projects, and

Then, in consideration of the above-mentioned functions and roles of each agency, effective supervision formation for implementation of irrigation projects should be considered for the following two cases: (i) irrigation schemes covering more than one district, and (ii) irrigation schemes located in one district.

As one of the ideas, it is proposed to establish an irrigation committee for smooth implementation. The committee for the former case will be operated mainly by DARI and RADO. However, the committee for the latter case will be managed by DADO although staff of DARI is required to join in it as technical advisors for the time being. NGOs and farmers' representatives should also take part in these committees from a viewpoint of participatory approach.

(2) IAs

The IAs are presently the main actors for irrigation development. Functions and duties of IAs should therefore be precisely mentioned in the Irrigation Regulations. Generally, functions and duties of IAs are as follows:

- Contribution to investment cost,
- Repair, maintain, operate and manage the irrigation and drainage facilities,
- Supply water to the members at appropriate times in proper quantities, and
- Collect water charges from members to repair, maintain, operate and manage the irrigation and drainage facilities and also for operation of IAs.

To smoothly execute these functions and duties, the Irrigation Regulation should give clear articles on need, objective, composition, registration, and operation of IAs.

(3) Private Companies

The Master Plan proposes the realization of self-reliant irrigation development as a key issue for Long Term. The investment by the private companies in irrigated farming will be one of important alternatives in the future. The MANREC in cooperation with relevant government agencies need to prepare favorable and attractive legal and institutional framework for the private investors. Based on this legal and institutional framework, functions and roles of the private investors should be mentioned in the Irrigation Regulations.

CHAPTER 6 ACTION PLANS FOR PRIORITY PROGRAMMES AND MODEL IRRIGATION SCHEMES

6.1 General

Action Plans for the selected 14 Priority Programmes of the Subject-wise Improvement Programme and the four Model Irrigation Schemes of the Scheme-wise Development Programme were worked out based on the results of PCM, RRA, site inspections, and review of relevant study reports. The results of the special study on major issues, which are discussed in Chapter 5 of this report, were also incorporated into the Action Plans.

The Action Plans were expressed with a Project Design Matrix and Project Proposal. Those are given in Appendix A for the Priority Programmes and Appendix B for the Model Irrigation Schemes. This chapter presents only project proposals for them.

In the implementation of the Priory Programmes, a crucial matter is to clarify the relation among them to heighten respective effects. Therefore an intelligible implementation plan is discussed in this chapter. As well, a relation between the inputs of subject components and scheme construction is also discussed in this chapter.

6.2 Action Plans for Priority Programmes

6.2.1 General

The Action Plan for the selected Priority Programmes is worked out based on the site inspection, PCM and RRA and also subsequent problem analysis, and is compiled in forms of the Project Design Matrix (PDM) and the Project Proposal, which are shown in Appendix A.

6.2.2 Development Concept

The development concept for preparation of the Action Plan is to create an appropriate environment for sustainable irrigation development from economically sound, technically appropriate, sociologically sustainable, environmentally friendly and institutionally reliable viewpoints, aiming to attain the following strategic targets in the Short Term proposed in the Master Plan:

- Reform of the environment for creation of government ownership;
- Involvement of the private sector;
- Establishment of Appropriate Technologies on irrigation development in a cost effective manner; and

- Arrangement of environmental issues on irrigation development

6.2.3 I-1: DARI, RADO and DADO Institutional Improvement Programme

(1) Title of Programme	DARI, RADO and DADO Institutional Improvement Programme (Code No. I-1)
(2) Location	Zanzibar
(3) Objectives	This programme aims to diagnose the organizational structures and management of the DARI, RADO and DADO, in particular, focusing on their appropriateness for implementation of ZIMP, namely the realization of sustainable irrigation development, and then, based on the diagnosis, to implement the institutional improvement of the DARI, RADO and DADO so that they can execute their mandates successfully.
(4) Programme Description	The bottom up approach on the competitive base of farmers should be strengthened further. However, the farmers can't easily adopt themselves to the bottom up approach without appropriate technical and financial support and guidance from the government. Therefore, the government must adopt itself institutionally and technically to the new bottom up approach for the successful realization of farmers' self-reliant irrigation development. For that purpose, first, the institutional strengthening of the DARI, RADO and DADO should be given a higher priority than other things. The programme consists of the following components which are crucial to the institutional strengthening: – Reform of the DARI, RADO and DADO with strengthening of the monitoring function – Quick capacity building of the existing technical staffs Presently, a possible reform plan is informally under consideration in the CARE. It is to transform the DARI into a new department, to be known as the Department of Irrigation. Strengthening of the DARI, RADO and DADO including this idea should be given serious consideration. The next subcomponent, "Quick Capacity Building of the Existing Technical Staffs" is a short-term programme to respond to the urgent necessity of upgrading the technical level of existing technical staffs of the DARI, the RADO and the DADO. In the DARI, presently, only two of 29 technical staffs hold master's degrees and eight staffs hold Bachelor of Science, Post Graduate Diploma or Advanced Diploma, which are almost equivalent degrees to one another. The others hold only a National Diploma, which is generally granted after completion of a two-year technical education after senior high school.
(5) Contents of Report on Recommendation	The proposed contents of the report is as follows: **Table of Contents** 1. Introduction: Project Purpose and the Background 2. Review of the Division of Roles and Functions of the Irrigation Development among relevant Ministries. 2.1 DARI, CARE, and MANREC 2.2 Other Ministries 2.3 RADO and DADO

	3. Diagnosis of the Organizational Structures and Management of the DARI, RADO and DADO 3.1 Overall Structure 3.2 DARI 3.3 RADO 3.4 DADO 4. Improvement Plan of the DARI, RADO and DADO Organizational Structure 4.1 Goal and Strategy of the Improvement Plan 4.2 Comparative Analysis of Alternative Plans 4.3 The Best Alternative Plan 4.4 Personnel Rotation System for the Improvement Plan 4.5 Capacity Building Plan for Staffs 5. Implementation Plan 5.1 Phasing of Necessary Actions of Organizational Improvement 5.2 Implementation Schedule 5.3 Cost estimation 5.4 Monitoring and Follow-up Mechanism of the Implementation Plan
(6) Required Cost	US$ 432 thousand
(7) Executing Agency	DARI of MANREC
(8) Implementation Schedule	One year for the study and one year for implementation of the Programme (July 2004 - June 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	The division of responsibilities for irrigation development among the relevant governmental organization needs to be authorized and recognized firmly by the government. This is the prerequisite for the programme. The good coordination among the relevant organizations is very crucial to the successful implementation of the programme. In addition, establishment of an efficient personnel rotation system and the capacity building of staffs (not only organization management skill, but also technical skill) must be implemented in parallel. Otherwise, the improved structure won't work smoothly as expected.
(10) Special Arrangements	-

6.2.4 I-2: IA Organizing & Registration Support Manual

(1) Title of Programme	IA Organizing & Registration Support Manual (Code No. I-2)
(2) Location	Zanzibar
(3) Objectives	For the time being, registration of IA as a cooperative or association should be promoted until the new legal framework has been established. A registered IA is essentially much preferable to a non-registered one even in the present situation, because a legal status as a cooperative or association may bestow social credibility to the IA filled with the prerequisites for the registration and may make the management of IA more smooth and easy for the farmers.

	Registration of IA can be regarded as the necessary initial step toward the self-reliant irrigation development. The main objective of the programme is to make a support manual for organizing and registration of IA, so that the extension service officers of the DADOs can provide the farmers with necessary information on organizing and registration of IA and guide them properly. The programme also includes a training programme for the extension service officers.
(4) Programme Description	The local governments need to provide the farmers with sufficient information on the application procedures, the differences between cooperatives and associations and other necessary relevant issues, such as standard organization charts of IAs, model bylaws and regulations and etc., so that the farmers can properly select an appropriate organizational form from between cooperative and association based on their needs. Therefore, the central government, namely DARI, needs to prepare the standard guidelines and manual for the DADO to encourage the farmers to properly organize and to register the IA without biased intervention of the government officials. The programme consists of the following two parts: – To prepare a support manual for the DADO extension service officers – To train the DADO extension service officers The preparation of the manual includes the following activities: – To review the existing organizing and registration procedure of the IA – To write the support manual of organizing and registration of the IA under the present legal framework. Training of the DADO extension service officers includes the following activities: – To hold seminars for explanation of the support manual to the DADOs' staffs and other stakeholders. – To train staffs of governmental offices concerned with the procedures of organizing and registration of the IA.
(5) Contents of Manual	The proposed contents of the Manual are as follows: **Table of Contents** 1. Introduction: Project Purpose and the Background 2. A Review of the Existing Organizing and Registration Procedure of the IA 2.1 Cooperative Societies Act 2.2 Societies Ordinance 2.3 Others 3. Overview of the IAs' roles and liabilities for irrigation development 3.1 Overview of Roles and Liabilities 3.2 Registration 3.3 Organizational Structure – Executive Committee, Sub Committee, Field Canal Subgroup 3.4 Membership 3.5 Water rights, Water charges, Land tenure 3.6 Ownership of the Facilities 3.7 Bylaws and Regulations – Necessity of Compulsory Participation of Irrigators

	3.8 Operation and Maintenance of the Facilities 3.9 Management of Organization 3.10 Dissolution 3.11 Others 4. Differences between Co-operatives and Associations 5. Standard Procedure of Organizing the IA 6. Standard Procedure of Registration 6.1 Cooperative 6.2 Association 6.3 Others 7. Movement of a New Legal Framework for the IA
(6) Required Cost	US$ 420 thousand
(7) Executing Agency	DARI of MANREC
(8) Implementation Schedule	One year for preparation of the manual and one month for training the extension officers (June 2005 – July 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	The manual should be applied to the all concerned IAs without biased intervention of the government officials. The DADO staffs must be neutral to the farmers' selection of their appropriate legal entity. Unnecessary intervention is surely harmful to promoting the farmers' ownership for irrigation development. Also, efforts are required to popularize the manual, especially to LGAs' staff concerned with irrigation development.
(10) Special Arrangements	The result of the study A3-2 of NIMP is utilized for Zanzibar. The manual must be modified after the enactment of the new legal framework. Besides, the programmes I-2 and I-4 can share and utilize the study results together. Therefore, unnecessary overlap of the study should be removed.

6.2.5 I-3: New Legal Framework for IA Establishment Study

(1) Title of Programme	New Legal Framework for IA Establishment Study (Code No. I-3)
(2) Location	Zanzibar
(3) Objectives	The IA is a basic private organization and a principal actor for irrigation development. A well-organized IA is one of crucial factors for its own success. As for the registration of the IA, there are generally two alternatives: cooperative or association. However, neither of them is necessarily an optimum organizational form for the IA. Therefore, the objective of the study is to make a recommendation of a new legal framework for the IA, which bestows an appropriate legal status on the IA and defines its rights and liabilities for irrigation development.
(4) Programme Description	A new legal framework exclusively for the IA should be established, as it is necessary for securing their ownership and self-reliable irrigation development. The study includes the following issues which should be clearly defined in the new framework:

	– The compulsory participation of all irrigators in the IA is a prerequisite of irrigation development. – MANREC must become a competent authority of the IA, that is to say, the registrar of the IA. Otherwise irrigation development can hardly be implemented consistently and smoothly. The study consists of the following items: – A review of the existing legal framework for the IA and irrigation development – Field survey of the existing IAs in the country – Analysis of the IAs' roles and liabilities for irrigation development (registration, organizational structure, membership, licensee of water rights, water charge collection and payment, land tenure ownership, by-laws and regulations, operation and maintenance activities, management of organization, ownership of the facilities, dissolution, and so forth.) – Recommendation of a new legal framework for the IA – Implementation plan of a new legal framework for the IA A reliable legal framework is a prerequisite for successful farmers-oriented irrigation development. It should provide a secure legal environment for farmers and other private stakeholders to participate and invest in irrigation development. Legal status of the IA, land tenure and water rights, as well as ownership of and responsibility for irrigation facilities should be clearly defined for irrigation development through the new legal framework.
(5) Contents of Report on Recommendation	The proposed contents of the report is as follows: **Table of Contents** Table of Contents of Report on Recommendation 1. Introduction: Project Purpose and the Background 2. A Review of the Existing Legal Framework for the IA and Irrigation Development 2.1 Cooperative Societies Act 2.2 Societies Ordinance 2.3 Others 3. Diagnosis of the existing IAs in the country 3.1 Overall Review 3.2 Unregistered IA 3.3 Registered IA as cooperative 3.4 Registered IA as association 3.5 Other types of IA 3.6 Problems to be tackled 4. Analysis of the IAs' roles and liabilities for irrigation development 4.1 Overview of Roles and Liabilities 4.2 Registration 4.3 Organizational Structure 4.4 Membership 4.5 Water rights, Water charges, Land tenure 4.6 Ownership of the Facilities 4.7 Bylaws and Regulations 4.8 Operation and Maintenance of the Facilities 4.9 Management of Organization 4.10 Dissolution 4.11 Others 5. Recommendations for a New Legal Framework for the IA 6. Implementation Plan of a New Legal Framework 5.1 Phasing of Necessary Actions for a New Legal Framework

	5.2 Implementation Schedule 5.3 Cost estimation 5.4 Monitoring and Follow-up Mechanism of the Implementation Plan
(6) Required Cost	US$ 525 thousand
(7) Executing Agency	DARI of MANREC
(8) Implementation Schedule	One year for study and one year for implementation of the Programme (July 2004 –June 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	A good coordination of the relevant ministries is crucial to the success of the study.
(10) Special Arrangements	The result of the study A3-1 of NIMP is utilized for Zanzibar.

6.2.6 I-4: IA Management Training Programme for Farmers

(1) Title of Programme	IA Management Training Programme for Farmers (Code No. I-4)
(2) Location	Zanzibar
(3) Objectives	Judging from the RRA done by the NIMP study team, the management of existing IAs should be improved. The following problems have been identified: – Poor participation of members in the IA activities such as operation and maintenance activities of irrigation facilities, meetings and etc. – Lack of leadership of the IA executive committee and necessity of leadership training – Poor awareness of the IA's importance and roles by farmers for self-reliant irrigation development and necessity of enlightenment of farmers for better understanding of the IA – Insufficient financial management ability The objectives are to prepare a training programme of the IA management and to provide IA leaders with the training services, so that they can improve their management skills and manage their organizations successfully for realization of the sustainable self-reliant irrigation development.
(4) Programme Description	The programme focuses on issues concerning management of the IA. Technical issues concerning operation and maintenance are dealt with in the other programme (C6). The programme consists of the following items: – To review the present performance of IA management and the problems. – To confirm the roles and functions of the IA for irrigation development. – To identify necessary items for the training programme. – To prepare model bylaws and regulations of the IA, which define the compulsory participation of the members and other necessary items. – To prepare the training manual and programme for the IA management for IA leaders.

	– To design an organizational setup for implementation of the training program. – To provide IA leaders with the training services through the setup
(5) Contents of Training Programme	The proposed contents of the training for the IA leaders are as follows: **Table of Contents** 1. Overview of Roles and Liabilities of the IA 2. Registration 3. Organizational Structure (Executive Committee, Sub-Committee, Field Canal Group) 4. Bylaws and Regulations –Necessity of Compulsory Participation of Irrigators 5. Selection of Leaders (Chairperson, Secretary, Treasurer) 6. Membership 7. Water rights, Water charges, Land tenure 8. Operation of General Meetings and Other Meetings 9. Financial Management (Registration Fees, Membership Fees, Budget Plan, Financial Report, Bank Account, Audit, and etc.) 10. Dissolution 11. Enlightenment of Members' Active Participation in the IA Activities 12. Leadership Training 13. Others
(6) Required Cost	US$ 456 thousand
(7) Executing Agency	DARI of MANREC
(8) Implementation Schedule	One year for preparation of the manual and the program and a half year for training the IA leaders (July 2005 – December 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Good cooperation of DITS and the LGAs (DALDOs) is a necessary condition for successful implementation of the programme. DITS is mainly responsible for preparing the manual and the training programme. The LGAs are mainly responsible for implementing the training programme for the IA leaders.
(10) Special Arrangements	The result of the study A3-3 of NIMP is utilized for Zanzibar. The programmes I-2 and I-4 can share and utilize the study results together. Therefore, unnecessary overlap of the study should be removed.

6.2.7 II-1: Regularization of Irrigation Administration and DARI Working Mandate Formulation Programme

(1) Title of Programme	Regularization of Irrigation Administration and DARI Working Mandate Formulation Programme (Code No.II-1)
(2) Location	Zanzibar
(3) Objectives	The programme aims to regularize irrigation administration of Zanzibar, and to standardize the mandates of DARI of MANREC in accordance with the irrigation regulations. The DARI's mandate should clarify scheme selection procedures and scheme implementation processes with collaboration from local

<table>
<tr><td></td><td>governments.
Through properly executing the programme, DARI will initiate proper working in the new governing of irrigation development. It is expected to attain the overall objectives of ZIMP.</td></tr>
<tr><td>(4) Programme Description</td><td>The circumstance of irrigation administration has drastically changed in Zanzibar. The progress of the agricultural sector development represented by the Government Policies is a most influential movement in the irrigation sector. Corresponding to such movement, decentralization and privatization have been brought into irrigation administration. Another remarkable advance on irrigation administration in Zanzibar is the formulation of the Master Plan which aims to revise and improve the existing ZIDP. The ZOT might promote the competent authority of irrigation administration following a recommendation in the Master Plan. In accordance with the promotion of the former DARI, the expected new position of irrigation authority has to be clarified immediately.
The current government policy is strongly supporting, in particular, the decentralization of many public sector responsibilities to local governments. Irrigation administration is positioned in the turmoil of the decentralization. New formation of an irrigation administration with the collaboration of the local governments is needed. Fulfillment of this programme is to answer those urgent needs of the times.</td></tr>
<tr><td>(5) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Outcomes</th></tr>
<tr><td>1-1 To review previous laws and rules.</td><td>Review note</td></tr>
<tr><td>1-2 To prepare a draft of regulations of irrigation administration.</td><td>Several series of regulations concerning irrigation development (Draft)</td></tr>
<tr><td>1-3 To adjust inconsistencies of the draft of the regulations with other related regulations and irrigation development policy.</td><td>Study report (implied)</td></tr>
<tr><td>1-4 To finalize the draft of regulations of irrigation administration.</td><td>Several series of regulations concerning irrigation development (Final)</td></tr>
<tr><td>2-1 To review previous mission for the DARI.</td><td>Review note</td></tr>
<tr><td>2-2 To prepare a plan of new mission statement of IDARI.</td><td>Mission Statement (Draft)</td></tr>
<tr><td>2-3 To finalize the plan of mission statement of DARI.</td><td>Mission Statement (Final)</td></tr>
<tr><td>3-1 To study demands to be included into the new duties standards of DARI</td><td>Study report (implied)</td></tr>
<tr><td>3-2 To review previous duties of DARI.</td><td>Review note</td></tr>
</table></td></tr>
</table>

	3-3 To finalize a plan of task duty standards of DARI.	Plan of task Duties Standard of DARI
	4-1 To conceptualize official procedures of schemes selection and implementation	Concept note
	4-2 To formalize each process of the scheme implementation in consideration with the finalized features of DARI and other related organizations and regulations.	Regular Forms for Scheme Implementation
	4-3 To prepare written rules on the formalities on scheme implementation.	Rules on the formalities on scheme implementation
(6) Required Cost	US$ 300 thousand	
(7) Executing Agency	DARI of MANREC	
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)	
(9) Assessment of Possible Problems and Bottlenecks in Implementation	At this moment, special attention should be given to farmers-managed small-scale irrigation schemes. Those small-scale irrigation schemes are intended to be managed on the basis of farmers' participation and initiatives. DARI of MANREC is expected to play an important role in promotion of the small-scaled irrigation development. Irrigation administration of DARI of MANREC, is essential for irrigation development in Zanzibar, but has undergone a complete change in consideration of the decentralization. All personnel concerned in irrigation administration should recognize such needs and embody ideal management of irrigation development in their duties.	
(10) Special Arrangements	A Subject-wise Improvement Programme for institutional improvement of government authorities concerned with irrigation development is proposed in **Programme I-1** together with implementation of this programme. Both programmes have close connection with each other. The two programmes should be implemented together.	

6.2.8 III-1: Survey and Investigation Guideline Establishment Programme

(1) Title of Programme	Survey and Investigation Guideline Establishment Programme (Code No.III-1)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish a practical Survey and Investigation Guideline which is convenient for conducting necessary site surveys and investigations for the sake of fulfilling high-quality planning and designing of new irrigation schemes and rehabilitation irrigation schemes. One copy of the established Survey and Investigation Guideline should be kept by each District

	Office and Agency related to irrigation development, to provide them with adequate instruction of the required surveys and investigations and those operations. Besides, it could provide the improvement of planning capability of relevant staff in irrigation development. Through the establishment of the guideline, it is expected to attain the overall objectives of ZIMP.
(4) Programme Description	In irrigation development, planning and designing are generally fundamental factors for a successful project. Planning and designing should be based upon reliable information and data, which are collected through proper surveys and investigations. There are many projects that have failed due to lack of important information and data. Preparation of necessary information and data for the project site is an urgent requirement. In order to reinforce planning skills by preparing necessary information and data, preparation and full utilization of a proper survey and investigation guideline is essential. In Zanzibar, irrigation development should be promoted in various manners corresponding to the variations of scheme sites. Pursuing of optimum irrigation development for each target area that has its own constraints and locality, requires an overall guideline of survey and investigation for irrigation development, in which proper alternatives could also be provided in the case of farmers' initiative schemes.
(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Topography 2.1 Topo-map and topo-equipment 2.2 Topographic survey 2.3 GIS mapping 3. Geology 3.1 Geologic survey 3.2 Borings and soundings 3.3 Physical prospecting 3.4 Geophysical analysis 3.5 Survey for erosion and land slide 4. Soil and Land 4.1 Needs for soil and land suitability studies 4.2 Exploratory surveys 4.3 Reconnaissance surveys 4.4 Semi-detailed surveys 4.5 Soil sampling 4.6 Field laboratories 4.7 Classification and soil mapping 4.8 Land evaluation 4.9 Present land use surveys 5. Water resources 5.1 River water 5.2 Ground water 5.3 Lakes 5.4 Other water sources 5.5 Water quality tests 5.6 Surveys for water uses 5.7 Water rights 5.8 Drainage 6. Socio-economy 6.1 Demography

	6.2 Sociology 6.3 Rural economy 6.4 Rural appraisal 6.5 Marketing 6.6 RRA and other rural society surveys 6.7 PRA 7. Environment 7.1 Environmental hazards in irrigated agriculture 7.2 Regulations on environmental safeguards 7.3 IEE 7.4 EIA 7.5 Environmental safeguards 8. Execution of field investigations and surveys 9. Additional Information and Data for Irrigation Planning ANNEX
(6) Required Cost	Not specified
(7) Executing Agency	DARI of MANREC: The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for the Zanzibar.
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	After preparation of this survey and investigation guideline, it is proposed to be applied to all concerned irrigation projects/programs with attentive training, and updating the guideline periodically. Also, efforts are required to popularize the general guideline, especially to local government staffs concerned with irrigation development.
(10) Special Arrangements	The Survey and Investigation Guideline for Irrigation Development Programme (Programme C.1) will be executed by DITS of MAFS in the Mainland. This programme will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar guideline.

6.2.9 III-2(1): Planning Guideline Establishment Programme

(1) Title of Programme	Planning Guideline Establishment Programme (Code No.III-2(1))
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish a comprehensive and practical Planning Guideline which is convenient for planning of both new irrigation schemes and rehabilitation of existing irrigation schemes. One set of the Planning Guideline should be distributed to and kept by each District Office related to irrigation development, to implant district staff with a unified understanding on planning of irrigation developments. The establishment of the guideline, is expected to attain the overall objectives of ZIMP
(4) Programme Description	In irrigation development, planning is the fundamental activity controlling the fate of a project. There are many irrigation projects that failed due to improper planning. Strengthening of skills in irrigation planning is an urgent need, and accordingly, establishment

	and full utilization of a proper planning guideline is essential. In Zanzibar, irrigation development should be promoted in various manners corresponding with the variations of project sites. And from now on, irrigation development should be implemented in collaboration with local government staffs under the decentralization policy. Optimum irrigation development for each target area that has its own constraints and locality, requires an overall irrigation planning guideline, in which proper alternatives could be provided for all schemes including farmers' initiative schemes as well. For the preparation of the planning guideline, it is required to take into consideration conceptual soundness and logical correctness as well as technical reliability.
(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation Purpose 2.1 Benefit of Irrigation 2.2 Advantages and Disadvantages of Irrigation 2.3 Risks for Irrigation Practice 3. Irrigation Area 3.1 Land Potential 3.2 Climate 3.3 Farmers Potential 3.4 Social Capital related to Irrigation 4. Irrigated Agriculture 4.1 Applicable Crops for Irrigation 4.2 Cultivation in Irrigated Agriculture 4.3 Post-harvesting 4.4 Marketing 4.5 Other Related Issues 5. Crop Water Requirements 6. Water Resources 6.1 Variation of Water Sources for Irrigation 6.2 Characteristics by water Sources 6.3 Water Resources Development for Irrigation 6.4 Legislation System of Water Use 6.5 Obtaining and Maintaining of Water Rights for Irrigation 7. Irrigation Methods and Irrigation Systems 7.1 Introduction on Irrigation Types 7.2 Irrigation Methods 7.3 Irrigation Categories 7.4 Classification of Irrigation Schemes 7.5 Irrigation Systems 8. Irrigation Development Levels 9. Project Evaluation 9.1 Technical Appropriation 9.2 Economical Soundness 9.3 Financial Dependability 9.4 Social Sustainability 9.5 Environmental Harmony 10. Operation and Maintenance of Irrigation Systems 10.1 Importance of O&M 10.2 Necessary Activities for O&M 10.3 Irrigators Association (IA)

	10.4 Establishment and Maintaining of IA 10.5 Related Organizations 10.6 Arbitration of Conflicts within IA and with Outsiders 11. Participation in Irrigation 11.1 Targets 11.2 Methods 11.3 Related Partners 11.4 Monitoring and Support 11.5 Related Issues 12. Project Cycle Management 13. Considerations in the Environment 14. River basin Management in Irrigation 15. Additional Information and Data for Irrigation Planning
(6) Required Cost	Not specified
(7) Executing Agency	DARI of MANREC: The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.
(8) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Programmes aim to prepare their own criteria and guidelines. The planning guidelines should be applied to all concerned irrigation projects/programmes. Otherwise, discords in the contents between these general guidelines and the individual guidelines belonging to the specified projects should be excluded. Also, efforts are required to popularize the general guideline, especially to local government staffs concerned with irrigation development.
(10) Special Arrangements	The Planning Guideline for Irrigation Development Programme (Programme C2.1) will be executed by DITS of MAFS in the Mainland. This programme of III-2(1) will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar's guideline.

6.2.10 III-2(2): Design Guideline Establishment Programme

(1) Title of Programme	Design Guideline Establishment Programme (Code No.III-2(2))
(2) Location	Tanzania and Zanzibar
(3) Objectives	This programme aims to establish a practical Design Guideline which is convenient for executing proper designs for new irrigation schemes and rehabilitation irrigation schemes to the site conditions. Placing a copy of the established Design Guideline in each district and section concerned to irrigation development, it provides adequate instructions on what
	kind of designs are required and how to produce those designs. Furthermore it is to improve design capability of concerned staffs in irrigation development. Through the establishment of the guideline, it is expected to attain the overall objectives of ZIMP.

(4) Programme Description	In irrigation development, designing as well as planning are the fundamental activities controlling the fate of projects. There have been many projects that were executed with great difficulty or sometimes failed due to low skill in designing. Proper design to meet actual conditions of the project site is an urgent requirement for successful irrigation development. In order to reinforce designing skill, preparation and full utilization of a proper design guideline is essential. In Zanzibar, irrigation development should be promoted in various manners corresponding to the variations of project sites. To pursue optimum irrigation development for each target area that has its own constraints and locality, an overall irrigation design guideline is required, in which proper alternatives in design could be provided for farmers' initiative schemes. For the preparation of the design guideline, conceptual soundness and logical correctness are to be held in addition to technical reliability.
(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation systems 2.1 Water source systems 2.2 Irrigation system layout 2.3 On-farm facilities and equipment 2.4 Drainage systems 3. Canal structures 3.1 Irrigation channels 3.2 Canal lining 3.3 Conveyance structures 3.4 Protective structures 3.5 Regulating structures 3.6 Water measurement structures 3.7 Other related structures 4. Diversion weirs 4.1 Type of weirs and layout of a diversion weir 4.2 Hydraulic design 4.3 Design of weir structures 4.4 Gate structures 4.5 Other related structures 5. Dams and Reservoirs 5.1 Dam types and their layout 5.2 Gravity dams 5.3 Fill dams 5.4 Water impounding 6. Boreholes and Wells 7. Pump stations 7.1 Design of pump equipment 7.2 Design of suction and delivery basins 7.3 Designing of pump houses 7.4 Design of pump operation systems 8. Farm irrigation structures 8.1 Structures for surface irrigation methods 8.2 Structures for sub-surface irrigation methods 8.3 Structures for pressurized irrigation methods 8.4 Watering devices 8.5 Water lifting devices

	9. Drainage facilities 9.1 Measures for reclamation of waterlogged and inundated soils 9.2 Design for sub-surface drainage 9.3 Design for surface drainage 9.4 By force drainage 10. Water harvesting 10.1 Selection of methods for rain water harvesting 10.2 Implicate water harvesting methods 10.3 Explicate water harvesting methods 10.4 Dynamic water harvesting methods 10.5 Related information on water harvesting 11. Land consolidation 12. River control and training ANNEX
(6) Required Cost	Not specified
(7) Executing Agency	DARI of MANREC: The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.
(8) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Establishment of the Design Guideline is required. After preparation of this Design Guideline, it is recommended to be applied to all concerned irrigation projects/programs, thereby, discords in the contents between this general guideline and the individual guidelines belonging to the specified projects should be excluded. Also, efforts are required to popularize the general guideline, especially to local government staffs concerned with irrigation development.
(10) Special Arrangements	The Design Guideline for the Irrigation Development Programme (Programme C2.2) will be executed by DITS of MAFS in the Tanzania mainland under the implementation of NIMP. This programme, III-2(2) will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar guideline.

6.2.11 III-3(1): Operation and Maintenance Guideline Establishment Programme

(1) Title of Programme	Operation and Maintenance Guideline Establishment Programme (Code No.III-3(1))
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish a practical Operation and Maintenance Guideline which is convenient for conducting efficient operation and maintenance of irrigation systems for sustainable achievement of effective irrigation. One copy of the established O & M Guideline is to be openly kept in each District Office and Agency related to irrigation development and also a working place of the farmers' organization, to provide adequate instruction on how to conduct activities in O&M. Furthermore it improves human capability in irrigation practice of concerned members under proper maintenance. Through the establishment of the guideline, it is

	expected to attain the overall objectives of ZIMP.
(4) Programme Description	On irrigation practice in irrigation schemes, a way of operation and maintenance generally influences the fate of schemes. There are many irrigation schemes that have been ruined due to lack of adequate operation and maintenance. In order to reinforce farmers' and/or farmers' groups' skill in operation and maintenance of irrigation systems, establishment and full utilization of a proper Operation and Maintenance Guideline is essential. A New Operation and Maintenance Guideline is to be established so as to be applicable in any possible irrigation scheme and practice in the Mainland and Zanzibar. The guideline should not only give useful and important knowledge in operation and maintenance of irrigation scheme, but also contribute to capacity building of concerned farmers and/or farmers' groups. For the preparation of the Operation and Maintenance Guideline, consideration should be given to ease of application and familiarity to beneficiaries in addition to technical reliability.
(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation water management 2.1 Irrigation practices in Tanzania 2.2 Government policy and strategies in irrigation development 2.3 Actors in irrigation 2.4 Water rights 2.5 Role of water management 3. Water users organizations 3.1 Playing the role of water users organization 3.2 Legal system of irrigation organization 3.3 Typical model of irrigation organization 3.4 Formation of irrigation organizations 3.5 Performance of irrigation organizations 3.6 Monitoring of IA's activities 4. Sources of water 4.1 Preservation of water sources 4.2 Preservation of River Basins 4.3 Preservation of aquifers 5. Irrigation water delivery 5.1 Basic soil-water plant relationships 5.2 Crop water requirements 5.3 Irrigation systems and water application methods 5.4 Measurement of irrigation water 6. Operation of irrigation facilities and structures 6.1 Dams and reservoirs 6.2 Intake structures 6.3 Irrigation channels 6.4 Water delivering structures 6.5 Watering and water spreading facilities 6.6 Pump facilities 6.7 Boreholes 6.8 Water harvesting facilities 7. Maintenance, repair and rehabilitation of irrigation and structures 8. Drainage 9. Environmental issues in irrigation systems 10. Information for urgent remedies against draught

	10.1 Characteristics of draught occurrences 10.2 Water stress effects on crops by draught occurrences 10.3 Remedies for the agronomic aspects 10.4 Physical remedies 10.5 Remedies by saving water 10.6 Monitoring of draught damages 10.7 Evaluation of draught damages 11. Additional Information and Data for Operation and Maintenance
(6) Required Cost	Not specified
(7) Executing Agency	DARI of MANREC: The MANREC must transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.
(8) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2005 – June 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Since experiences on adequate execution of Operation and Maintenance are superficial in the Mainland and Zanzibar, it is hardly expected that the players will be able to deal with the completed guideline with a practiced hand in the early stage. After preparation of this Operation and Maintenance Guideline, it is proposed to apply this guideline to all concerned irrigation projects/programs, and if necessary properly give attentive training. Also, efforts are required to popularize the general guideline, especially to local government staffs concerned with irrigation development.
(10) Special Arrangements	The Operation and Maintenance Guideline for the Irrigation Development Programme (Programme C3.1) will be executed by DITS of MAFS in the Mainland under the implementation of NIMP. This programme III-3(1) will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar guideline.

6.2.12 III-4: Farmers' Participation in the Irrigation Development Programme

(1) Title of Programme	Farmers' Participation in the Irrigation Development Programme (Code No.III-4)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to enhance farmers' participation in irrigation so that irrigation schemes are managed properly and continuously by farmers themselves. The programme is to review the current situation of farmers' participation in irrigation schemes, and to focus on the needs of farmers' participation in irrigation development. A proper guideline for farmers' participation will be prepared based on the review results. The farmers' participation should be discussed for the planning, designing, construction and O & M stages. In particular, farmers' contribution for construction work and O & M activities should be clearly mentioned in the guidelines. Deployment of the guideline in good order will be also prepared in the

<table>
<tr><td></td><td>programme. Furthermore, some numbers of pilot model irrigation schemes for farmers' participation will be established, in which replicable effects of the pilot models for farmers' participation is expanded to other areas. A leaflet on this programme showing the results and necessary instruction of farmers' participation in irrigation development will be prepared, and its copies will be handed out so as to spread the programmes' effects. Through properly utilizing the result of the programme, it is expected to attain the overall objectives of ZIMP.</td></tr>
<tr><td>(4) Programme Description</td><td>Due to periodic food insecurity in Zanzibar, there is a keen need to develop farming under irrigation in order to exploit the existing irrigation potential so as to complement weak rainfed farming. However, some of the implemented irrigation schemes are disappointedly deteriorated in their operation due to poor farmers' participation. Food security is attainable through irrigation development with adequate farmers' participation.
Furthermore, putting forward the decentralization in agriculture including irrigated agriculture, DARI, local governments and irrigating farmers' themselves are going to play important roles for small-scale farmer-managed irrigation, thus strengthening the irrigation development under enthusiastic farmers' participation at the center of the movement. In these respects, it should be said that farmers' participation is essential in irrigation development.</td></tr>
<tr><td>(5) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Outcomes</th></tr>
<tr><td>1-1To review previous similar references on farmers' participation.</td><td>Review note</td></tr>
<tr><td>1-2To study the contents of the guideline for farmers' participation.</td><td>Plan of Contents of Guideline</td></tr>
<tr><td>1-3To prepare the Farmers' participation Guideline reflecting identified requirements for the guideline.</td><td>Farmer's Participation Guideline</td></tr>
<tr><td>2-1To prepare an inventory of irrigation schemes for farmers' participation in consideration of the irrigation scheme inventory prepared in ZIMP study.</td><td>Inventory of Irrigation Scheme for Farmers' Participation</td></tr>
<tr><td>2-2To propose criteria for scheme selection for the pilot model for strengthening farmers' participation.</td><td>Criteria of Scheme Selection</td></tr>
<tr><td>2-3To select pilot model schemes from among possible schemes listed in the inventory.</td><td>List of Selected Schemes</td></tr>
<tr><td>3-1To prepare the Strengthening Plan for farmers participation to the selected pilot schemes.</td><td>Strengthening Plan for Farmers' Participation</td></tr>
<tr><td>3-2To arrange necessary resources for implementation of the Strengthening Plan.</td><td>-</td></tr>
<tr><td>4-1To implement the Strengthening Plan as planned.</td><td>Execution report of the Strengthening Plan</td></tr>
<tr><td>5-1To monitor the performance of farmers' participation in the pilot schemes.</td><td>Monitoring report</td></tr>
</table></td></tr>
</table>

	5-2To support O&M of the pilot schemes as required.	-
	5-3To arrange necessary resources for villagers' tours to the pilot schemes.	-
	6-1To plan tours of visiting pilot schemes.	Tour Plan
	6-2To conduct the tours as scheduled.	Tour report
	7-1To draft a leaflet for the effect of strengthening farmers' participation.	Leaflet of Farmers' Participation (Draft)
	7-2 To finalize the draft of leaflet.	Leaflet of Farmers' Participation (Final)
	7-3 To print the required leaflet sheets	Copies of Leaflet of Farmers' Participation
(6) Required Cost	Not specified	
(7) Executing Agency	DARI of MANREC: The MANREC must transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for the Zanzibar.	
(8) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)	
(9) Assessment of Possible Problems and Bottlenecks in Implementation	At this moment, special attention should be given to farmers-managed irrigation schemes, which are duly dependent on proper farmers' participation. Roles of DARI and local governments in irrigated agriculture development have been more and more vital in line with the government's fundamental policy of decentralization. Farmers' participation should be led under proper support of the DARI and local governments. Strengthening of DARI and local governments' organization and capacity building of concerned personnel in charge might be made in parallel to or slightly behind implementation of this programme. Taking the importance of village farmers' managed irrigation developments into consideration, mutual linkage between this programme and other related programmes should be kept.	
(10) Special Arrangements	The Farmers' Participation in the Irrigation Development Programme (Programme C-4) will be executed by DITS of MAFS in the Tanzania mainland under the implementation of NIMP. This programme, III-4 will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar's guideline.	

6.2.13 IV-1: Technical Manuals Handling Guideline Establishment Programme

(1) Title of Programme	Technical Manuals Handling Guideline Establishment Programme (Code No.IV-1)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish a teaching source for properly handling every technical reference and the relevant information, which are definitely important for improving and heightening irrigation technology. Formerly, technical manuals for engineering in

	irrigation had been prepared in the Mainland and Zanzibar, however, those were unused due to improper handling and managing. Technical information and knowledge are essential for capacity building for persons relevant to irrigation development. In order to provide necessary technical information and knowledge, establishment of adequate technical manuals and guidelines are required. Those technical manuals and guidelines could make available necessary technical information and knowledge through good management and proper updating. The guideline being prepared in this programme is to provide important skills for proper management and handling of technical manuals and guidelines. Through good application of the guideline, it is expected to attain the overall objectives of ZIMP.
(4) Programme Description	In accordance with the finding of technical failures through problem analysis during the Master Plan study, a number of technical guidelines are proposed to be prepared in the Subject-wise Improvement Programme. Those guidelines would be prepared by fully reflecting the findings. However, after the completion of those guidelines, the guidelines should not be left unused, or be lost without purpose, or to leave them un-revised when they need to be updated. It can be said that the handling manner of the technical guidelines directly results in success or failure of improving and heightening irrigation technology, which is essential for irrigation development. Technical Manuals Handling Guideline to be prepared under this programme is to instruct how to utilize the technical manuals concerned, how to keep them, how to maintain them, and how to revise them when necessary.
(5) Contents of Programme	The proposed contents of the Guidelines are as follows: **Table of Contents** 1 Introduction 2 Technical information and manuals 2.1 Technical references 2.2 Technical reports 2.3 News on irrigation 2.4 Survey and investigation guideline 2.5 Planning guideline 2.6 Designing guideline 2.7 O&M guideline 2.8 Others 2.9 Monitoring of draught damages 2.10 Evaluation of draught damages 3 Distribution and maintenance of technical manuals 3.1 Organizations and places where the manuals are to be distributed 3.2 Managing staff 3.3 Managing process 4 Open use of technical manuals 4.1 System for public inspection 4.2 Method of public inspection 4.3 Monitoring of performance of public inspection 4.4 Improvement of public inspection system 5 Revision of technical manuals 5.1 Periodic revision of technical manuals 5.2 Revising and disposing procedure

	5.3 Management of updating 6 Monitoring system of technical manuals 5.1 Need of monitoring of technical manuals 5.2 Monitoring system 5.3 Reflection of monitored results to updating 5.4 Maintenance of monitoring system ANNEX
(6) Required Cost	Not specified
(7) Executing Agency	DARI of MANREC: The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.
(8) Implementation Schedule	Six months for study and implementation of the related NIMP Programme (January 2005 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	The technical manual handling guideline is strongly requested. Even though a lot of technical manuals and guidelines are going to be provided within implementation of other programmes, it is of no use unless those are not kept and used properly. After preparation of this guideline, it is proposed to give all concerned irrigation projects/programmes proper training on application of guidelines. Also, efforts are required to popularize the general guideline, especially to local government staffs concerned with irrigation development.
(10) Special Arrangements	The Technical Manual Handling Guideline for Irrigation Development Programme (Programme D.2) will be executed by DITS of MAFS in the Mainland under the implementation of NIMP. This programme of IV-1 will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar guideline.

6.2.14 IV-2: Information and Database Improvement Programme

(1) Title of Programme	Information and Database Improvement Programme (Code No.IV-2)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish or improve the information system and database related to irrigation development, which are definitely necessary for pursuing irrigation development. Even now, useful and important information concerning irrigation developments exists separately and is being kept unknown from other persons. Irrigation development requires interdisciplinary information and data over many concerned fields. Information on irrigation potential prepared in the Master Plan study is a good example to show clear success of high-qualified utilization of existing data and information. Furthermore, it could be said that leaving of useful data and information unused is a great loss of national assets. Through effective use of the established database concerned with irrigation development, it is expected to attain the objectives of ZIMP.

<table>
<tr><td>(4) Programme Description</td><td>One major mission of the governmental administration concerning irrigation is generally to “Promote the use of information communication technology and develop an irrigation data bank”. This mission is still more highlighted corresponding to enhancing government’s attention to irrigation development. This programme is to contribute to this important irrigation administration’s mission directly. This issue deeply concerns the irrigation administration of the ZOT.

The programme consists of three major significant tasks. The first important task is to properly design an information system and database which meets actual needs at present and in the future. The second important task is to establish a real information system and database as it is designed. The third important task is to build up an operating system maintaining and updating the established database so that it is maintained appropriately. The programme should fulfill these important tasks successfully through procuring necessary equipment and assigning staffs, pursuing specified activities, and testing and so on.

The programme requires that the collection of data and information, and compiling them using a computer system be started. The data on the progress of irrigation development shall be collected from the local governments.</td></tr>
<tr><td>(5) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Outcomes</th></tr>
<tr><td>1-1 To identify necessary kinds and modalities of the databases to be required for the purpose of irrigation development and management.</td><td>Review note</td></tr>
<tr><td>1-2 To prepare all required kinds of databases so as to utilize necessary data or GIS information.</td><td>Several series of databases (e.g. scheme inventory, O&M condition of schemes, GIS data concerning irrigation development, personnel data of irrigation engineers and technicians, etc.)</td></tr>
<tr><td>2-1 To identify types of computer systems by which constructed databases are accessed.</td><td>Specification of computer system</td></tr>
<tr><td>2-2 To prepare an operation manual for the databases so as to be operational for the identified computer systems.</td><td>Operation manual</td></tr>
<tr><td>3-1 To investigate possible resources to be mobilized for database up-dating under the present institutional conditions.</td><td>Investigation report</td></tr>
<tr><td>3-2 To make a cycle plan for updating databases by utilizing possible resources in MAFS.</td><td>Plan report</td></tr>
</table></td></tr>
<tr><td>(6) Required Cost</td><td>Not specified</td></tr>
</table>

(7) Executing Agency	DARI of MANREC: The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.
(8) Implementation Schedule	One and half years for study and implementation of the related NIMP Programme (July 2004 – December 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	New establishment of an information system and database is strongly requested. Even though some databases were already provided in some manner within implementation of previous projects/programmes, those are not related to each other and unknown in public. After preparation of this database, it is proposed to provide all concerned irrigation projects/programs with proper training on data exchange. Also, efforts are required to popularize the outcomes of the programme, especially to local government staffs concerned with irrigation development.
(10) Special Arrangements	The Information System and Database Improvement Programme (Programme D.3) will be executed by DITS of MAFS in the Mainland under the implementation of NIMP. This programme of IV-2 will be completed by incorporating the accomplished outcomes under the NIMP into a Zanzibar tool.

6.2.15 V-1(5): Environmental Assessment Study for Irrigation Practice

(1) Title of Programme	Environmental Assessment Study for Irrigation Practice (Code No.:V-1(5))
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme is to conduct an environmental assessment study to correctly justify the causal relationships between irrigation water use and environmental issues. Proper methods of irrigation management being friendly to the natural environment are to be conceived. Through implementation of this programme, the possibility and limitation of irrigation development could be delineated in the scope of the environment. Good application of the outcomes of the programme to the familiar schemes and enhancement of awareness of importance of environmental conservation in irrigation, are expected to attain the overall objectives of ZIMP.
(4) Programme Description	Irrigation water use may somehow effect the natural environment in and around the irrigated site, because no irrigated areas can be separated from the surrounding environment in connection with the global hydrologic chain. Though some may cause obvious degradation in environment, others do not lead to serious considerations and are easily manageable without great difficulties. Recently, there is an insistent opinion that water abstraction for irrigation causes environmental hazards like drying up the river during the dry season e.g. an issue in Usangu Basin in the Mainland. However, the concerns about environmental degradation, have been not justified in a scientifically proper manner. Causal relationships

<table>
<tr><td></td><td>between irrigation water use and environmental issues have not been confirmed.
Any irrigation development that produces serious environmental degradation should be stopped. If environmental effects related to irrigation water use are observed despite being manageable, such irrigation should be controlled in an adequate manner so as to suppress environmental hazards. In order to correctly justify any causal relation between irrigation water use and environmental issues, and to develop proper irrigation management technology affecting minor environmental impacts, a comprehensive environmental assessment study for irrigation practice is to be implemented.</td></tr>
<tr><td>(5) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Outcomes</th></tr>
<tr><td>1-1 To select study areas where substantial environmental issues related to the irrigated agriculture occur.</td><td>Study report (implied)</td></tr>
<tr><td>1-2 To investigate the actual environmental situation of the study areas.</td><td>Study report (implied)</td></tr>
<tr><td>1-3 To investigate effects of irrigation practice on the environment.</td><td>Study report (implied)</td></tr>
<tr><td>1-4 To clarify causes and mechanisms of the environmental issues</td><td>Study report (implied)</td></tr>
<tr><td>2-1 To produce countermeasures so as to avoid or lighten the environmental hazards.</td><td>Study report (implied)</td></tr>
<tr><td>2-2 To devise feasible countermeasures</td><td>Study report (implied)</td></tr>
<tr><td>3. To formulate improvement measures for the environmental deterioration that irrigators can deal with.</td><td>Study report (implied) Executive document</td></tr>
</table></td></tr>
<tr><td>(6) Required Cost</td><td>Not specified</td></tr>
<tr><td>(7) Executing Agency</td><td>DARI of MANREC:
The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.</td></tr>
<tr><td>(8) Implementation Schedule</td><td>Two years for study and implementation of the related NIMP Programme (July 2004 – June 2006)</td></tr>
<tr><td>(9) Assessment of Possible Problems and Bottlenecks in Implementation</td><td>As the environmental chain is sometimes profoundly ranging, deep insight and scientific viewpoints are essential to uncover real causal relationships between irrigation and environmental phenomena. Proper specialists are to be assigned for the programme implementation and provided any available data related to the study.</td></tr>
</table>

	Conservation of the environment is occasionally contradictory to an intention of development. However, concealment and distortion of facts identified in a development intention is strictly forbidden. To discover the real causes is indispensable to establish a sustainable system of irrigated agriculture.
(10) Special Arrangements	This environmental programme (Programme E1.5) will be executed by DITS of MAFS in the Mainland under the implementation of NIMP. However outcomes of the programme which are in common with the natural conditions of Zanzibar should be contrived for Zanzibar. This programme, V-1(5) will be completed by incorporating the accomplished outcomes under the NIMP to Zanzibar's use.

6.2.16 V-1(6): Study of River-Basin Approach in Irrigation Development

(1) Title of Programme	Study of River-Basin Approach in Irrigation Development (Code No.V-1(6))
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme is to conduct a planning study to correctly justify how to introduce a river-basin approach for irrigation water users. And proper methods of irrigation development and management are to be conceived. Water rights for irrigation water use are the roots of water management to be collaborated with other users in a river basin. The study will clarify the routine of water rights management, and formulate how to organize and manage an organization of irrigation water users which is a major body to systematically negotiate with other powers by unifying concerned beneficiary farmers. Through use of the outcomes of the programme and enhancement of awareness of the importance of river-basin management in irrigation, it is expected to attain the overall objectives of ZIMP.
(4) Programme Description	No irrigated areas can be separated from the surrounding environment because of its connection with z global hydrologic chain. Generally, such water environment could be enclosed as a unit of a river basin. Water resources including groundwater may balance the quantity of water within a river basin. Water uses should also be considered in the balance of water in the unit of a river basin. In the Mainland and Zanzibar, the river basin approach has been soundly underlined since 1990. New water resources management systems preconditioning the application of a river basin approach has been launched in accordance with newly established National Water Policy in the Mainland. In the course of the new policy, every water user, needless to say, irrigation water users, have to work to accommodate each other within the same river basin. Zanzibar is confronted with the same circumstance in water management. Participation in water management and authorization obtaining water rights will be essential for irrigation water users in order to survive in Zanzibar. This programme is to find a means for proper water management as a water user of irrigation under the condition of river-basin management.
(5) Contents of Programme	The proposed contents of the Programme are as follows:

	Activities	Outcomes
	1-1 To investigate the present situation of obtaining water rights for irrigators	Study report (implied)
	1-2 To clarify the difficulties and problems for obtaining water rights for irrigators	Study report (implied)
	1-3 To devise systematic procedures to easily handle water rights for irrigators	Study report (implied)
	2-1 To study technical skills increase allowable water available for irrigation	Study report (implied)
	3-1 To study technical skills to reduce the demand for irrigation water.	Study report (implied)
	4-1 To study the proper organizational arrangement towards negotiation between water users.	Study report (implied)
	5-1 To prepare a guideline for the river basin approach for the irrigation sector.	Study report (implied) Guideline for river-basin management for the irrigation sector
(6) Required Cost	Not specified	
(7) Executing Agency	DARI of MANREC: The MANREC should transform the guideline prepared by DITS (Division of Irrigation and Technical Services, MAFS) into a guideline suitable for Zanzibar.	
(8) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)	
(9) Assessment of Possible Problems and Bottlenecks in Implementation	River basin management requires basin wide data including data for other water users and diverse information of natural conditions for the concerned river basin. In order to make those required data available, a satisfactory cooperative relation with river basin management offices and other water users is essential. Efforts to build a reliable cooperative relation with other parties concerned is need. Furthermore, self-awareness of irrigators on a sense of river-basin management is a starting point for success for the introduction of river basin management into the irrigation sector. Wide enlightenment of irrigators and farmers is also important.	
(10) Special Arrangements	The Programme for the Study of the River-Basin Approach in Irrigation Development (Programme E1.6) will be executed by DITS of MAFS in the Mainland under the implementation of NIMP. Though the scale of river-basin management concerning irrigation is, by comparison, rather small in Zanzibar, the manner of management in the river-basins basis is applicable. This programme V-1(6) will be completed by incorporating the accomplished outcomes under the NIMP to Zanzibar's use.	

6.3 Action Plan for Model Irrigation Schemes

6.3.1 General

The Action Plan for the model irrigation schemes is based on the site inspections and RRA, and is expressed in the forms of the Project Design Matrix (PDM) and the Project Proposal, which are shown in Appendix B.

6.3.2 Development Concept

The action plan for the model irrigation schemes is prepared under the following concepts, which lead to technical self-reliance, financial self-reliance, and institutional/organizational strengthening, and consequently to the self-reliance of the irrigation schemes.

Development Concept for the Model irrigation Schemes

Description	Development Concepts
Technical Self-reliance	- Planning and design of irrigation infrastructures taking into consideration farmers' capacity of O & M and water management. - Raising of technical knowledge of farmers on O & M and water management, providing appropriate training to them.
Financial Self-reliance	- Formulation of a rehabilitation / improvement plan for irrigation infrastructure considering farmers' affordability to O & M. - Preparation of an agricultural development plan, which leads to improvement of farmers' profitability, encouraging them to introduce vegetable farming.
Institutional/Organizational Strengthening	- Institutional strengthening for raising the capacity for organizational management of IA、such as leadership, decision-making, and conflict resolution. - Institutional strengthening for raising financial management by IA、such as collection of water fees and O & M cost. - Promotion of farmers' participation in project implementation during planning, design, and construction periods.

6.3.3 Project Design Matrix (PDM)

The PDMs prepared by the Study Team are outlined below:

(1) Overall Goal

Based on the results of the Master Plan study, the 'overall goal' in all four Model Irrigation Schemes is to improve agricultural productivity and profitability in the irrigation schemes.

(2) Project Purpose

The 'project purpose' is to "ensure the stable supply of irrigation water to the farms". The 'objectively verifiable indicator' is to enable all farmers in the scheme to get sufficient water according to schedule by the end of the project and the scheme monitoring reports will be the 'means of verification'.

(3) Outputs

In accordance with the results of the field investigation, the following three main

'outputs' were established:

- Capacity of IA management is strengthened.
- Irrigation infrastructures are rehabilitated or improved.
- Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced.

The 'objectively verifiable indicators' will be: (i) 80% or more farmers participate in the maintenance work by the end of the project, (ii) rehabilitation is completed by the specified year, and (iii) 100% of committee members are trained for O&M by the end of the project. The scheme monitoring reports will be the 'means of verification'.

(4) Activities

To achieve the outputs mentioned above, the following activities were worked out, based on the 'objective trees' presented in Chapter 5:

Objectives	Activities
(a) Capacity of IA management is strengthened.	- Raise farmers' awareness of the project implementation.
	- Re-organize the structure of IA.
	- Enhance leadership of committee members.
	- Strengthen decision making of IA.
	- Prepare by-laws and regulations.
	- Enhance financial management capacity of IA.
	- Promote registration of IA.
(b) Irrigation infrastructures are rehabilitated or improved.	- Conduct surveys and investigations with farmers' participation.
	- Carry out design works.
	- Make agreements on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works
	- Execute pre-implementation activities including tendering and its evaluation.
	- Construct irrigation infrastructures with farmers' participation.
	- Turn-over O&M of completed irrigation facilities to IA.
	- Raise farmers' awareness to the project implementation.
(c) Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced	- Prepare irrigation schedule and maintenance plan.
	- Conduct water distribution.
	- Conduct maintenance works.
	- Enhance skills to mediate and resolve water disputes among members and with outside people.
	- Monitor performance of scheme.

(5) Inputs

The foreign donor will cover costs of training and rehabilitation / improvement costs. Vehicles, operation and maintenance equipment and costs of monitoring and engineering services will be provided.

The GOZ will provide manpower, including engineers, support staff and project office space as well as administration cost for the project implementation. Farmers will contribute 10 to 20 % of rehabilitation and improvement costs.

6.3.4 Mlemele Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Seven villages, namely, Matele, Tondooni, Mitamani, Dodo, Kumvini, Kitokame and Pogwa, Chake Chake District, South Pemba Region, Pemba Island.</td></tr>
<tr><td>Scheme Area</td><td>65 ha</td><td>Nos. of Households</td><td>218</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water for the scheme through initiating water harvesting development, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancement of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Small earthfill dam (height 3m x length 120 m)
(b) Main irrigation canal (unlined canal with length 7,220 m)</td><td colspan="2">(c) Drainage canal (unlined channel with length 4,620 m)
(d) Farm road (length 2,500 m)
(e) Related structures (Lump Sum)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : GOZ side
1 Manpower (DARI, DADO)
2 Recurrent costs for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 447 Million
(US$ 421,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">DARI of MANREC</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

6.3.5 Makwararani Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Six villages, namely, Mtakao, Kivugo, Kichangani, Michungani, Njuguni and Mapofu, Micheweni District, North Pemba Region, Pemba Island.</td></tr>
<tr><td>Scheme Area</td><td>72 ha</td><td>Nos. of Households</td><td>280</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water for the scheme through construction of a small dam and rehabilitation of the existing irrigation canal system, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancement of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Small earthfill dam (height 2m x length 150 m)
(b) Main irrigation canal (unlined canal with length 8,950 m)</td><td colspan="2">(c) Drainage canal (unlined channel with length 14,000 m)
(d) Farm road (length 1,700 m)
(e) Related structures (Lump Sum)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : GOZ side
1 Manpower (DARI, DADO)
2 Recurrent costs for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 580 Million
(US$ 546,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">DARI of MANREC</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

6.3.6 Bumbwi Sudi Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Eleven villages, namely, Mwache-Alale, Dole, Bumbwi-Sudi, Mguzuni, Kitundu, Ndagaa, Mwakaje, Kiboje, Mfenesini, Kizimbani and Miwani, West District, Urban West Region, Unguja Island.</td></tr>
<tr><td>Scheme Area</td><td>383 ha</td><td>Nos. of Households</td><td>469</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water for the scheme through rehabilitation of the pump system and construction of ponds to store surface water, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Submersible pump installation (rehabilitation of 4 nos. and new installation of 6 nos.)
(b) Bore-hole drilling (new holes of 2 nos.)
(c) Pond (new construction of 2 nos.)
(d) Main irrigation canal with lining (rehabilitation of 2,900 m and new construction of 12,740 m)</td><td colspan="2">(e) Secondary irrigation canal with lining (new construction of 7,300 m)
(f) Drainage canal (new construction of 8,900 m)
(g) Farm road (rehabilitation of 8,900 m and new construction of 5,900 m)
(h) Related structures (Lump Sum)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : GOZ side
1 Manpower (DARI, DADO)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 1,965 Million
(US$ 1,849,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">DARI of MANREC</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

6.3.7 Chaani Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Seven villages, namely, Chaani, Kentwa, Mbuzini, Gamba, Kandwi, Kivunge and Mkwajuni, North-A District, North-Unguja Region, Unguja Island.</td></tr>
<tr><td>Scheme Area</td><td>250 ha</td><td>Nos. of Households</td><td>600</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water for the scheme through initiating water harvesting development, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Small earthfill dam (height 4m x length 38 m)
(b) Main irrigation canal (lined canal with length 6,600 m)
(c) Secondary irrigation canal (unlined canal with length 11,100 m)</td><td colspan="2">(d) Drainage canal (unlined canal with length 1,600 m)
(e) Farm road (length 6,600 m)
(f) Related structures (Lump Sum)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : GOZ side
1 Manpower (DARI, DADO)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 1,477 Million
(US$ 1,390,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">DARI of MANREC</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

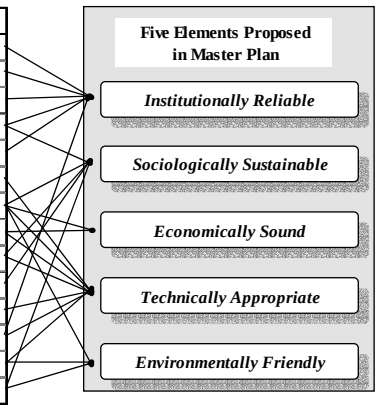
6.4 Implementation Plan

(1) Priority Programmes of the Subject-wise Improvement Programme

As mentioned above, 14 Priority Programmes were selected from the 34 Programmes of the Subject-wise Improvement Programme taking into consideration the strategies for the Short Term of the Development Programme. The programmes of these selected 14 Priority Programmes are conceived from *Economically Sound, Technically Appropriate, Sociologically Sustainable, Environmentally Friendly* and *Institutionally Reliable* viewpoints.

Relation between Prority Programmes and Five Elements

Code	Subject-wise Improvement Programme in Action Plan
I-1	DARI,RADO and DADO Institutional Improvement Programme
I-2	IA Organizing and Registration Support Manual
I-3	New Legal Framework for IA Establishment Study
I-4	IA Management Training Programme for Farmers
II-1	Regularization of Irrigation Administration and DARI Working Mandate Formulation Prpgramme
III-1	Survey and Investigation Guideline Establishment Programme
III-2 (1)	Planning Guideline Establishment Programme
III-2 (2)	Design Guideline Establishment Programme
III-3 (1)	O & M Guideline Establishment Programme
III-4	Farmers' Participation in Irrigation Development Programme
IV-1	Technical Manuals Handling Guideline Establishment Programme
IV-2	Information and Database Improvement Programme
V-1 (5)	Environmental Assessment Study for Irrigation Practice in Tanzania
V-1 (6)	Study of River-Basin Approach in Irrigation Development



JICA Study Team

The implementation plan for them was worked out focusing on (i) commencement of the fiscal year when new budget is available, (ii) IA as the main actor for irrigation development and (iii) appropriate input time for each component to bring out their effect. The plan also shows the relation between the programmes and the proposed Verification Study to be conducted together with the MAFS.

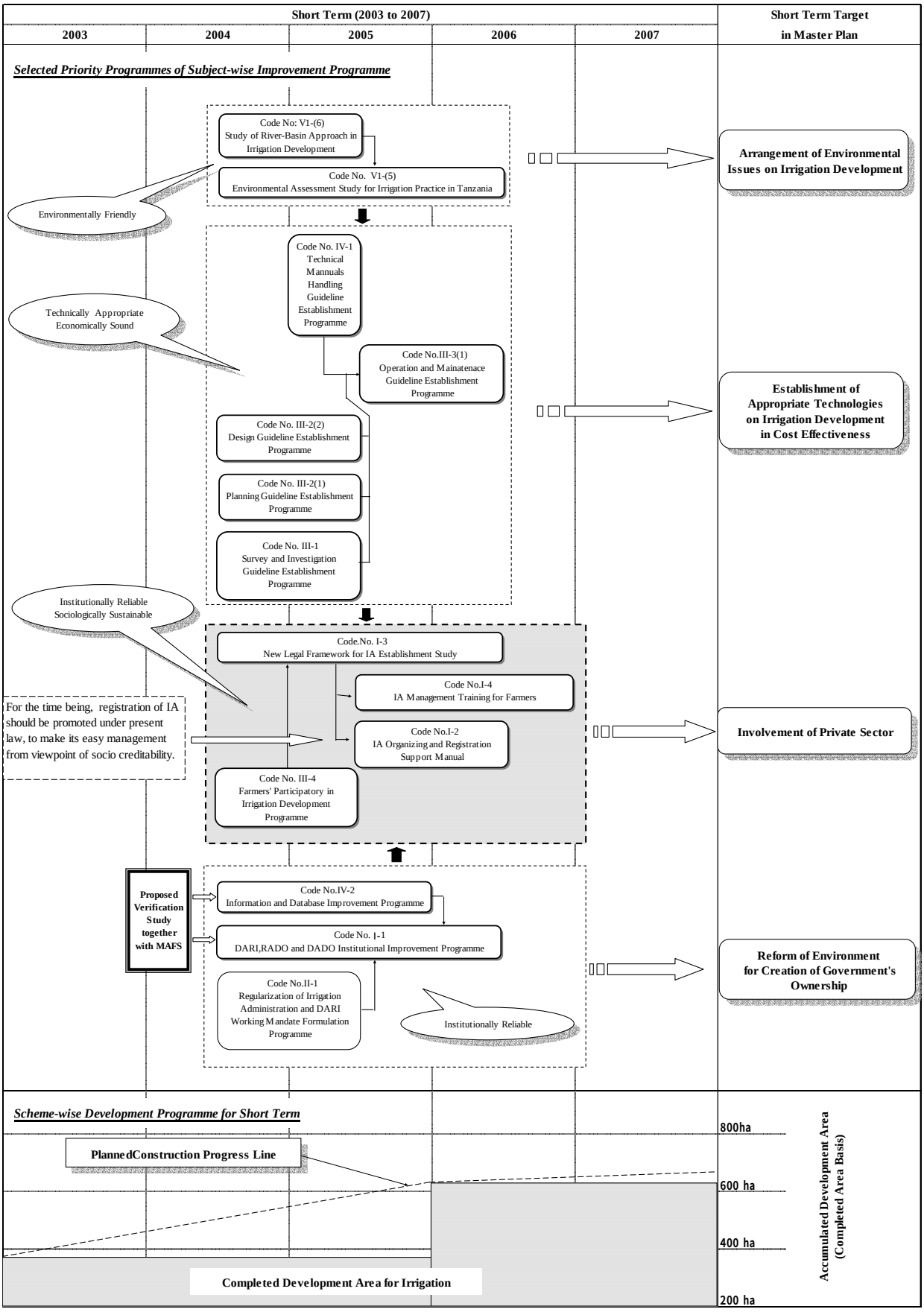
(2) Implementation Plan for the Scheme-wise Development Programme in the Short Term (2003 to 2007)

The implementation plan for the Scheme-wise Development Plan in the Short Term was prepared on an annual basis.

(3) Illustrated Implementation Plan

The plan is illustrated on the next page. Figure 6.4.1 shows the implementation plan for all programmes and schemes (area basis) by 2020.

Illustrated Implementation Plan



CHAPTER 7 RECOMMENDATIONS

7.1 General

Resulting from the Action Plan study and the Master Plan study, 14 Priority Programmes and four Model Irrigation Schemes were selected from 33 Programmes of the Subject-wise Improvement Programme and 16 Irrigation Schemes of the Scheme-wise Development Programme. Then an Action Plan for them was worked out based on the results of analysis on problems and constraints obtained through PCM, RRA, site inspections and review of reference reports. From the proposed Action Plan, especially the implementation plan attached, the urgent commencement of the following issues is recommended:

7.2 Institutional Strengthening of DARI

The Master Plan study pointed out the institutional and organizational weakness of the DARI as an executing agency for proper irrigation development. The DARI is required to have stronger mandates for the personnel administration and budget allocation in addition to a stronger institutional and organizational position. The Action Plan study proposes the urgent execution of 14 Priority Programmes of the Subject-wise Improvement Programme, which are the most crucial common issues toward sustainable irrigation development. In these Priority Programmes, the DARI institutional strengthening programme is given a top priority. It is thus recommended that the DARI institutional strengthening programme should be implemented urgently.

7.3 Support on Irrigation Scheme Formation Process to DARI

The success of irrigation developments largely depends upon good performances in project cycle, such as good planning, good designing, good construction, and good O & M. In these consecutive performances, the planning of irrigation schemes is the most fundamental activity as a starting point toward sustainable irrigation development.

The site inspections for many irrigation schemes and also discussion with MANREC staff concerned, indicated that the development plans of irrigation schemes were not clear especially from technical and economical viewpoints, and also there was no definite criteria for selection of appropriate irrigation schemes. To cope with this situation, it is recommended to build the capacity of the district staff concerned and also prepare guidelines showing the proper process of scheme formation and selection.

Lots of basic data and information, such as results of inventory surveys,

topographic maps and current conditions of irrigation development, which are so useful for proper planning of irrigation schemes for the DARI have been collected in the Master Plan study. It is recommended that a simple data base system should be established at the DARI of MANREC, to make the irrigation scheme formation dependable and smooth the monitoring activities.

7.4 Improvement of Legal Framework for and Strengthening of IA

Operation, maintenance and management of irrigation schemes are totally entrusted to IA. However, current situations of IA are institutionally, financially and technically too weak to fulfill the above activities. The Master Plan study recognized the need of legal framework improvement for irrigation development including IA. Following this recommendation and also the results of PCM workshops, RRA and site inspections, the Action Plan study presents the IA Strengthening Programme consisting of three programmes: (i) a New Legal Framework for IA Establishment Study, (ii) IA Organization and Registration Support Manual, and (iii) Management Training for Farmers.

Taking into consideration the above, it is recommended that the government should start the improvement of the legal framework and then the IA Strengthening Programme, to establish the strong IAs indispensable for sustainable irrigation development.

Tables

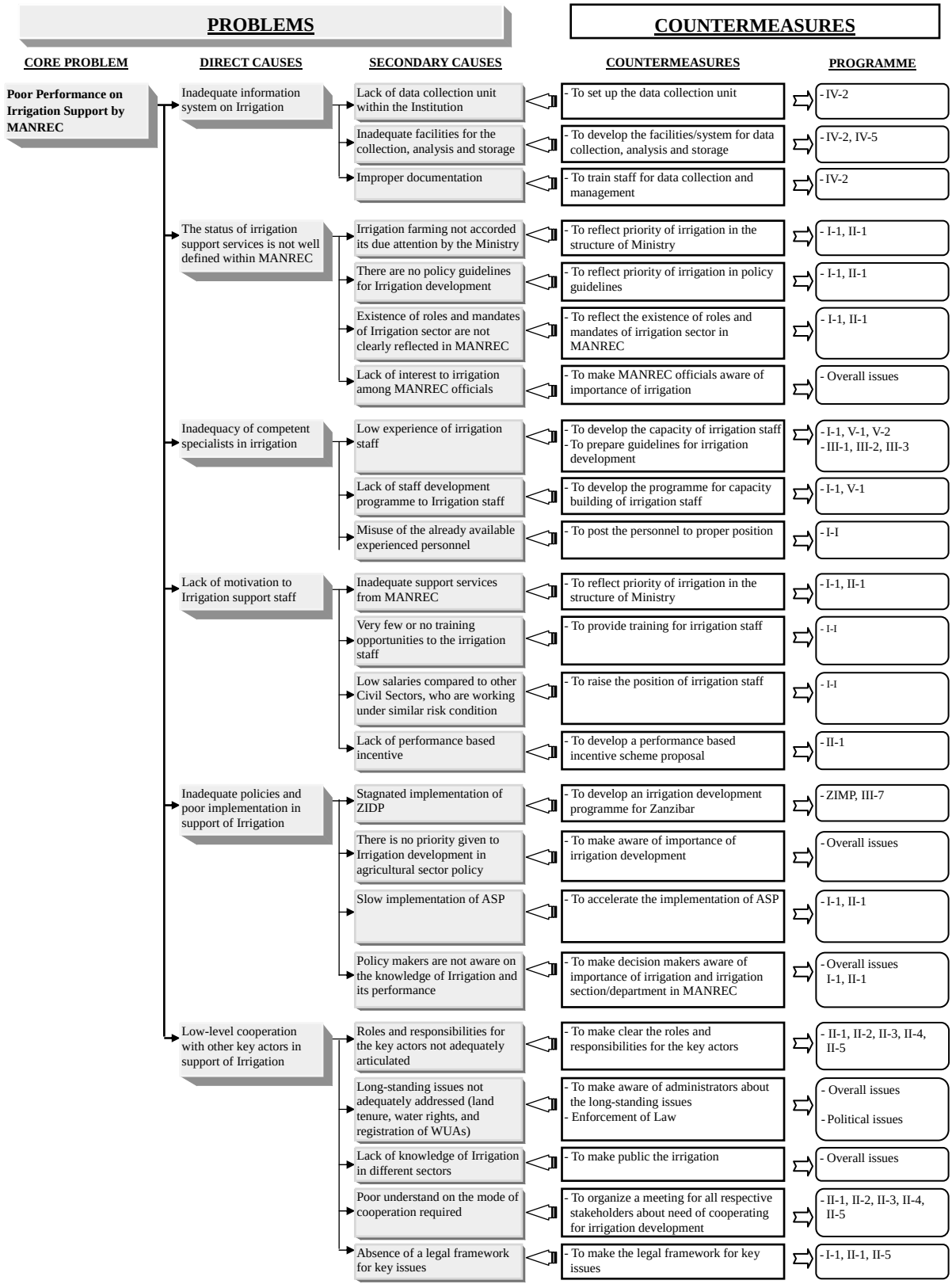
Table 3.4.1 Salient Features of Each Scheme

Item	Mlemele	Makwararani	Bumbwi Sudi	Chaani
Project Title	Mlemele Irrigation Scheme	Makwararani Irrigation Scheme	Bumbwi Sudi Irrigation Scheme	Chaani Irrigation Scheme
Scheme Category	Water Harvesting (surface water development by dam reservoir)	Water Harvesting (surface water development by dam reservoir)	Pump Irrigation (conjuntive use of surface water and groundwater)	Water Harvesting (surface water development by dam reservoir)
Project Area	65 ha. : Matele, Tondooni, Mitamani, Dodo, Kumvini, Kitokame and Pogwa villages	72 ha. ; Mtakao, Kivugo, Kichangani, Michungani, Njuguni and Mapofu villages	383 ha. ; Mwache-Alale, Dole, Bumbwi-Sudi, Mguzuni, Kitundu, Ndagaa, Mwakaje, Kiboje, Mfenesini, Kizimbani and Miwani villages	250 ha. ; Chaani, Kentwa, Mbuzini, Gamba, Kandwi, Kivunge and Mkwajuni villages
Water Source	Right Mlemele River (tentative name)	Makwararani river	Nine(9) pumps and two(2) ponds	Bwabwaja river
River Discharge	Maximum: 13 m^3/sec Minimum: 0 m3/sec	Maximum: 12.8 m^3/sec Minimum: 0 m3/sec	Pump lifting discharge : 25 - 100 l/sec	Maximum: 4.0 m^3/sec Minimum: 0.04 m3/sec
Applied Crop	Rice (4.5 ton/ha.)	Rice (4.5 ton/ha.)	Rice (4.5 ton/ha.)	Rice (4.5 ton/ha.)
Cropping Intensity	120%	150%	175%	150%
Remarks	Irrigable lands extend about 40 ha in the catchment of Left Mlemele river and 25 ha in the same with Right Mlemele river. Taking flow regime during flood into consideration, possibility of dam reservoir construction was confirmed at a site in the Right M	Total number of farmers for the project is estimated at 280. IA should be organized urgently for O & M of irrigation facilities.	Total number of farmers related to the project is estimated at 469 for 22 IAs. The project area consists of 7 Irrigation Fields. Each Irrigation Field is subdivided into several irrigation blocks. IAs are grouped at the basis of each irrigation block	Total number of farmers for the project is estimated at 600 households. There are two farmers groups who are taking river water by temporary weirs in Kishima-fedha and Kijamba. The group of Kishima-fedha consists of 60 farmers with 20 acre farmlands, a
Existing Development Plan Prepared by Government	Dam Plan Dam type : Earthfill Dam height from river bed : 3.0 m Dam length : 95.0 m Reservoir capacity : 0.33 MCM Catchment area : 2.25 km^2 Canal System Plan Lined main irrigation canal : 7,220 m Lined secondary irrigation canal : 1,760 m Drainage canal : 4,620 m	Dam Plan Dam type : Earthfill Dam height from river bed : 2.0 m Dam length : 150.0 m Reservoir capacity : 0.35 MCM Catchment area : 5.12 km^2 Canal System Plan Lined main irrigation canal : 8,950 m Lined secondary irrigation canal : 4,430 m Farm road (improved) : 2,000 m Farm road (newly constructed) : 1,700 m	Irrigable area : 383 ha Submerged pump : 6 nos. Pond/reservoir : 2 nos. Lined main irrigation canal : 12,740 m Lined secondary irrigation canal : 7,300 m Draninage canal : 8,900 ha Farm roads : 5,900 m	Dam Plan Dam type : Concrete gravity Dam height from river bed : 4.0 m Dam length : 38 m Reservoir capacity : 1.17 MCM Catchment area : 3.60 km^2 Canal System Plan Lined main irrigation canal : 6,600 m Lined secondary irrigation canal : 11,100 m Farm road : 6,600 m Land consolidation : 250 ha

Source: JICA Study Team

Figures

MANREC

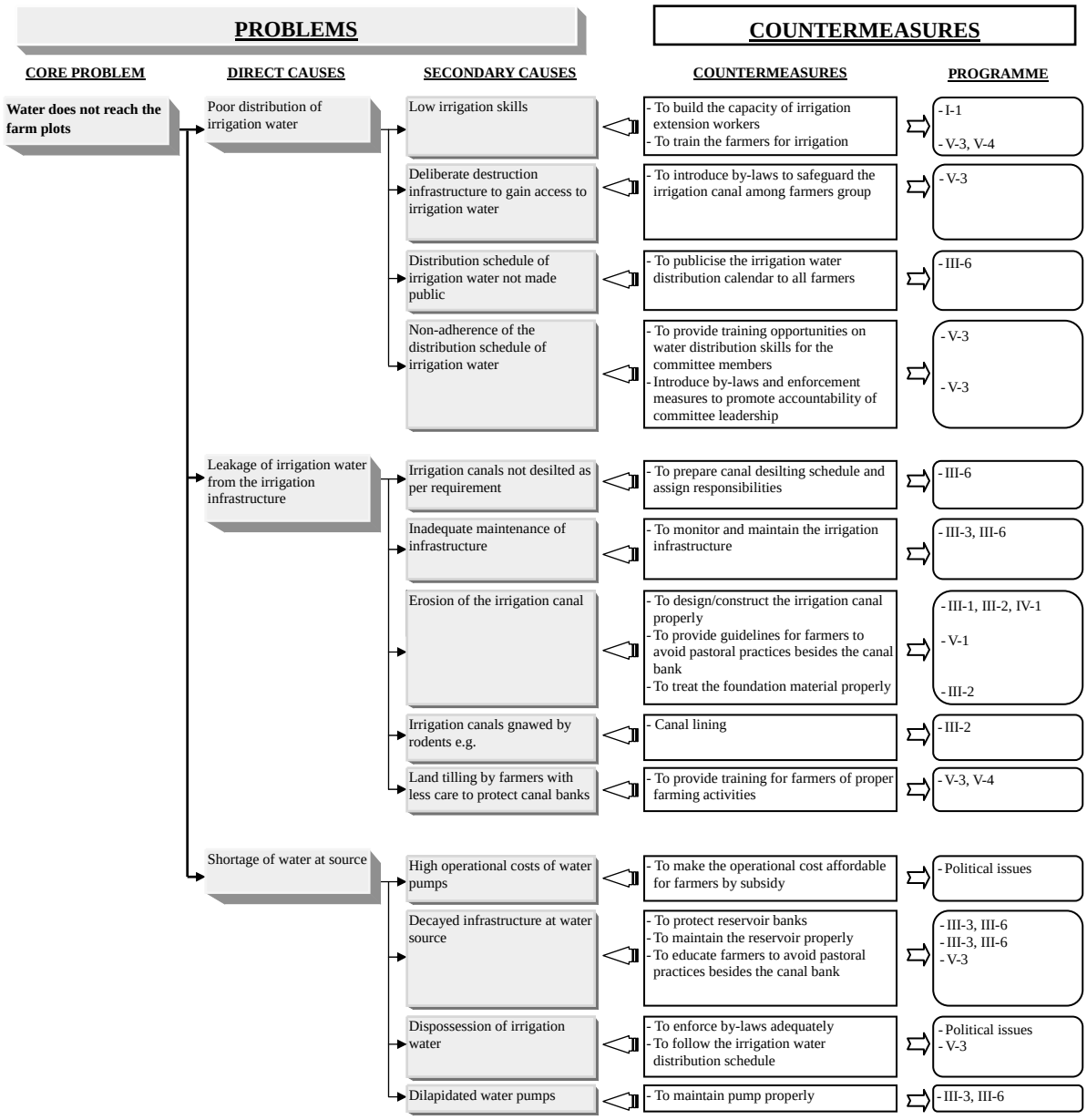


The Study on the Zanzibar Irrigation Master Plan in the United Republic of Tanzania

Japan International Cooperation Agency

Figure 4.2.1
PCM Workshop Analysis Results and Countermeasures (MANREC)

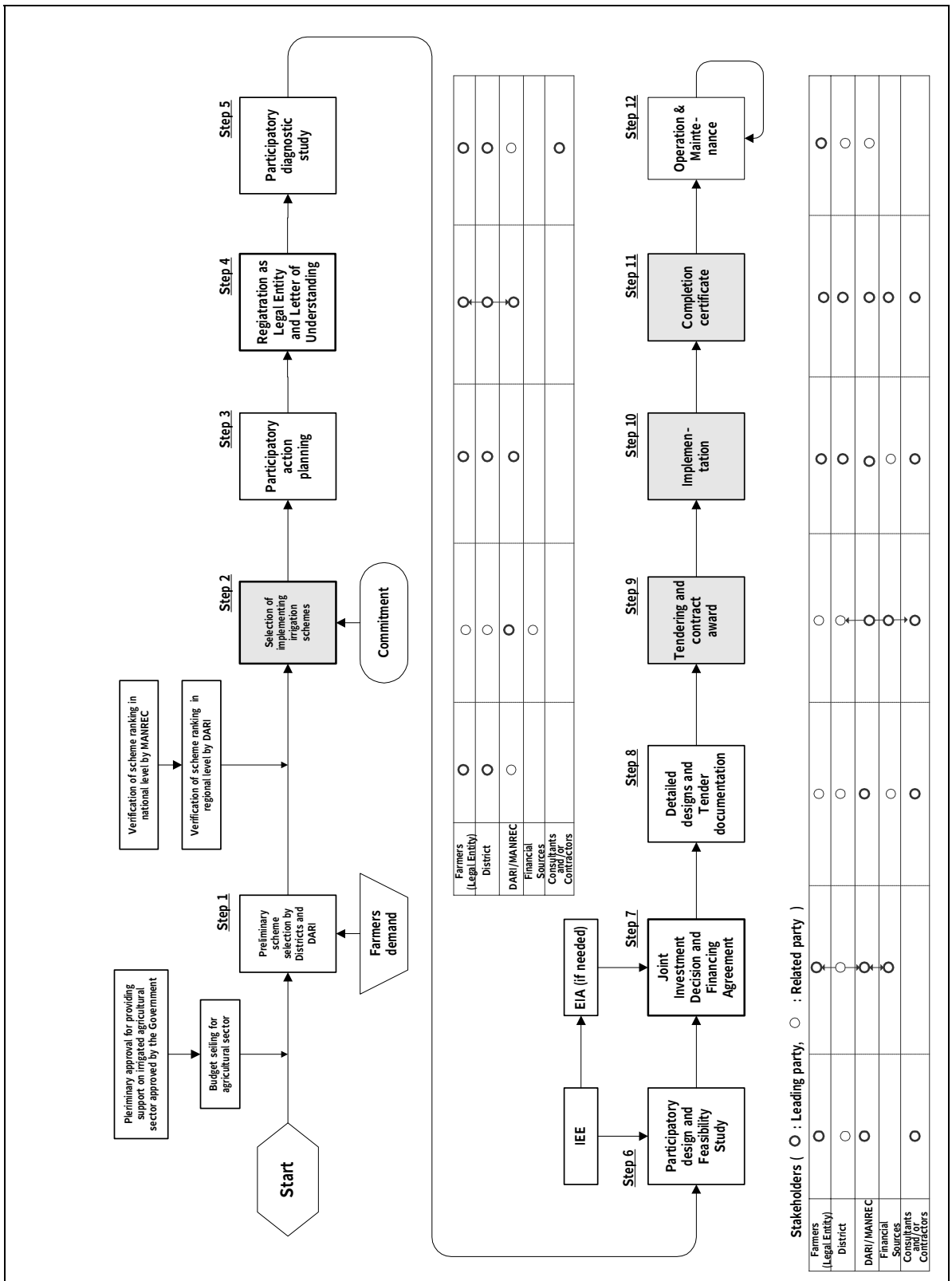
Farmers/IAs



The Study on the Zanzibar Irrigation Master Plan in the United Republic of Tanzania

Japan International Cooperation Agency

Figure 4.2.2
PCM Workshop Analysis Results and Countermeasures (Farmers/IAs)



The Study on the Zanzibar Irrigation Master Plan in the United Republic of Tanzania	**Figure 5.2.1 Provisional Implementation Process of Small-Irrigation Scheme**
Japan International Cooperation Agency	

	Code No.	Component Title	Required Period (Years)	Short Term Reform					Medium Term Decentralization						Long Term Self-reliance						Remarks
				2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
1	**I-1**	**DARI,RADO and DADO Institutional Improvement Programme**	**2.0**																			
2	**I-2**	**IA Organizing and Registration Support Manual**	**1.0**																			
3	**I-3**	**New Legal Framework for IA Establishment Study**	**2.0**																			
4	**I-4**	**IA Management Training for Farmers**	**1.5**																			
5	**II-1**	**Regularization of Irrigation Administration and DARI Working Mandate Formulation Programme**	**1.0**																			
6	II-2	Regulatory Networking System Establishment between RADO/DAD and DARI	1.0																			
7	II-3	NGO's Intervention in Irrigation Development Encourage Programme	1.0																			
8	II-4	Cooperation Channeling within Irrigation-Sector Establishment Programme	1.0																			
9	II-5	Sub-sectors Coordination System Establishment	1.0																			
10	**III-1**	**Survey and Investigation Guideline Establishment Programme**	**1.0**																			
11	**III-2(1)**	**Planning Guideline Establishment Programme**	**1.0**																			
12	**III-2(2)**	**Designing Guideline Establishment Programme**	**1.0**																			
13	**III-3(1)**	**Operation and Maintenance Guideline Establishment Programme**	**1.0**																			
14	III-3(2)	Monitoring & Evaluation Guideline Establishment Programme	1.0																			
15	**III-4**	**Farmers' Participation in Irrigation Development Programme**	**1.0**																			
16	III-5	Village Irrigation Development Guideline Establishment Programme	1.0																			
17	III-6	Farmers' O&M Manual Establishment Programme	1.0																			
18	**IV-1**	**Technical Manuals Handling Guideline Establishment Programme**	**0.5**																			
19	**IV-2**	**Information and Database Improvement Programme**	**1.5**																			
20	IV-3	Irrigation Development Contractors and Consultants' Listing Programme	1.0																			
21	IV-4	LGA Networking System Establishment Programme	1.0																			
22	IV-5	Existing-scheme Monitoring System Establishment Programme	1.0																			
23	V-1(1)	Irrigation Technology Research Center Establishment Programme	2.0																			
24	V-1(2)	Perennial Irrigation Method Improvement Programme	1.5																			
25	V-1(3)	Flood Irrigation Development Programme	2.0																			
26	V-1(4)	Small Dam Technology for Irrigation Development Establishment Programme	2.0																			
27	**V-1(5)**	**Environmental Assessment Study for Irrigation Practice in Tanzania**	**2.0**																			
28	**V-1(6)**	**Study of River-Basin Approach in Irrigation Development**	**1.0**																			
29	V-2	Hydraulic Experimental Center Establishment Programme	2.5																			
30	V-3	Farmers' Participation Training Programme	1.0																			
31	V-4(1)	Irrigated Agriculture Training Programme for Rice Production Increase	5.0																			Started by JICA-KARC
32	V-4(2)	Irrigated Agriculture Training Programme for Cash Crops Production Increase	2.5																			
33	V-5	Integrated Irrigation Development Model establishment Programme	1.5																			

Scheme-wise Development Programme

Irrigation Types

	Developed Area for Irrigation in ha																		Accumulated Developed Area
Surface Irrigation by Dam Reservoir	106	106	356	356	356	356	356	356	756	756	783	805	805	919	1,021	1,349	1,349	2,500 ha
Surface Irrigation byDiversion Weir	90	90	90	90	90	132	132	132	132	132	132	432	432	432	432	432	432	2,000 ha
Groundwater Irrigation by Pump	178	178	178	178	178	178	178	178	178	178	178	178	602	602	602	602	602	1,500 ha
Total	374	374	624	624	624	666	666	1,066	1,066	1,066	1,093	1,415	1,839	1,953	2,055	2,383	2,383	1,000 ha
Planned Construction Progress																		500 ha

Note: ▬ : *Priority Components* ▭ : *Other Components*

The Study on the Zanzibar Irrigation Master Plan in the United Republic of Tanzania

Japan International Cooperation Agency

Figure 6.4.1
Implementation Plan

Attachment 1

Minutes of Meeting for the Study

MINUTES OF MEETINGS
FOR
THE STUDY
ON
THE ZANZIBAR IRRIGATION MASTER PLAN
IN
THE UNITED REPUBLIC OF TANZANIA

AGREED UPON BETWEEN

THE MINISTRY OF AGRICULTURE, NATURAL RESOURCES, ENVIRONMENT AND COOPERATIVES, ZANZIBAR

THE UNITED REPUBLIC OF TANZANIA

AND

JAPAN INTERNATIONAL COOPERATION AGENCY

Dar es Salaam, 9th May, 2002

Ms. Rahma M. Mshangama
Principal Secretary
Ministry of Agriculture, Natural Resources,
Environment and Cooperatives,
Zanzibar

Mr. Sumio Aoki
Resident Representative
Tanzania Office,
Japan International Cooperation Agency

for

Mr. Wilfred Ngirwa
Permanent Secretary
Ministry of Agriculture and Food Security,
Dar es Salaam

1. Introduction

Both the Ministry of Agriculture and Food Security of Main Land Tanzania (hereinafter referred to as "MAFS") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") agreed to the Scope of Works (hereinafter referred to as "S/W") for the Study on National Irrigation Master Plan (hereinafter referred to as "NIMP") which was signed on 10th April, 2001, at Dar es Salaam. In accordance with the S/W, the Study on NIMP for Main Land Tanzania commenced in October 2001, and is scheduled to be completed by March 2004.

In the course of the Study, the Ministry of Agriculture, Natural Resources, Environment and Cooperatives, Zanzibar (hereinafter referred to as "MANREC") requested JICA through MAFS to include Zanzibar in the Study Area of the NIMP.

In this regard, JICA finally with the consent of MAFS, agreed to include Zanzibar in the Study area of the NIMP provided that:

- MANREC shall complete the Inventory Survey for irrigation schemes and subjects by May 2002 using the questionnaire forms prepared by JICA.
- Government of Zanzibar (hereinafter referred to as "GOZ") shall undertake Items 7.1 and 7.2 mentioned in the S/W.

The scope of works for the Study for Zanzibar in the NIMP are stipulated below.

2. Objectives of the Study (Define "the Study" in this M/M)

Objectives of the Study for Zanzibar are as follows:

(1) To formulate the Master Plan on Irrigation Development for Unguja and Pemba Islands with reference to the NIMP for the Main Land; and

(2) To prepare the Implementation Plan for priority irrigation schemes selected in the Master Plan.

3. Study Area

(1) The Master Plan for Zanzibar shall cover both Unguja and Pemba islands.

(2) The Implementation Plan shall be prepared for one or two irrigation scheme(s) for both the Unguja and Pemba islands, which shall have been selected in the Master Plan.

4. Scope of the Study

4.1 Phase 1

4.1.1 Data Collection

(1) To complete the Inventory Survey for irrigation schemes on the Unguja and Pemba islands executed by the GOZ.

(2) To collect and review the existing information and/or data mainly on the following aspects:

(a) Natural, social and economic conditions,

(b) National, regional and district development policies/strategies/plans,

(c) Agricultural and social infrastructure,

(d) Water and land resources allocation,

(e) Operation and maintenance of existing agricultural facilities,

(f) Water management,

(g) Farming system,

(h) Agricultural extension and credit,

(i) Post harvesting and marketing,

(j) Environmental issues,

(k) Others.

(3) To conduct field surveys for supplementary data as required.

(4) To identify potential irrigation area through analysis of existing data and information collected.

4.1.2 Formulation of a Master Plan

(1) To cover the following aspects in the Master Plan:

(a) Irrigation and drainage development,

(b) Institutional building,

(c) Water management,

(d) Monitoring and evaluation,

(e) Others.

(2) To use the existing data and information for formulation of a Master Plan.

(3) To set the target year of 2020 for the Master Plan.

(4) To select the priority irrigation schemes by referencing the selection criteria prepared for the Main Land.

(5) To refer to the priority irrigation subjects selected for the Main Land.

4.2 Phase 2

The Implementation Plan for the priority irrigation schemes will be studied in response to the recommendation and content of the Master Plan. As for the Implementation Plan for priority irrigation subjects, the plan for the Main Land will be referred for Zanzibar. In the course of presentation for the Implementation Plan, an Initial Environmental Examination (IEE) will be conducted in accordance with the relevant environmental law in Zanzibar.

5. Study Schedule

The Study will be carried out in accordance with the Tentative Schedule attached as Annex.

6. Reports

JICA shall prepare and submit the following reports, written in English, to the GOZ;

(a) Inception Report 1:
Twenty (20) copies at the commencement of the Study in Zanzibar.

(b) Draft Master Plan Report:
Twenty (20) copies at the end of first work in Zanzibar.

(c) Master Plan Report:
Thirty (30) copies at the start of second field work in Zanzibar.

(d) Inception Report 2:
Twenty (20) copies at the start of second field work in Zanzibar.

(e) Progress Report:
Twenty (20) copies in the process of second field work in Zanzibar.

(f) Draft Implementation Plan Report:
Twenty (20) copies at the end of second work in Zanzibar

(g) Implementation Plan Report:
Thirty (30) copies about 2 month after the submission of Implementation Plan Report

7. Counterpart Agency

MANREC will act as a counterpart agency to the JICA Study Team and also as a coordinating and guiding body in relation with other governmental and non-governmental organizations and donors concerned for the smooth implementation of the Study.

8. Counterpart Personnel

MANREC shall assign the necessary number of counterpart personnel to the JICA Study Team during the field work period.

9. Steering Committee

MANREC shall organize a steering committee consisting of representatives from the relevant agencies for the smooth and effective implementation of the Study.

10. Stakeholder Meeting

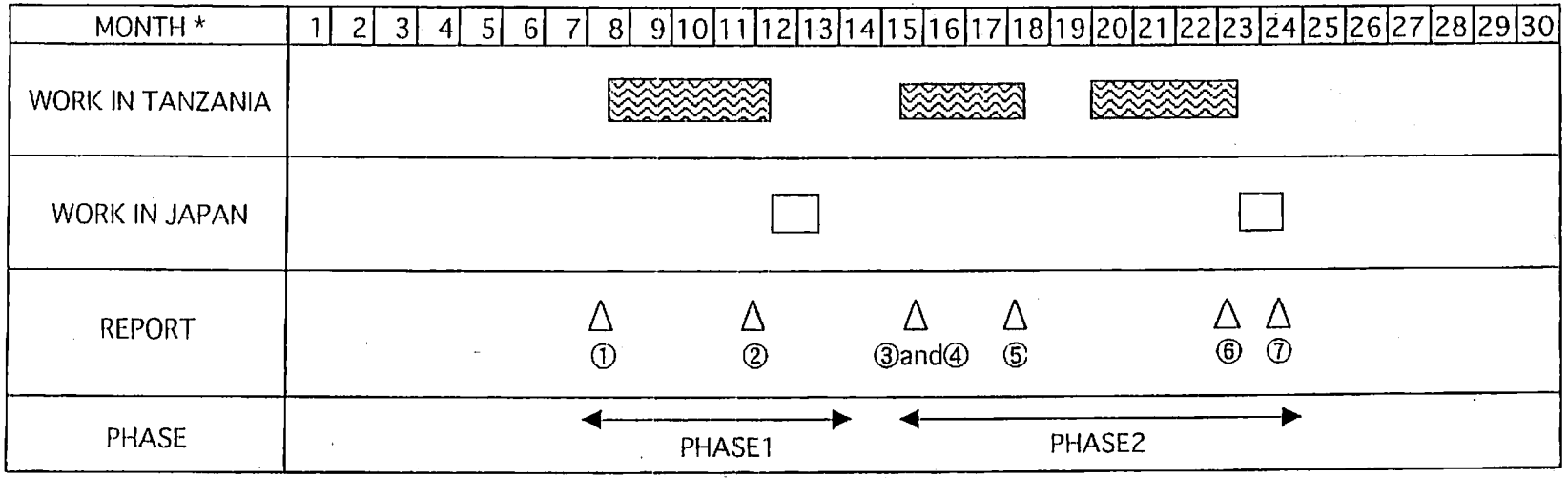
MANREC shall hold Stakeholder Meeting(s) for recognizing the process and outputs of the Study among related actors.

11. Consultation

JICA, MAFS and MANREC shall maintain constant communication and consult with each other in respect to any matters that may arise from or in connection with the Study.

ANNEX

TENTATIVE SCHEDULE for ZANZIBAR



* indicates the period from the commencement of the study for Main Land

① Inception Report 1
② Draft Master Plan Report
③ Master Plan Report
④ Incepion Report for Phase 2
⑤ Progress Report for Phase 2
⑥ Draft Implementation Plan Report
⑦ Implementation Plan Report

Attachment 2

Scope of Work and

Minutes of Meetings for the Study

SCOPE OF WORK

FOR

THE STUDY

ON

THE NATIONAL IRRIGATION MASTER PLAN

IN

THE UNITED REPUBLIC OF TANZANIA

AGREED UPON BETWEEN

THE MINISTRY OF AGRICULTURE AND FOOD SECURITY

THE UNITED REPUBLIC OF TANZANIA

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Dar Es Salaam, 10, April, 2001

Mr. Wilfred Ngirwa
Permanent Secretary
Ministry of Agriculture and Food Security
The United Republic of Tanzania

Mr. Norio KUNIYASU
Leader
The Preparatory Study Team
Japan International Cooperation Agency

Mr. P. J. Ngumbulu
Permanent Secretary
Ministry of Finance
The United Republic of Tanzania

I. INTRODUCTION

In response to the request of the Government of The United Republic of Tanzania (hereinafter referred to as "GOT"), the Government of Japan has decided to conduct the Study on National Irrigation Master Plan (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

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

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are as follows:

2.1 To formulate the Master Plan in line with the prevailing policy, strategy and program of GOT, in particular, Agricultural Sector Development Strategy and Agricultural Sector Program;

2.2 To formulate the Implementation Plan in accordance with the priority which will be set in the Master Plan;

2.3 To conduct the Verification Study, aiming at capacity building for irrigation development; and

2.4 To carry out technology transfer to Tanzanian counterpart personnel through on-the-job training in the course of the Study.

III. STUDY AREA

3.1 The Master Plan Study will be carried out at national level for the whole country.

3.2 The Implementation Plan and the Verification Study will be examined in the area(s) prioritized in the Master Plan.

IV. SCOPE OF THE STUDY

In order to achieve the objectives above, the study shall consist of the following activities.

4.1 Phase 1

4.1.1 Data collection

(a) To collect and review the existing information and/or data mainly on the following aspects;

(i) Natural, social and economic conditions.
(ii) National, regional and district development policy/strategy/ plan.
(iii) Agricultural and social infrastructure.
(iv) Water and land resources allocation.
(v) Operation and maintenance of existing agricultural facilities.
(vi) Water management.
(vii) Farming system.
(viii) Agricultural extension and credit.
(ix) Post harvesting and marketing.
(x) Environmental issues.
(xi) Others.

(b) To conduct field surveys for supplementary data collection.

4.1.2 Formulation of the Master Plan

(a) The Master Plan will mainly cover the following aspects;
(i) Irrigation and drainage development.
(ii) Institutional building.
(iii) Water management.
(iv) Monitoring and evaluation.
(v) Others.

(b) To select the priority area(s) in accordance with the social, economic, physical and environmental conditions.

4.2 Phase 2

4.2.1 Formulation of the Implementation Plan.

The Implementation Plan in the priority area(s) will be studied in response to the recommendation and content of the Master Plan.

4.3 Phase 3

4.3.1 Implementation of Verification Study.

To carry out the Verification Study among the Implementation Plan(s) for aiming at capacity building of stakeholders in irrigation development. The detail content of the Verification Study will be examined in Phase 2.

V. STUDY SCHEDULE

The Study will be carried out in accordance with the Tentative Schedule attached as Annex.

VI. REPORTS

JICA shall prepare and submit the following reports, written in English, to the GOT;

(i) Inception Report for Phase 1:
Thirty (30) copies at the commencement of the Study.

(ii) Progress Report for Phase 1:
Thirty (30) copies in the process of first work in Tanzania.

(iii) Draft Master Plan Report:
Thirty (30) copies at the end of first work in Tanzania.

(iv) Master Plan Report:
Fifty (50) copies at the beginning of second work in Tanzania.

(v) Inception Report for Phase 2:
Thirty (30) copies at the beginning of second work in Tanzania.

(vi) Progress Report for Phase 2:
Thirty (30) copies in the process of second work in Tanzania.

(vii) Draft Implementation Plan Report:
Thirty (30) copies at the end of second work in Tanzania.

(viii) Implementation Plan Report:
Fifty (50) copies at the beginning of third work in Tanzania.

(ix) Inception Report for Phase 3:
Thirty (30) copies at the beginning of third work in Tanzania.

(x) Progress Report for Phase 3:
Thirty (30) copies in the process of third work in Tanzania.

(xi) Draft Verification Study Report:
Thirty (30) copies at the end of third work in Tanzania.

(xii) Verification Study Report:
Fifty (50) copies at the fourth work in Tanzania.

Tanzanian side shall submit the comments on each Report at the

meetings/workshops to be held in the process of work in Tanzania.

VII. UNDERTAKING OF THE GOT

7.1 To facilitate the smooth conduct of the Study, GOT shall take necessary measures:

(i) To secure the safety of the Study Team:

(ii) To permit the members of the Study Team to enter, leave and sojourn in Tanzania for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees:

(iii) To exempt the members of the Study Team from taxes, duties and other charges on equipment, machinery and other materials to be brought into and out of Tanzania for the conduct of the Study in accordance with the laws and regulations existing in Tanzania.

(iv) 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;

(v) To provide necessary facilities to the Study Team for remittance as well as utilization of the funds introduced into Tanzania from Japan in connection with the implementation of the Study;

(vi) To secure permission for the Study Team to enter private properties or restricted areas for the implementation of the Study;

(vii) To secure permission for the Study Team to take all data and documents, including photographs and maps, relevant to the Study out of Tanzania to Japan for the purpose of the Study, and

(viii) To provide medical services as needed. Its expenses will be chargeable to members of the Study Team.

7.2 The GOT shall bear claims, if any arises, against 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 members of the Study Team.

7.3 The Ministry of Agriculture and Food Security (hereinafter referred to as MAFS) shall act as a counterpart agency to the Study Team and

also as a coordinating and guiding body in relation with other governmental organizations and non-governmental organizations concerned for smooth implementation of the Study.

7.4 MAFS shall, at its own expense and in cooperation with other organizations concerned, provide the Study Team with the following;

(i) Available data and information related to the Study,

(ii) Counterpart personnel,

(iii) Suitable office space with necessary equipment in Dar Es Salaam, and

(iv) Credentials or identification cards.

VIII. UNDERTAKING OF JICA

For the implementation of the study, JICA shall take the following measures;

(i) To dispatch, at its own expense, study teams to Tanzania, and,

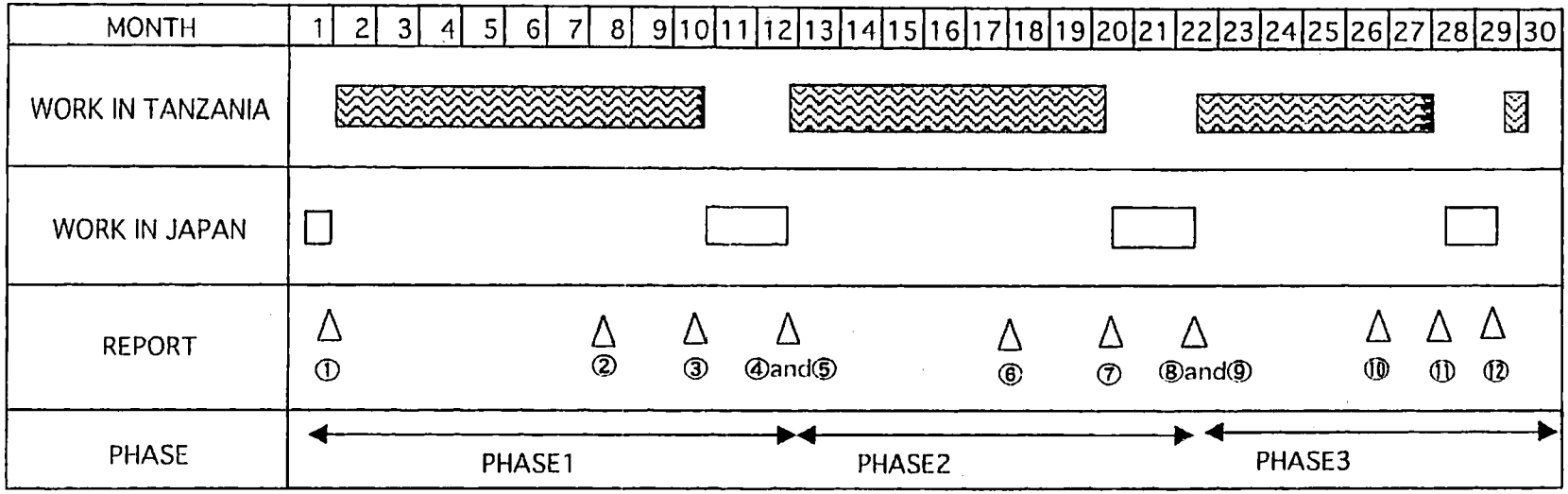
(ii) To pursue technology transfer to the Tanzanian counterpart personnel in the course of the Study.

IX. CONSULTATION

JICA and MAFS shall maintain constant communication and consult with each other in respect of any matters that may arise from or in connection with the Study.

ANNEX

TENTATIVE SCHEDULE



① Inception Report for Phase 1
② Progress Report for Phase 1
③ Draft Master Plan Report
④ Master Plan Report
⑤ Incepion Report for Phase 2
⑥ Progress Report for Phase 2
⑦ Draft Implementation Plan Report
⑧ Implementation Plan Report
⑨ Inception Report for Phase 3
⑩ Progress Report for Phase 3
⑪ Draft Verification Study Report
⑫ Verification Study Report

MINUTES OF MEETINGS

FOR

THE STUDY

ON

THE NATIONAL IRRIGATION MASTER PLAN

IN

THE UNITED REPUBLIC OF TANZANIA

AGREED UPON BETWEEN

THE MINISTRY OF AGRICULTURE AND FOOD SECURITY

THE UNITED REPUBLIC OF TANZANIA

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Dar Es Salaam, 10, April, 2001

Mr. Wilfred Ngirwa
Permanent Secretary
Ministry of Agriculture and Food Security
The United Republic of Tanzania

Mr. Norio KUNIYASU
Leader
The Preparatory Study Team
Japan International Cooperation Agency

In response to the request of the Government of The United Republic of Tanzania (hereinafter referred to as "GOT"), the Preparatory Study Team (hereinafter referred to as "the Team") headed by Mr. KUNIYASU Norio was sent to The United Republic of Tanzania by the Japan International Cooperation Agency from 18th March, to 11th April, 2001.
The Team held a series of discussions in relation to the Scope of the Study on National Irrigation Master Plan (hereinafter referred to as "the Study") with representatives of the Ministry of Agriculture and Food Security of GOT (hereinafter referred to as "MAFS") and other relevant organizations. The list of participants in the series of meetings is attached as ANNEX 1. The following were agreed upon by both Tanzanian and Japanese sides in relation to the Study.

1. Title of the Study

Both sides agreed that the title of the study should be changed from "The Master Plan Study on National Irrigation Development Promotion" to "The Study on National Irrigation Master Plan".

2. Undertakings

Refer to the undertakings of the GOT written in the Scope of Works, MAFS expressed difficulties in providing vehicle(s), a photocopy machine, a personal computer, an air conditioner, a facsimile and an electric generator by its own expense to the Study Team and requested JICA to make the arrangements of such equipment. The Team promised to convey the requests to the Government of Japan.
JICA requested MAFS to make necessary arrangement in providing temporary office space(s) in Dar Es Salaam preferably within the proximity of the Irrigation Section office and in the respective zonal irrigation unit office in the prioritized area(s) which will be decided in the course of the Study. MAFS promised to undertake this responsibility.

3. Counterpart Agency

Both sides confirmed that MAFS acts as a counterpart agency to the Study Team and also as a coordinating and guiding body in relation with other governmental and non-governmental organizations and donors concerned for the smooth implementation of the Study. Both sides also confirmed that

the Study will be implemented under the cooperative manner between both sides, with respect of the ownership of GOT.

4. Target Year

MAFS requested that the duration of the Master Plan should be set forth 15 years, taking into consideration of the existing irrigation master plan (National Irrigation Development Plan) target year as 2014.

5. Steering Committee

For the smooth and effective implementation of the Study, both sides agreed upon the need for establishment of a steering committee consisting of representatives from the following ministries and organizations before the commencement of the Study.

(1) Ministry of Agriculture and Food Security
(2) President's Office, Planning and Privatization Commission
(3) President's Office, Regional Administration and Local Government
(4) Vice President's Office, Environment Department
(5) Prime Minister's Office
(6) Ministry of Finance
(7) Ministry of Water and Livestock Development
(8) Ministry of Natural Resources and Tourism
(9) Ministry of Energy and Minerals
(10) Ministry of Lands and Human Settlement Development
(11) JICA Tanzania Office
(12) Embassy of Japan (as an observer)
(13) Any other co-opted members

6. Counterpart Personnel

MAFS promised to assign the necessary number of counterpart personnel for the Study Team from the organizations concerned. The member list of counterpart personnel is attached as ANNEX 2.

MAFS expressed difficulties in providing travel allowance for them and requested JICA to make necessary arrangements, because of the budget limitation.

7. Counterpart Training in Japan

MAFS requested the training of counterpart personnel on specific relevant subjects in Japan for the efficient implementation of the Study. The Team promised to convey it to the Government of Japan.

8. Workshop/Stakeholder Meeting

Both sides agreed to hold the workshops and/or stakeholder meetings for recognizing the process and outputs of the Study among related actors.

9. Data Base

The Tanzanian side requests to establish an irrigation data base. The Japanese side promised to examine the matter in the course of the Study in consultation with the Tanzanian side.

ANNEX 1

(A) LIST OF MAFS STAFF MET BY THE JICA PREPARATORY STUDY TEAM

1. Mr. W. NGIRWA	Permanent Secretary
2. Dr. N. P. SICILIMA	Director of Crop Development
3. Mrs. J. BITEGEKO	Director of Policy and Planning
4. Eng. G. M. KALINGA	Assistant Director for Irrigation
5. Eng. A. H. SIMBA	Irrigation Engineer
6. Eng. D. B. E. URASSA	Civil Engineer
7. Mr. P. MAFURU	Agricultural Economist, Head of Monitoring and Evaluation Unit
8. Mr. A. L. SIMUKANGA	Environmental Engineer
9. Eng. F. MBOGO	Irrigation Engineer
10. Eng. I. MASENZA	Water Resources Engineer
11. Mrs. E. NNYITI	Soil Scientist, Zonal Irrigation Unit, Morogoro
12. Eng. C. K. CHIZA	National Project Coordinator, Rehabilitation of Traditional Irrigation Project
13. Eng. A. E. R. ISSAE	Civil Engineer
14. Dr. J. NOZAKA	Irrigation Advisor(JICA expert)

(B) LIST OF PARTICIPANTS FOR STAKEHOLDERS MEETING ON THE NATIONAL IRRIGATION MASTER PLAN STUDY

1. Mr. W. NGIRWA	Permanent Secretary, MAFS
2. Dr. N. P. SICILIMA	Director of Crop Development, MAFS
3. Eng. R. J. MTEMU	Head of Technical Advisory Unit, ASPS
4. Mr. P. J. ZOUTEWELLE	Irrigation Advisor, ASPS, DANIDA
5. Dr. S. LUGEYE	Agricultural Advisor, Ireland Aid
6. Mr. E. OCLEIRIGH	Programme Officer, Ireland Aid
7. Mr. J. SALMON	Rural Livelihoods Advisor, DFID
8. Mr. G. S. NGAREYA	Assistant Director, Prime Minister's Office
9. Dr. I. K. ALOO	Senior Forest Officer, Ministry of Natural Resources & Tourism
10. Ms. M. TAKADA	Programme Officer, WFP
11. Mr. J.K. KABYMERA	Programme Officer, FAO
12. Mr. H. V. PEDERSEN	Chief Technical Advisor, ASPS, DANIDA
13. Eng. G. M. KALINGA	Assistant Director for Irrigation, MAFS
14. Eng. A. H. SIMBA	Irrigation Engineer, MAFS
15. Dr. J. NOZAKA	Irrigation Advisor, MAFS
16. Mr. N. ITO	Second Secretary, Embassy of Japan
17. Mr. I. RUGEMALILE	Economist, Embassy of Japan
18. Mr. Y. SASAOKA	Special Advisor, JICA

19.	Mr. R. SASAKI	Advisor, JICA
20.	Mr. Y. AIZAWA	Advisor, JICA
21.	Mr. S. OKUBO	Advisor, JICA

(C) List of the Preparatory Study Team, JICA

1.	Mr. KUNIYASU Norio	Leader, Irrigation Policy
2.	Mr. MITSUGI Hiroto	Member, Donor Coordination
3.	Dr. YOSHIDA Koji	Member, Farming
4.	Mr. JITSUHIRO Noboru	Member, Water Resources
5.	Mr. FURUDONO Seigo	Member, Irrigation/Agricultural Infrastructure
6.	Mr. AZEGAMI Naoya	Member, Agricultural Organization/Management
7.	Mr. HAYASHI Kenji	Member, Project Planning

LIST OF PROPOSED COUNTERPART PERSONNEL

1. Eng. A. H. SIMBA	Irrigation/Civil Engineer (Irrigation HQ)
2. Mr. P. F. MAFURU	Agricultural Economist (Irrigation HQ)
3. Mr. H. MEDADI	Irrigation Agronomist (Irrigation HQ)
4. Mrs. E. NNYITI	Soil Scientist (Morogoro Zonal Irrigation Unit)
5. Mr. I. MASENZA	Water Resources Engineer/Hydrologist (Irrigation HQ)
6. Mr. R. KOMANGA	Sociologist (Morogoro Zonal Irrigation Unit)

Attachment 3

Minutes of Meeting for Inception Report 2

MINUTES OF MEETING
ON
INCEPTION REPORT 2
FOR
THE STUDY
ON
THE NATIONAL IRRIGATION MASTER PLAN FOR ZANZIBAR
IN
THE REPUBLIC OF TANZANIA

The Study Team submitted twenty (20) copies of the Inception Report 2 for the 3rd field work of the Study on the National Irrigation Master Plan for Zanzibar (hereinafter referred to as "the Study") to the Ministry of Agriculture, Natural Resources, Environment and Cooperatives (hereinafter referred to as "MANREC"), in accordance with the Minutes of Meeting for the Study signed between MANREC and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on May 9, 2002.

A Meeting on the Report was held with the Steering Committee on December 20, 2002, although prior discussions on it were made between counterpart personnel of MANREC and the Study Team in advance on December 19, 2002. In the Meeting, the Study Team explained the contents of the Report centering the summary of results of Phase 1 work and plan of operation of Phase 2 work. This was followed by discussions on the contents of the Report among the Participants. As a result of the discussions, the contents of the Report were accepted by the Steering Committee. The main issues discussed among Participants and the list of Participants, are shown in ANNEXES attached hereto.

Mr. Rassim M. Biwi
Deputy Commissioner,
Commission of Agriculture, Research
and Extension, Ministry of Agriculture Natural
Resources, Environment and Cooperatives,
Zanzibar,
Date: December 21, 2002

Mr. Hitoshi Shimazaki
Leader
The Study Team
Date: December 21, 2002

Eng. A.H.Simba
Chief Counterpart Personnel
Ministry of Agriculture and Food Security,
Main Land
Date: December 21, 2002

Mr.Hitoshi Fujiie
Project Programme
Japan International Cooperation Agency
Date: December 21, 2002

(ANNEX I)

Main Issues Confirmed and Agreed at the Meeting

(1) In the Action Plan for the Scheme-wise Development Plan, consideration should be given to the maximum use of the existing water resources.

(2) The crops to be cultivated should be clarified through Rapid Rural Appraisal. In particular, need of rice cultivation should be explained to the farmers.

(3) The IEE should be carried out in collaboration with the Department of Environment.

(4) Farmers' contribution to the Scheme-wise Development should be studied in the Action Plan for the Subject-wise Improvement Programme.

(5) MANREC shall take the initiative for inter-sectoral coordination so as to achieve the expected targets stated in the Master Plan Report.

(6) In the Action Plan, strengthening of irrigation section should be considered as mentioned in the Master Plan Report

(7) The Action Plan for the rehabilitation of existing pump irrigation scheme should be prepared in consideration of the lessons learnt from the existing ones.

(8) MANREC requested again the Study Team to consider the overseas or in-country training of counterpart personnel.

(ANNEX II)

List of Participants

1. Tanzanian Side

(1) Steering Committee, Zanzibar

(a) Mr. Kassim M. Biwi	Deputy Commissioner, Commission of Agric, Research and Extension, MANREC
(b) Mr. Ismail S.Mgeni	Officer in Charge, MANREC
(c) Mr. Hemed Salim	Director, Department of Water, Ministry of Water
(d) Dr. Bakar S. Asseid	Director, Department of Commercial Crops and Fruits, MANREC
(e) Mr. Mbarouk S. Mbarouk	Director, Department of Cooperatives
(f) Mr. Abdulrahman Mnoga	Local Government Officer, Ministry of Regional Administration
(g) Mr.Hassan Moh'd	Senior Planning Officer, Ministry of Finance & Economic Affairs
(h) Mr. Juma Ali Juma	Commission of Agriculture, Research and Extension, MANREC
(i) Mr. Ali Juma	Acting Director, Department of Environment, MANREC
(j) Mr. Shaaban Abdulmalik	Chief Counterpart Personnel, Commission of Agriculture, Research and Extension, MANREC
(k) Mr. Shaame M. Shaame	Irrigation engineer, Commission of Agriculture, Research and Extension, MANREC
(l) Mr. Andrea S. Mbinga	Irrigation/Rural Infrastructure engineer, Commission of Agriculture, Research, and Extension, MANREC
(m) Mr. Mahmoud V. Pandu	Land Resource engineer, Commission of Agriculture, Research and Extension, MANREC
(n) Mr. Abdulla K.Hamad	Irrigation Staff in Pemba, MANREC
(o) Mr. Mchenga A. Mchenga	Irrigation engineer, Commission of Agriculture, Research and Extension, MANREC

(2) Ministry of Agriculture and Food Security, Main Land

(a) Mr.A.H.Simba	Chief Counterpart Personnel Senior Irrigation Engineer
(b) Dr.Jiro Nozaka	Irrigation Advisor

2. Japanese Side

(1) JICA Monitoring Team

(a) Mr. Hitoshi Fujiie	Project Management

(2) JICA Study Team

(a)	Mr. Hitoshi Shimazaki	Leader
(b)	Mr. Shuichi Matushima	Staff
(c)	Mr. Takuya Igawa	Staff

Attachment 4

Minutes of Meeting for Draft Action Plan Report

MINUTES OF MEETING
ON
Draft Action Plan Report
FOR
THE STUDY
ON
THE ZANZIBAR IRRIGATION MASTER PLAN
IN
THE REPUBLIC OF TANZANIA

The Study Team submitted twenty (20) copies of the Draft Action Plan Report for the Study on the Zanzibar Irrigation Master Plan (hereinafter referred to as "the Report") to the Ministry of Agriculture, Natural Resources, Environment and Cooperatives (hereinafter referred to as "MANREC"), in accordance with the Minutes of Meeting for the Study signed between MANREC and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on May 9, 2002.

The meeting on the Report was held with the Steering Committee on August 7, 2003. In the meeting, the Study Team explained the contents of the Report and further highlighted the objectives of Action Plan, analysis of Model Irrigation Schemes and selection of Priority Components, special study on major issues identified in problem analysis, and Action Plans for Priority Components and Model Irrigation Schemes. This was followed by discussions on the contents of the Report among the Participants. As the results of the discussions, the contents of the Report were accepted by the Steering Committee. The main issues discussed among Participants and the list of Participants are shown in ANNEXES attached hereto.

Mr.Khalid S. Mohd
Director of Planning and Administration
Ministry of Agriculture, Natural Resources,
Environment and Cooperatives,
Zanzibar
Date: August 8, 2003

Mr. Hitoshi Shimazaki
Leader
The Study Team
Date: August 8, 2003

Eng. A.H.Simba
Chief Counterpart Personnel
Ministry of Agriculture and Food Security.
Mainland
Date: August 8, 2003

(ANNEX I)

Main Issues Confirmed and Agreed at the Meeting

1. Technical Issues

(1) Detailed engineering study should be conducted to justify reliability of water resources, before implementation of the schemes.

(2) Training to farmers should be carried out through normal procedure of MANREC with reference to the training programme proposed in the Draft Action Plan Report.

(3) The MANREC should take necessary actions on legal framework for Water Users' Associations, to execute proper management, operation and maintenance of irrigation facilities by them.

(4) Need of canal lining should be examined from not only technical viewpoint but also economical viewpoint.

(5) It was confirmed that the accumulated irrigation development area by 2020 was estimated based on the results of study on the possibly available financial source and prioritization of irrigation schemes inventorized.

(6) It was agreed that the marketing policy is essential. It should contain quality control and price control for heightening irrigation development effect.

(7) It was agreed that careful attention should be paid on increasing use of agricultural chemicals from environmental viewpoint.

(8) The MANREC requested that Chapter 7 should be excluded from the final version of Action Plan Report due to its inconsistency with the Report.

(9) The MANREC will submit to the Study Team further comments on the Report by the end of August 2003.

2. Operational Issues

(1) The MANREC requested to consider the financial assistance to cover field allowance for counterpart personnel, if the joint execution of Verification Study with the Mainland is realized.

(2) The MANREC should arrange the staff and space enough to keep data collected in the Master Plan and Action Plan Studies, which will be crucial for the coming joint Verification Study on the establishment for simple database and information system in MANREC, if the proposed Verification Study in the Report is accepted by the JICA Headquarters.

(ANNEX II)

List of Participants

1. Tanzanian Side

(1) Steering Committee, Zanzibar

Committee Members

(a)	Mr. Khalid S. Mohd	Director of Planning, MANREC
(b)	Mr. Kassim Biwi	Deputy Commissioner, MANREC
(c)	Dr. Bakari S. Asseid	Director, Department of Cash Crops, Fruits and Forestry
(d)	Mr. Khamis Ussi Ali	Cooperative Registrar, Department of Cooperatives, MANREC
(e)	Mr. Said S. Suleiman	Water Engineer for Director Department of Water, Ministry of Water
(f)	Mr. Abdulrahman Mnoga	Principal Local Government Officer, Ministry of Local Government
(g)	Mr. Hasssan Mohamed	Chief Planning Officer, Ministry of Finance

Ministry of Agriculture, Natural Resources, Environment and Cooperatives

(h)	Mr. Shaaban Abdulmalik	Chief Counterpart Personnel, Commission of Agriculture, Research, Extension, MANREC
(i)	Mr. Mchenga A. Mchenga	Irrigation Engineer (Counterpart), Commission of Agriculture, Research, Extension, MANREC
(j)	Mr. Juma Ali Juma	Counterpart on Organization and Institution, MANREC
(k)	Mr. Ramadhan Aseid	Irrigation Engineer, MANREC
(l)	Mr. Mohammed Omar	Agriculture Mechanization Officer, DARI, MANREC
(m)	Mr. Alawi M. Vuai	Seed Production Officer, DARI, MANREC
(n)	Mr. Hassan A. Hassan	Head of Boreholes and Pumps, DARI, MANREC
(o)	Mr. Andreas S. Mbinga	Irrigation/Rural Infrastructure Engineer (Counterpart), Commission of Agriculture, Research, Extension, MANREC
(p)	Ms. Mansura Mosi	Planning Officer, MANREC
(q)	Mr. Rashid H. Said	Irrigation Engineer, MANREC
(r)	Mr. Mahmoud V. Pandu	Counterpart on Farm Management and Land Use, Commission of Agriculture, Research, Extension, MANREC

(2) Ministry of Agriculture and Food Security, Mainland

(a)	Mr. A.H. Simba	Chief Counterpart Personnel Senior Irrigation Engineer

(b)	Ms. R.A. Kweka	Soil Scientist, MAFS
(c)	Mr. R. Rushomesa	Land Use Planner, MAFS

2. Japanese Side

JICA Tanzania Office

(a)	Mr. H.Kinomoto	Deputy Resident Representative
(b)	Dr.J.Nozala	JICA Expert (Irrigation Advisor, MAFS/MANREC)

JICA Study Team

(a)	Mr. Hitoshi Shimazaki	Leader of JICA Study Team
(b)	Dr. Shuichi Matsushima	Staff
(c)	Dr. Mamoru Osada.	Staff
(d)	Mr. Hiroyasu Ohnuma	Staff
(e)	Mr. Takuya Igawa	Staff
(f)	Mr. Yuki Ishikawa	Staff