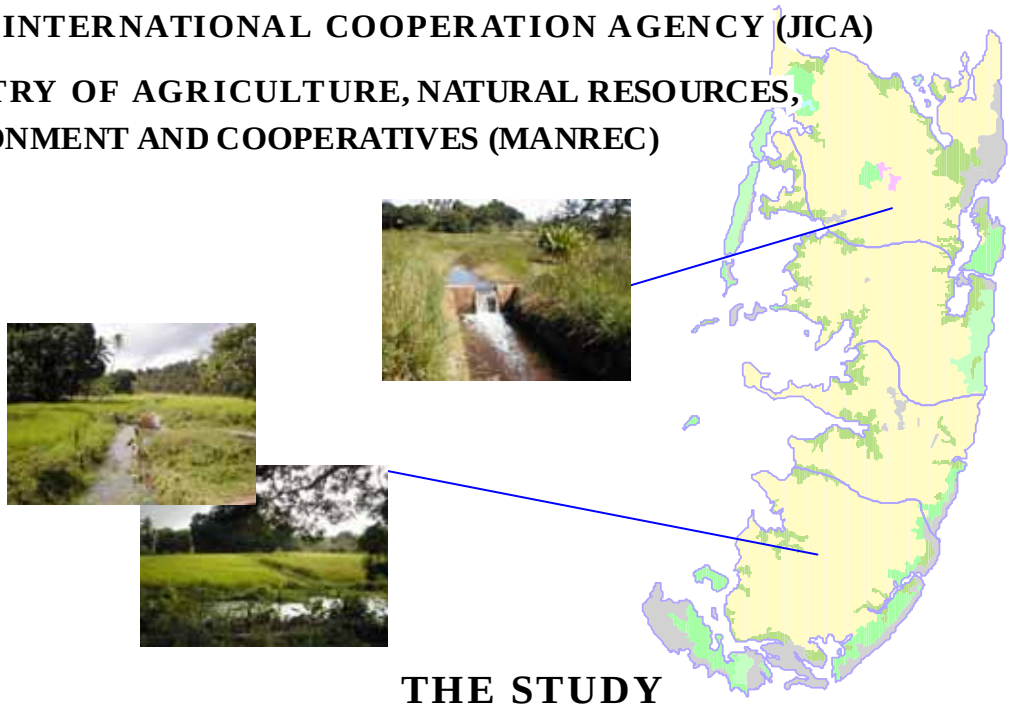
No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

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



THE STUDY

ON

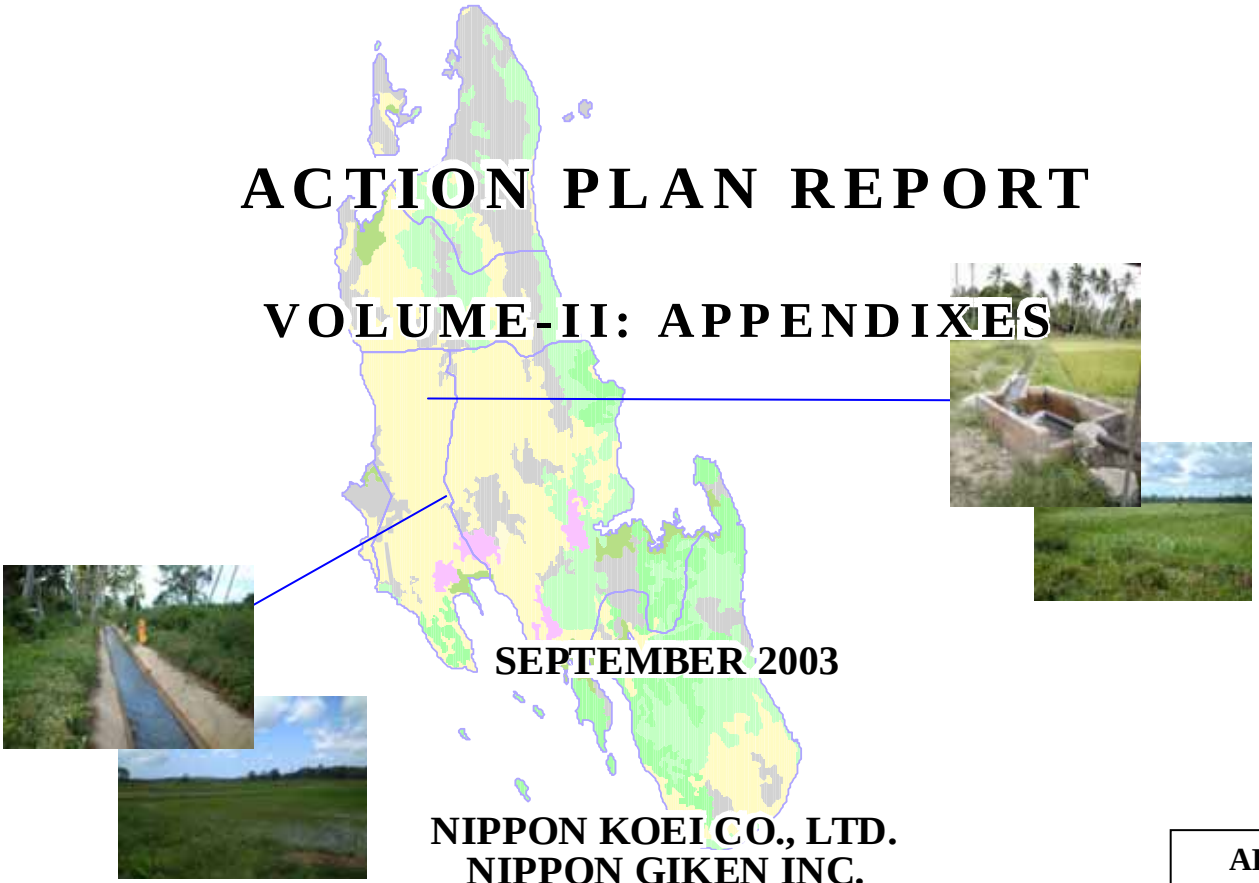
THE ZANZIBAR IRRIGATION MASTER PLAN

IN

THE UNITED REPUBLIC OF TANZANIA

ACTION PLAN REPORT

VOLUME-II: APPENDIXES



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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF AGRICULTURE, NATURAL RESOURCES,
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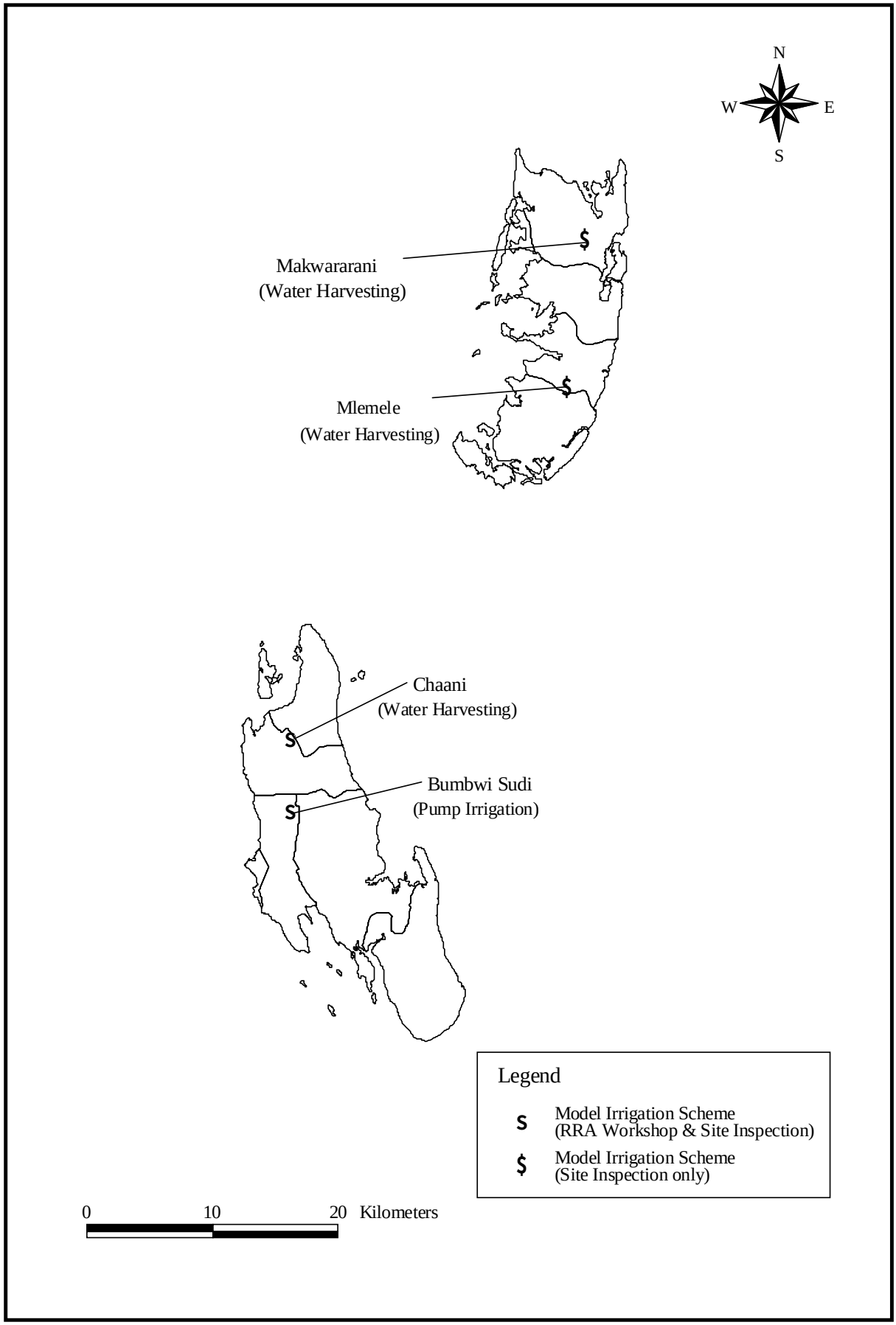

Model Irrigation Schemes in Zanzibar

Appendix A

Project Proposal and Project Design Matrix For Priority Programmes

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

Action Plan Report

Appendix A

Project Proposal and Project Design Matrix for Priority Programmes

Table of Contents

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

(1) Project Proposal

(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) PDM for the Programme	See the attached PDM.
(6) 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
(7) Required Cost	US$ 432 thousand
(8) Executing Agency	DARI, MANREC
(9) Implementation Schedule	One year for the study and one year for implementation of the Programme (July 2004 - June 2006)
(10) Assessment of Possible Problems and Bottlenecks in Implementation	The division of responsibilities for the 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.
(11) Special Arrangements	-

(2) Project Design Matrix

(DARI, RADO and DADO Institutional Improvement Programme) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal The sustainable irrigation development is realized.	– Implementation progress of the ZIMP	– Monitoring and evaluation reports of the ZIMP since 2003	– Other related programmes of ZIMP are vigorously implemented as scheduled.
Project Purpose The DARI, RADO and DADO are institutionally strengthened to execute their mandates successfully for realization of sustainable irrigation development.	– By 2007, institutional improvement of the DARI, RADO and DADO is completed in line with the plan.	– Completion report of the institutional improvement	– Necessary official backup is properly provided to the reformed organizations of the DARI, RADO and DADO so as to function properly by MANREC.
Outputs 1. Institutional improvement plan of the DARI, RADO and DADO is finalized. 2. Their organizational structures are legitimately changed. 3. Personnel changes and, if necessary, recruitment of staff are done in the DARI, RADO and DADO in line with the institutional improvement plan.	1. By 2005, the institutional improvement plan is approved by the Government 2. The institutional improvement of the DARI, RADO and DADO is started in line with the Plan. 3. Capability of each unit in the DARI, RADO and DADO is strengthened to execute its mandates.	1. Note of approval by the Government 2. Progress report of institutional improvement of DARI, RADO and DADO 3. Progress report of institutional improvement of DARI, RADO and DADO	– Other relevant projects for strengthening DARI, RADO and DADO such as the data base improvement project, the policy guidelines in irrigation development project are implemented in parallel.
Activities 1-1 To review previous institutional improvement plans on the DARI, RADO and DADO. 1-2 To prepare a realistic and most effective plan of institutional improvement of the DARI, RADO and DADO. 2-1 To make an implementation plan of legitimate change corresponding to the institutional improvement. 2-2 To execute the implementation plan. 3-1 To make a personnel assignment plan corresponding to the institutional improvement. 3-2 To execute the personnel assignment plan.	**Inputs** **Donor** Task Force 1) Institution 8 M/M 2) Organization 8 M/M 3) Management 8 M/M 4) Legal specialist 6 M/M 5) Irrigation 6 M/M Subject specialist for the subject of task duties (as required) Equipment 1) Computer system L.S. 2) Office equipment L.S. 3) Others L.S. Budget Some part of expenditures of local activities related to the Project.	**GOZ** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Necessary expenditures in internal investigations.	– All necessary arrangement for institutional improvement of the DARI, RADO and DADO is fulfilled by MANREC without substantial delay. **Preconditions** – It is clearly confirmed the necessity of institutional improvement of the DARI, RADO and DADO is recognized by MANREC. – MANREC can provide necessary resources for the project. – The mandates based on the roles and functions of the DARI, RADO and DADO are clearly authorized by the government.

(3) Implementation Schedule

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

	Activities	Expected results	Schedule	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
			2004: 1 2 3 4 5 6 7 8 9 10 11 12 / 2005: 1 2 3 4 5 6 7 8 9 10 11 12 / 2006: 1 2 3 4 5 6 7 8 9 10 11 12					
1	To review of the division of roles and functions of the irrigation development among relevant ministries	Study report		AD (DARI)	Consultants	as required	25	
2	To diagnose the organizational structure and management of the DARI, RADO and DADO	Study report		AD (DARI)	Consultants	as required	49	
3	To Prepare the improvement plan of theDARI, RADO and DADO organizational structure	Study report		AD (DARI)	DARI, Consultants	as required	74	
4	To prepare the personnel rotation system	Study report		AD (DARI)	DARI, Consultants	as required	74	
5	To prepare the training plan of the DARI, RADO and DADO senior staffs for their management skill improvement.	Study report		AD (DARI)	DARI, Consultants	as required	49	
6	To prepare the training plan of the DARI, RADO and DADO senior staffs for their technical skill improvement.	Study report		AD (DARI)	DARI, Consultants	as required	49	
7	Approval of the improvement plan of the ITSD organizational structure	-		AD (DARI)	DARI	as required	25	
8	Implementation of the plan	Follow-up report		AD (DARI)	DARI, Consultants	as required	86	
							432	Total

2. I-2: IA Organizing & Registration Support Manual

(1) Project Proposal

(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 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 prepare 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) PDM for the Programme	See the attached PDM.
(6) 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 Cooperative and Association 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
(7) Required Cost	US$ 420 thousand
(8) Executing Agency	DARI, MANREC
(9) Implementation Schedule	One year for preparation of the manual and one month for training the extension officers (July 2005 – July 2006)
(10) 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.
(11) 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.

(2) Project Design Matrix

(IA Organizing & Registration Support Manual) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized.	– Implementation progress of the ZIMP	– Monitoring and evaluation reports of the ZIMP since 2003	– Other related programmes of ZIMP are vigorously implemented as scheduled.
Project Purpose The Government establishes the backstop mechanism for the farmers' participatory bottom up movement for organizing and registration of the IAs.	– By 2007, the support manual is prepared. – By 2008, the registration ratio of the IAs is improved at over 50% compared with 2002.	– Statistical data based on the reports of the extension officers – Annual sampling survey by the DADO.	– The organizing and registration of IA continue successfully. – Modality and method of registration of IA don't change drastically.
Outputs 1. The support manual for organizing and registration of IA is prepared and provided for the DADOs. 2. The new support manual is expanded to and utilized by every concerned governmental staff, in particular extension service officers.	1. The support manual for organizing and registration of IA is approved officially. 2-1 Relevant staffs in DARI, RADO and DADO recognize the support manual. 2-2 All extension service officers concerned with irrigation development utilize the support manual.	1. Report of the follow-up study on expansion of the support manual 2-1 Report of the follow-up study on organizing and registration of IA. 2-2 Record of extension service officers	– MANREC makes necessary institutional arrangements for introduction and utilization of the support manual successfully without substantial delay. – The other relevant ministries and the LGAs are cooperative for introduction of the support manual
Activities 1-1 To review the existing organizing and registration procedure of the IA 1-2 To make the support manual of organizing and registration of the IA under the present legal framework. 1-3 To prepare a model bylaw and regulations of the IA, which defines the compulsory participation of the members and other necessary items. 2-1 To train staffs of governmental offices concerned with the procedures of organizing and registration of the IA. 2-2 To hold seminars for explanation of the support manual to the DADO' staffs and other stakeholders.	**Inputs** **Donor** Study Team 1) Legal specialist 8 M/M 2) Institution 8 M/M 3) Management 10 M/M 4) Irrigation 8 M/M 5) Facilitator 1 M/M Equipment 1) Vehicles L.S. 2) Office equipment L.S. 3) Others L.S. Budget Some part of expenditures of local activities related to the Project.	**GOZ** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Allowances and expenses of governmental staff training 3) Some portion of the budget for the backstop mechanism.	– The DARI, RADO and DADO will fulfill all necessary arrangements for introduction and utilization of the support manual on schedule. **Preconditions** – It is clearly confirmed the necessity of the support manual of organizing and registration of the IA by the DARI, RADO, DADO and irrigators. – MANREC assigns necessary resources (manpower, budget, technical support) to the project.

(3) Implementation Schedule

Component I-2: IA Organizing & Registration Support Manual

	Activities	Expected results	Schedule	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
			2004: 1 2 3 4 5 6 7 8 9 10 11 12 / 2005: 1 2 3 4 5 6 7 8 9 10 11 12 / 2006: 1 2 3 4 5 6 7 8 9 10 11 12					
1	To review the existing organizing and registration procedure of the IA	Study report		AD (DARI)	Consultants	as required	70	
2	To sum up the IAs' roles and liability for irrigation	Study report		AD (DARI)	DARI, Consultants	as required	70	
3	To prepare a model bylaw and regulations of the IA, which defines the compulsory participation of the members and other necessary items.	Study report		AD (DARI)	DARI, Consultants	as required	140	
4	To make the support manual of organizing and registration of the IA under the present legal framework.	Study report		AD (DARI)	DARI, Consultants	as required	70	
5	Approvement of the manual by the MANREC	Approved Manual		AD (DARI)	DARI	as required	35	
6	To hold seminars for explanation of the support manual to the LGAs' staffs and other stakeholders.	Follow-up report		AD (DARI)	DARI, Consultants	as required	18	
7	To train staffs of governmental offices concerned with the procedures of organizing and registration of the IA.	Follow-up report		AD (DARI)	DARI, Consultants	as required	18	
							420	Total

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

(1) Project Proposal

(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) PDM for the Programme	See the attached PDM.

(6) Contents of Manual	The proposed contents of the report is as follows: **Table of Contents** 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 right, Water charge, Land tenure 4.6 Ownership of the Facilities 4.7 Bylaw 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
(7) Required Cost	US$ 525 thousand
(8) Executing Agency	DARI, MANREC
(9) Implementation Schedule	One year for the study and one year for implementation of the Programme (July 2004 –June 2006)
(10) Assessment of Possible Problems and Bottlenecks in Implementation	A good coordination of the relevant ministries is crucial to the success of the study.
(11) Special Arrangements	The result of the study A3-1 of NIMP is utilized for Zanzibar.

(2) Project Design Matrix

(New Legal Framework for IA Establishment Study) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal The sustainable irrigation development is realized.	– Implementation progress of the ZIMP	– Monitoring and evaluation reports of the ZIMP since 2003	– Other related programmes of ZIMP are vigorously implemented as scheduled.
Project Purpose A new legal framework for the IA is established.	– By 2007, the new legal framework of IA is approved by the Parliament and enacted.	– The Parliament record – Follow-up survey of the project	– Necessary official backup is properly provided to organize and register the IAs under the new legal framework. – New IAs become capable of operating and maintaining the irrigation schemes at the same time.
The Outputs 1. Recommendation of Water Users' Association Act and its draft is finalized. 2. Public awareness of importance of the new legal framework for the IA among stakeholders is promoted.	1. By 2005, establishing the new legal framework for the IA starts in line with the recommendation. 2. Workshop on the new legal framework is held in every Region.	1. Progress report of the new legal framework 2-1 Record of workshop for the stakeholders 2-2 Report of the extension officers in each district.	– MANREC executes the recommendation as planned.
Activities 1-1 To review existing statutory framework relevant to the establishment and functions of IA. 1-2 To execute a comparative study of existing IAs focusing on registered cooperative societies, registered associations and non-registered irrigators' groups. 2-1 To draft legislation for the establishment and functions of the IA. 2-2 To submit a recommendation of IA act establishment. 3-1 To promote the public awareness of importance of the IA for the irrigation development among stakeholders through workshops for them.	**Inputs** **Donor** Task Force 1) Institution 10 M/M 2) Irrigation 10 M/M 3) Legal specialist 15 M/M Subject specialist for the subject of task duties (as required) Equipment 1) Computer system L.S. 2) Office equipment L.S. 3) Others L.S. Budget Some part of expenditures of local activities related to the Project.	**GOZ** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Necessary expenditures in internal investigations.	– Consensus of opinion on the necessity of a new legal framework for the IA is attained among the stakeholders: Irrigators, MANREC, relevant Ministries, NGOs and so forth. **Preconditions** – It is clearly confirmed the necessity of new legal framework for the IA by MANREC. – MANREC provides necessary resources (manpower, budget, technical support) for the project.

(3) Implementation Schedule

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

	Activities	Expected results	Schedule	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
			2004: 1 2 3 4 5 6 7 8 9 10 11 12 / 2005: 1 2 3 4 5 6 7 8 9 10 11 12 / 2006: 1 2 3 4 5 6 7 8 9 10 11 12					
1	To review the existing legal framework for the IA and irrigation development	Study report		AD (DARI)	Consultants	as required	70	
2	To carry out a field survey of the existing IAs in Zanzibar	Study report		AD (DARI)	DARI, Consultants	as required	105	
3	To analize the IAs' roles and liability for irrigation development	Study report		AD (DARI)	DARI, Consultants	as required	105	
4	To prepare the recommendation of a new legal framework for the IA	Study report		AD (DARI)	DARI, Consultants	as required	105	
5	To prepare the implementation plan of a new legal framework for the IA	Study report		AD (DARI)	DARI, Consultants	as required	35	
6	Preparation of the new legal framework	Study report		AD (DARI)	DARI, Consultants	as required	98	
7	Enactment of the new legal framework	Follow-up report		AD (DARI)	DARI	as required	7	
							525	Total

4. I-4: IA Management Training Programme for Farmers

(1) Project Proposal

(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 ZIMP 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) PDM for the Programme	See the attached PDM.
(6) 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

(7) Required Cost	US$ 456 thousand
(8) Executing Agency	DARI, MANREC
(9) 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).
(10) Assessment of Possible Problems and Bottlenecks in Implementation	Good cooperation of ITSD and the LGAs (DALDOs) is a necessary condition for successful implementation of the programme. ITSD 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.
(11) 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.

(2) Project Design Matrix

(IA Management Training Programme for Farmers) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized.	– Implementation progress of the ZIMP	– Monitoring and evaluation reports of the ZIMP since 2003	– Other related programmes of ZIMP are vigorously implemented as scheduled.
Project Purpose The IAs are well managed by the farmers themselves and function well for operation and maintenance of the irrigation schemes	– Well documented record of meetings – Audited financial reports – Improved participation ratio of irrigators in the IAs	– Follow-up survey of the project – Statistical data based on reports of the extension officers in each district.	– MANREC and the LGAs continuously put the high priority on the project and the ZIMP.
Outputs 1.The government prepares the training programme of the IA management for the IA leaders. 2. IA leaders take the training courses based on the programme.	1. By the mid 2006 the training programme for the IA leaders is prepared by the Government. 2. By 2007 more than 80% of the registered IA leaders take the training courses.	1. The final report of the training program formation study. 2. Record of the training program: the number of the successfully completed participants in the training courses.	– Trained leaders continue to work for their IAs. – The training program is implemented without substantial delay. – IA leaders are also well prepared to operate and to maintain the irrigation schemes efficiently.
Activities 1-1. To review the present performance of IA management and the problems. 1-2. To identify necessary items for the training programme. 1-3. To prepare the training programme for the IA management for IA leaders. 2-1.To design an organizational setup for implementation of the training program. 2-2.To provide IA leaders with the training services through the setup.	**Inputs** **Donor** Consultant Team 1) IA Management 14 M/M 2) Institution 10 M/M 3) Irrigation 6 M/M 4) Training Plan 6 M/M 5) Facilitator 2 M/M Subject specialist for the subject of task duties (as required) Equipment 1) Office equipment L.S. 2) Others L.S. Budget Some part of expenditures of local activities related to the Project.	**GOZ** Personnel 1) Counterparts in each subject 2) Training Staffs Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Cost of the project management. Facilities 1) Training facilities	– Good coordination of DARI, DADOs and other relevant institutions are attained for the project. **Preconditions** – It is clearly confirmed the necessity of IA management training for the IA leaders by the DARI, DADOs and irrigators. – MANREC assigns necessary resources (manpower, budget, technical support) to the project.

(3) Implementation Schedule

Component I-4: IA Management Training Programme for Farmers

	Activities	Expected results	Schedule 2004 (1–12)	Schedule 2005 (1–12)	Schedule 2006 (1–12)	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1	To review the present performance of IA management and the problems.	Study report				AD (DARI)	Consultants	as required	46	
2	To confirm the roles and functions of the IA for irrigation development.	Study report				AD (DARI)	DARI, Consultants	as required	46	
3	To identify necessary items for the training programme.	Study report				AD (DARI)	DARI, Consultants	as required	23	
4	To prepare a model bylaw and regulations of the IA	Study report				AD (DARI)	Consultants	as required	46	
5	To prepare the training manual and programme for the IA management for IA leaders.	Study report				AD (DARI)	Consultants	as required	91	
6	To design an organizational setup for implementation of the training program.	Study report				AD (DARI)	Consultants	as required	46	
7	Approval of the training manual and programme for the IA management and the organizational setup	-				AD (DARI)	DADOs, DARI	-	23	
8	To provide IA leaders with the training services through the setup	Follow-up report				AD (DARI)	DADOs, DARI, Consultants	as required	137	
									456	Total

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

(1) Project Proposal

<table>
<tr><td>(1) Title of Programme</td><td>Regularization of Irrigation Administration and DARI Working Mandate Formulation Programme (Code No. II-1)</td></tr>
<tr><td>(2) Location</td><td>Zanzibar</td></tr>
<tr><td>(3) Objectives</td><td>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 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) PDM for the Programme</td><td>See the attached PDM</td></tr>
<tr><td>(6) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Procurement</th><th>Providing of manpower and training</th><th>Remarks</th></tr>
<tr><td>To review previous laws and rules concerning to the irrigation administration.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td></td></tr>
<tr><td>To prepare a draft of regulations of irrigation administration.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td></td></tr>
<tr><td>To adjust inconsistencies of the draft of the regulations with other related regulations and irrigation development policy.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td>Certain committee collaborating other concerned authorities should be organized.</td></tr>
<tr><td>To finalize the draft of regulations of irrigation administration.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td></td></tr>
</table></td></tr>
</table>

	To review previous missions for the DARI of MANREC.	Not specified	- Consultants having required ability and faculty	
	To prepare a plan of new mission statement of DARI of MANREC.	Not specified	- Consultants having required ability and faculty	Link to the Subject-wise **programme I-1**
	To finalize the plan of mission	Not specified	- Consultants having required ability and faculty	
	To study demands to be included into the new duties standard of DARI of MANREC.	Not specified	- Consultants having required ability and faculty	
	To review previous duties of DARI of MANREC.	Not specified	- Consultants having required ability and faculty	
	To finalize a plan of task duty standards of DARI of MANREC.	Not specified	- Consultants having required ability and faculty	
	To conceptualize official procedures of schemes selection and implementation.	Not specified	- Consultants having required ability and faculty	
	To formalize each process of the scheme implementation in consideration with the finalized features of DARI of MANREC and other related organizations and regulations.	Not specified	- Consultants having required ability and faculty	
	To prepare written rule on the formalities on scheme implementation.	Not specified	- Consultants having required ability and faculty	
(7) Required Cost	US$ 300 thousand			
(8) Executing Agency	DARI of MANREC			
(9) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)			
(10) Assessment of Possible Problems and Bottlenecks in Implementation	mall-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.			
(11) 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.			

(2) Project Design Matrix

(Regularization of Irrigation Administration and DARI Working Mandate Formulation Programme) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well performance of DARI in accordance with the regulations of irrigation and DARI mandate	Performance of DARI is improved. ZIMP is fulfilled almost on schedule.	Progress Reports of ZINP since 2004	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Irrigation administration of Tanzania is regulated. And proper waking mandate of DARI is regulated and started to apply.	By January 2006, regulations of irrigation administration are made effective. By January 2006, the DARI working mandate is approved by the Government. By January 2006, the DARI start to work fully under the working regulation.	Application notice of Zanzibar Government Note of approval by the Government Result of work investigation for DARI	Irrigation development is progressed obeying those irrigation regulations. Organization of DARI is re-structured as proposed in other institutional improvement programme. Necessary official back-up is properly provided to DARI so as to maintain the application of the mandate.
Outputs 1. Regulations of irrigation administration are established. 2. Mission statement of DARI is established. 3. Task duties of DARI is established in line with the Mission statement of DARI.. 4. Procedures on scheme implementation are systemized and formalized.	 The mission statement of DARI is approved and proclaimed by the Government. The mission statement of DARI is approved and proclaimed by the Government. By January 2006, the task duties of DARI is in effective.	 Concerned Zanzibar Government Circular Record of official proclamation Report on-the-spot investigation.	Concerned personnel and organizations in irrigation administration become familiar with the regulations Staff of DARI is filled up or replaced to meet the requirement in the Mission statement. The systemized formalities of scheme implementation will become a rule for common use to the related actors.
Activities 1-1 Review previous lows and rules. 1-2 Prepare a draft of regulations of irrigation administration.	**Inputs** **Donor** Preparation Team 1) Task management 6 months 2) System operation 6 months 3) Institution 6 months 4) Juristic specialist 6 months	**GOT** Personnel 1) Counterparts in each subject	All necessary arrangement for installation of databases will be fulfilled on schedule by concerned section in MANREC.

1-3 Adjust inconsistencies of the draft of the regulations with other related regulations and irrigation development policy. 1-4 Finalize the draft of regulations of irrigation administration. 2-1 Review previous mission for the DARI. 2-2 Prepare a plan of new mission statement of DARI. 2-3 Finalize the plan of mission statement of DARI. 3-1 Study demands to be included into the new duties standard of DARI. 3-2 Review previous duties of DARI. 3-3 Finalize a plan of task duties standard of DARI. 4-1 Conceptualize official procedures of schemes selection and implementation. 4-2 Formalize each process of the scheme implementation in consideration with the finalized feature of DARI and other related organizations and regulations. 4-3 Prepare a written rules on the formalities on scheme implementation.	Subject specialist for the subject of task duties (as required) Equipment 1) Computer system L.S. 2) Office equipment L.S. 3) Others L.S. Budget Some part of expenditures in local activities related to the Project.	Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Necessary expenditures in internal investigations.	**Preconditions** It is clearly confirmed the needs of establishment of certain task duties standard of DARI is recognized in MANREC. MANREC can provide necessary resources to DARI so that DARI works as required in new mission statement.

(3) Implementation Schedule

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

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Review previous lows and rules on irrigation administration.	Review note																									PS(MANREC) HD(DARI)	Consultants		30	
1-2	Prepare a draft of regulations of irrigation administration.	Plan of Regulations (Draft)																									HD(DARI)	Consultants		30	
1-3	Adjust inconsistencies of the draft of the regulations with other related regulations and irrigation development policy.	Study report (implied)																									HD(DARI)	Consultants		30	
1-4	Finalize the draft of regulations of irrigation administration.	Plan of Regulations (Final)																									PS(MANREC) HD(DARI)	Consultants		15	
2-1	Review previous mission for the DARI.	Review note																									HD(DARI)	Consultants		35	
2-2	Prepare a plan of new mission statement of DARI	Mission Statement (Draft)																									HD(DARI)	Consultants		15	
2-3	Finalize the plan of mission	Mission Statement (Final)																									PS(MANREC) HD(DARI)	DARI		10	
3-1	Study demands to be included into the new duties standard of DARI	Study report(implied)																									HD(DARI)	Consultants		15	
3-2	Review previous duties of DARI.	Review note																									HD(DARI)	Consultants		15	
3-3	Finalize a plan of task duties standard of DARI.	Plan of task Duties Standard																									PS(MANREC) HD(DARI)	DARI		10	
4-1	Conceptualize official procedures of schemes selection and implementation.	Concept note																									HD(DARI)	Consultants		30	
4-2	Formalize each process of the scheme implementation in consideration with the finalized feature of DARI and other related organizations and regulations.	Regular Forms for Scheme Implementation																									HD(DARI)	DARI, Consultants		45	
4-3	Prepare a written rules on the formalities on scheme implementation.	Rules on the formalities on scheme implementation																									PS(MANREC) HD(DARI)	Consultants		20	
																														300	

6. III-1: Survey and Investigation Guideline Establishment Programme

(1) Project Proposal

(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) PDM for the Programme	See the attached PDM
(6) Contents of Guidelines	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 2.2.1 Plain survey 2.2.2 River and route survey 2.2.3 Profile leveling survey 2.2.4 Specified survey 2.3 GIS mapping 2.3.1 GIS instrument 2.3.2 GIS system and software 2.3.3 GIS data 3. Geology 3.1 Geologic survey 3.2 Boring 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 5.1.1 River system and morphology 5.1.2 River discharge 5.1.3 Sediment transportation 5.1.4 River water quantity and living in the water 5.1.5 Aquatic environment 5.1.6 Water abstraction, swage and water navigation 5.1.7 Discharge measurement 5.2 Ground water 5.2.1 Aquifers and water yield 5.2.2 Boring and physical prospecting 5.2.3 Uplifting tests 5.2.4 Studies for uplifting affects against present boreholes 5.2.5 Groundwater quality 5.3 Lakes 5.3.1 Water availability studies 5.3.2 Lake water uses 5.3.3 Water contamination and water quality 5.4 Other water sources 5.5 Water quality tests 5.6 Surveys for water uses 5.7 Water rights 5.7.1 Registration on water uses 5.7.2 Acquisitive procedures of water rights 5.7.3 Maintaining and updating of obtained 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 8.1 Executing organization 8.2 Operation and services 8.3 Executing costs 8.4 Reporting of field investigations and surveys 8.5 Evaluation of the results 9. Additional Information and Data for Irrigation Planning ANNEX

(7) Required Cost	Not specified
(8) 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.
(9) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)
(10) 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.
(11) 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.

(2) Project Design Matrix

(Survey and Investigation Guideline Establishment) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well utilizing of the survey guideline.	By the mid 2005, the survey guideline is utilized at the stage of survey and investigation for 80 % of irrigation schemes newly planned by DARI and districts since 2002.	Investigation Reports for new irrigation scheme from 2002 to 2005	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Survey and Investigation(S&I) Guideline which is convenient for survey and investigation of new irrigation planning is completed A copy of the S&I Guideline is placed in each district and section related irrigation development. .	a) By May 2005, completed S&I Guideline is approved by officials concerned. b) In June 2005, delivered copies of the S&I Guideline are confirmed popularity in their sections (positive for more than 80 %).	Official document on approval of the S&I Guideline. Report on-the-spot investigation (An on-the spot investigation shall be taken)	Good circumstance for utilization of the S&I Guideline is maintained. When revised the S&I Guideline, delivered one should be replaced smoothly.
Outputs 1. Fields and its level of survey and investigation to meet requirement for the S&I Guideline are decided. 2. A S&I Guideline is prepared. 3. Handling manual for the S&I Guideline is prepared. 4. Copy of the S&I Guideline is delivered to each district and section related irrigation development.	All fields and survey items contained into previous similar instructions are included in the S&I Guideline. By April 2005, the S&I Guideline is completed for its preparation. By June 2005 or before starting of guideline delivering, the handling manual is completed for its preparation. By the mid 2005, the guideline is completely delivered.	Result of interview survey to personnel concerned to on the needs of preparation of S&I Guideline for irrigation development S&I Guideline Handling manual Record of delivery of the S&I Guideline	Districts and concerned agencies have technical capability and financial resource to fully conduct survey and/or investigation designated into the S&I Guideline. Management system of the S&I Guideline exists and function properly in every concerned agencies.
Activities 1-1 Study previous failures in planning and designing due to lack of necessary survey and investigation. 1-2 Study requirement for survey and investigation for irrigation development.	**Inputs** **Donor** Preparation Team 1) Coordinator 6 months 2) Irrigation 3 months 3) Meteo-hydrology 3 months 4) Topo-survey 3 months 5) Hydraulics 3 months 6) Geology 3 months	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S.	All necessary arrangement for the stationing of the system will be fulfilled on schedule by any reliable parties concerned.

2 Prepare the S&I Guideline reflecting identified requirement for the guideline. 3-1 Plan a management and utilizing system of the guideline. 3-2 Prepare the handling manual in line with the management plan. 4 Transport copies of the S&I Guideline to the agencies designated in the management plan.	7) Land use, GIS 3 months 8) Agronomy 3 months 9) Environment 3 months Equipment 1) Vehicles L.S. 2) GIS L.S. 3) Survey equipment L.S. 4) Others L.S. Budget Some part of expenditures in local activities related to the Project.	Budget 1) Salaries and necessary expenses for counterparts 2) Some portion of the budget for publication of the Guideline 3) Necessary expenditures in operation of the system	**Preconditions** It is clearly confirmed the needs of preparation of the S&I Guideline is recognized in local government agencies and private groups.

(3) Implementation Schedule

Component III-1: Survey and Investigation Guideline Establishment Programme

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Study previous failures in planning and designing due to lack of necessary survey and investigation.	Study report																									AD(IS)	Consultants		-	
1-2	Study requirement for survey and investigation for irrigation development.	Study report																									AD(IS)	Consultants		-	
2-1	Prepare the S&I Guideline reflecting identified requirement for the guideline.	S&I Guideline																									D(ITSD) AD(IS)	IS, Consultants		-	
3-1	Plan a management and utilizing system of the guideline..	Plan of management and utilizing system																									AD(IS)	Consultants	Survey and GIS equipment	-	
3-2	Prepare the handling manual in line with the management plan..	Handling rules																									AD(IS)	Consultants		-	
4-1	Transport copies of the S&I Guideline to the agencies designated in the management plan.	Placement of S&I Guideline																									AD(IS)	IS		-	

7. III-2 (1): Planning Guideline Establishment Programme

(1) Project Proposal

(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, a planning is the fundamental activity controlling fate of project. There find many irrigation projects which failed due to improper planning. Strengthening of skills in irrigation planning is an urgent need, and establishment and full utilization of a proper planning guideline is essential accordingly. Several technical guidelines and manuals have been prepared for the specified projects. However, these are not widely and effectively utilized in irrigation development. It causes from inadequacy of knowledge management system or failure of information delivering and circulating arrangement. As to the existing technical manuals and guidelines, there is still a room to improve contents in the existing guidelines and manuals. For instance, the existing technical guidelines and manuals show a tendency toward only introduction and explanation for technical subject item-by-item derived from international technical guidelines. In addition, these scarcely present the description on irrigation development level. 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) PDM for the Programme	See the attached PDM
(6) Contents of Guidelines	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 5.1 Estimation Procedure of Crop Water Requirement 5.2 Water Requirement for Land Preparation and Sowing 5.3 Estimation of Reference Evapo-transpiration (ETo) 5.3.1 Estimation Method of Reference Evapo-transpiration 5.3.2 Necessary data and Information 5.3.3 Practical Calculation of ETo 5.4 Other Additional Water Requirement 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 7.2.1 Surface Gravity Method 7.2.2 Sub-surface Method 7.2.3 Splay and Drip Method 7.2.4 Other Method 7.3 Irrigation Categories 7.3.1 Canal Irrigation 7.3.2 Pump Irrigation 7.3.3 Water Harvesting 7.3.4 Watering 7.4 Classification of Irrigation Schemes 7.4.1 Traditional Irrigation Scheme 7.4.2 Water harvesting Scheme 7.4.3 Modern Irrigation Scheme 7.4.4 Improved Traditional Irrigation Scheme 7.5 Irrigation Systems 7.5.1 Intake Structures 7.5.2 Canal System 7.5.3 On-Farm Facilities 7.5.4 Dam and Reservoir 7.5.5 Pump System 7.5.6 Others 8. Irrigation Development Levels 8.1 Definition of Irrigation Development Level 8.2 Classification of Irrigation 8.3 Indicators of Irrigation Development Level 8.4 General Features of the Indicators 8.5 References for Adoption of the Indicators 8.6 Additional Remarks 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 System 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 12.1 Concept 12.2 Method 12.3 Execution 12.4 Monitoring and Evaluation 13. Considerations in the Environment 13.1 Environmental Issues 13.2 Environmental Impacts caused by Irrigation 13.3 Mitigating Measures 13.4 Necessary Considerations 14. River-basin Management in Irrigation 14.1 Concept 14.2 Establishment of Management Organization of Irrigators 14.3 Activities of River-basin Management in Irrigation 14.4 Negotiation with River-basin Offices 14.5 Protecting Measures of Existing Irrigation Water Use 15. Additional Information and Data for Irrigation Planning
(7) Required Cost	Not specified
(8) 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.
(9) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2007
(10) 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.
(11) 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.

(2) Project Design Matrix

(Planning Guideline Establishment) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well utilizing of the planning guideline.	By the mid 2006, the planning guideline is utilized at the stage of planning for 80 % of irrigation schemes newly planned by DARI and districts since 2002.	Planning Reports for new irrigation scheme from 2002 to 2005	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Planning Guideline which is convenient for planning of new irrigation scheme is completed A copy of the Planning Guideline is placed in each district and section related irrigation development. .	a) By May 2005, completed Planning Guideline is approved by officials concerned. b) By the mid 2005, delivered copies of the Planning Guideline are confirmed popularity in their sections (positive for more than 80 %).	Official document on approval of the Planning Guideline. Report on-the-spot investigation (An on-the spot investigation shall be taken)	Good circumstance for utilization of the Planning Guideline is maintained. When revised the Planning Guideline, delivered one should be replaced smoothly.
Outputs 1. Fields and its level of planning and decision making to meet requirement for the Planning Guideline are decided. 2. A Planning Guideline is prepared. 3. Handling manual for the Planning Guideline is prepared. 4. Copy of the Planning Guideline is delivered to each district and section related irrigation development.	All fields and technical items contained into previous similar instructions are included in the Planning Guideline. By May 2005, the Planning Guideline is completed for its preparation. By June 2005 or before starting of guideline delivering, the handling manual is completed for its preparation. By the mid 2005, the guideline is completely delivered.	Result of interview survey to personnel concerned on the needs of preparation of Planning Guideline for irrigation development Planning Guideline Handling manual Record of delivery of the Planning Guideline	Districts and concerned agencies have technical capability and financial resource to fully conduct planning and/or decision making designated into the Planning Guideline. Management system of the Planning Guideline exists and functions properly in every concerned agencies.

Activities	**Inputs**			
1-1 Study previous failures in planning and designing due to lack of necessary technology in planning. 1-2 Study requirement for planning and decision making for irrigation development. 2 Prepare the Planning Guideline reflecting identified requirement for the guideline. 3-1 Plan a management and utilizing system of the guideline.. 3-2 Prepare the handling manual in line with the management plan.. 4 Transport copies of the Planning Guideline to the agencies designated in the management plan.	**Donor** Preparation Team 1) Planning 6 months 2) Irrigation 6 months 3) Meteo-hydrology 6 months 4) River/Watershed 6 months 4) Topo-survey 3 months 5) Hydraulics 6 months 6) Geology 3 months 7) Land use, GIS 6 months 8) Agronomy 6 months 9) Environment 3 months 10)Participation 6 months Equipment 1) Vehicles L.S. 2) GIS L.S. 3) Others L.S. Budget Some part of expenditures in local activities related to the Project.	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Some portion of the budget for publication of the Guideline 3) Necessary expenditures in operation of the system	All necessary arrangement for the stationing of the management system of the guideline will be fulfilled on schedule by any reliable parties concerned. **Preconditions** It is clearly confirmed the needs of preparation of the Planning Guideline is recognized in local government agencies and private groups.

(3) Implementation Schedule

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

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (thotsand US$)	Remarks
1-1	Study previous failures in planning and designing due to lack of necessary technology in planning.	Study report																									AD(IS)	Consultants		-	To be referred the result of Action Plan
1-2	Study requirement for planning and decision making for irrigation development.	Study report																									AD(IS)	Consultants		-	
2-1	Prepare the Planning Guideline reflecting identified requirement for the guideline.	Planning Guideline																									AD(IS)	IS, Consultants		-	
3-1	Plan a management and utilizing system of the guideline.	Plan of management and utilizing system																									AD(IS)	Consultants		-	
3-2	Prepare the handling manual in line with the management plan.	Handling rules																									AD(IS)	Consultants		-	
4-1	Transport copies of the Planning Guideline to the agencies designated in the management plan.	Placement of Planning Guideline																									AD(IS)	IS		-	

8. III-2 (2): Design Guideline Establishment Programme

(1) Project Proposal

(1) Title of Programme	Design Guideline Establishment Programme (Code No. III-2(2))
(2) Location	Mainland 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 So far, several technical guidelines were prepared in relation to the specified projects. However, existing technical guidelines and manuals are not utilized in irrigation development widely and effectively. It causes from inadequacy of knowledge management system or failure of information delivering and circulating. In addition, contents of the existing references might have a room to be improved. The existing technical guidelines and manuals composed of introduction and explanation for technical subject item-by-item diverting from international technical guidelines. Those existing technical references also scarcely mention the aspect on appropriate technology and proper irrigation development level and so on. 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) PDM for the Programme	See the attached PDM.
(6) Contents of Guidelines	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation systems 2.1 Water source system 2.2 Irrigation system layout 2.2.1 Main canal 2.2.2 Secondary canal 2.2.3 Tertiary canal 2.2.4 Distribution canal 2.3 On-farm facilities and equipment 2.3.1 Gravity surface irrigation 2.3.2 Pressured irrigation

	2.4 Drainage systems 2.4.1 Drainage system layout 2.4.2 Drainage canal for surface drainage system 2.4.3 Sub-surface drainage 2.4.4 Pump drainage 3. Canal structures 3.1 Irrigation channels 3.1.1 Canal cross-section 3.1.2 Hydraulic design 3.1.3 Sectional properties of canal section 3.1.4 Bed gradient and longitudinal profile 3.1.5 Canal alignment 3.2 Canal lining 3.2.1 Selection of type of lining 3.2.2 Cast in situ concrete lining 3.2.3 Precast concrete tile lining 3.2.4 Lining in expansive soils 3.3 Conveyance structures 3.3.1 Inverted canal siphons 3.3.2 Elevated flumes 3.3.3 Road crossings 3.3.4 Drops/chutes 3.4 Protective structures 3.4.1 Culverts 3.4.2 Overchutes 3.4.3 Drain inlets 3.4.4 Wasteways 3.5 Regulating structures 3.5.1 Head regulators 3.5.2 Checks 3.5.3 Silt control devices 3.6 Water measurement structures 3.6.1 Parshall flumes 3.6.2 Constant head orifice 3.7 Other related structures 4. Diversion weirs 4.1 Type of weirs and layout of a diversion weir 4.2 Hydraulic design 4.2.1 Hydraulic jump 4.2.2 Design against seepage 4.2.3 Hydraulic design of other weirs portion 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 5.2.1 Cross-section of dam body 5.2.2 Related structures 5.2.3 Reservoir protection 5.3 Fill dams 5.3.1 Embanking materials 5.3.2 Cross-section of dam body 5.3.3 Related structures 5.3.4 Reservoir protection 5.4 Water impounding 6. Boreholes and Wells 6.1 Evaluation of water demand and aquifer 6.2 Drilling methods 6.3 Design of boreholes

	6.4 Power source of wells 6.5 Design of wells 6.6 Water delivery 6.7 Related equipment of boreholes and wells 7. Pump stations 7.1 Design of pump equipment 7.1.1 Design of suction and delivery water level and pumping head 7.1.2 Design pumping discharge 7.1.3 Design of pump equipment 7.1.4 Design of power source 7.1.5 Design of related equipment 7.1.6 Countermeasures against water hammer 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 9.2.1 Design of under-drain 9.2.2 Design of drain system 9.2.3 Design of vertical drainage 9.3 Design for surface drainage 9.3.1 Design of surface drain 9.3.2 Design of open-channel drainage 9.3.3 Design of outlet system 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 11.1 Design of field lots 11.2 Design of farm roads 11.3 Design of on-farm irrigation and drainage 11.4 Sub-soil improvement works 11.5 Design of land re-plotting 12. River control and training 12.1 River training works 12.2 Design of river control structures 12.3 Bank revetment works 12.4 Sediment control works 12.5 Temporary works 13. Other references ANNEX
(7) Required Cost	Not specified
(8) 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.

(9) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)
(10) 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.
(11) 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.

(2) Project Design Matrix

(Designing Guideline Establishment) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well utilizing of the Designing guideline.	By the mid 2006, the designing guideline is utilized at the stage of planning for 80 % of irrigation schemes newly planned by DARI and districts since 2002.	Design Reports for new irrigation scheme from 2002 to 2006	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Designing Guideline which is convenient for designing of new irrigation scheme is completed A copy of the Designing Guideline is placed in each district and section related irrigation development. .	a) By May 2005, completed Designing Guideline is approved by officials concerned. b) In the mid 2005, delivered copies of the Designing Guideline are confirmed popularity in their sections (positive for more than 80 %).	Official document on approval of the Designing Guideline. Report on-the-spot investigation (An on-the spot investigation shall be taken)	Good circumstance for utilization of the Designing Guideline is maintained. When revised the Designing Guideline, delivered one should be replaced smoothly.
Outputs 1. Fields and its level of designing of irrigation system to meet requirement for the Designing Guideline are decided. 2. A Designing Guideline is prepared. 3. Handling manual for the Designing Guideline is prepared. 4. Copy of the Designing Guideline is delivered to each district and section related irrigation development.	All fields and technical items contained into previous similar instructions are included in Designing Guideline. By May 2005, the Designing Guideline is completed for its preparation. By June 2005 or before starting of guideline delivering, the handling manual is completed for its preparation. By the mid 2005, the guideline is completely delivered.	Result of interview survey to personnel concerned on the needs of preparation Designing Guideline for irrigation development Designing Guideline Handling manual Record of delivery of the Designing Guideline	Districts and concerned agencies have technical capability and financial resource to fully conduct designing designated into the Designing Guideline. Management system of the Designing Guideline exists and function properly in every concerned agencies.

Activities

1-1 Study previous failures in designing and construction due to lack of necessary technology in designing.

1-2 Study requirement for designing for irrigation development.

1-3 Review previous designing guidelines prepared by any other projects/programmes.

2 Prepare the Designing Guideline reflecting identified requirement for the guideline.

3-1 Plan a management and utilizing system of the guideline..

3-2 Prepare the handling manual in line with the management plan..

4 Transport copies of the Designing Guideline to the agencies designated in the management plan.

Inputs

Donor

Preparation Team

1) Irrigation system	6 months
2) Structure	6 months
3) Hydraulics	6 months
4) River/Watershed	6 months
5) Structure design	6 months
6) Geology	3 months
7) Land use, GIS	6 months
8) Agronomy	6 months
9) Environment	3 months
10)participation	4 months

Equipment

1) Vehicles	L.S.
2) GIS	L.S.
3) Others	L.S.

Budget

Some part of expenditures in local activities related to the Project.

GOT

Personnel

1) Counterparts in each subject

Equipment

1) Office	L.S.
2) Others	L.S.

Budget

1) Salaries and necessary expenses for counterparts
2) Some portion of the budget for publication of the Guideline
3) Necessary expenditures in operation of the system

All necessary arrangement for the stationing of the management system of the guideline will be fulfilled on schedule by any reliable parties concerned.

Preconditions

It is clearly confirmed the needs of preparation of the Designing Guideline is recognized in local government agencies and private groups.

(3) Implementation Schedule

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

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Study previous failures in designing and construction due to lack of necessary technology in designing.	Study report																									AD(IS)	Consultants		-	
1-2	Study requirement for designing for irrigation development.	Study report																									AD(IS)	Consultants		-	
1-3	Review previous designing guidelines prepared by any other projects/programmes.	Review note																									AD(IS)	Consultants		-	
2-1	Prepare the Designing Guideline reflecting identified requirement for the guideline.	Designing Guideline																									AD(IS)	IS, Consultants		-	
3-1	Plan a management and utilizing system of the guideline..	Plan of management and utilizing system																									AD(IS)	Consultants		-	
3-2	Prepare the handling manual in line with the management plan..	Handling rules																									AD(IS)	Consultants		-	
4-1	Transport copies of the Designing Guideline to the agencies designated in the management plan.	Placement of Designing Guideline																									AD(IS)	IS		-	

9. III-3 (1): Operation and Maintenance (O&M) Guideline Establishment Programme

(1) Project Proposal

(1) Title of Programme	Operation and Maintenance (O&M) 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 adequate operation and maintenance of existing irrigation system for sustainable achievement of effective irrigation in new irrigation schemes and rehabilitation existing irrigation schemes. 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) PDM for the Programme	See the attached PDM
(6) Contents of Guidelines	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 2.3.1 Farmers 2.3.2 LGAs 2.3.3 Central government 2.4 Water rights 2.4.1 Registration system of water right 2.4.2 Obtaining procedure of irrigation water right 2.4.3 Maintain of irrigation water right 2.4.4 Water right and river basin management 2.5 Role of water management 2.5.1 Activities in surface irrigation 2.5.2 Activities in sub-surface irrigation 2.5.3 Conjunctive use of surface and ground water 3. Water users organizations 3.1 Playing the role of water users organizations 3.2 Legal system of irrigation organizations

	3.3 Typical model of irrigation organizations 3.4 Formation of irrigation organizations 3.5 Performance of irrigation organizations 3.6 Monitoring of organization activities 4. Sources of water 4.1 Preservation of water sources 4.1.1 River water 4.1.2 Groundwater 4.1.3 Lake water 4.1.4 Rainwater harvesting 4.1.5 Others 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 7.1 Dam and reservoir 7.2 Intake structures 7.3 Irrigation channels 7.4 Water delivering structures 7.5 Watering and water spreading facilities 7.6 Pump facilities 7.7 Boreholes 7.8 Water harvesting facilities 8. Drainage 8.1 Sub-surface drainage facilities 8.2 Drainage channels 8.3 Others 9. Environmental issues in irrigation systems 9.1 Environmental hazards on river water regime 9.2 Environmental hazards like waterlogging 9.3 Environmental hazards on biological aspects 9.4 Environmental hazards on human health 9.5 Environmental hazards on natural conditions 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 ANNEX 1 Related information on O&M 2 Concerned agencies and organization in irrigation 3 Applicable existing training courses of irrigation management 4 Laws and regulations concerning about irrigation

(7) Required Cost	Not specified
(8) 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.
(9) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2005 – June 2006)
(10) 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.
(11) 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.

(2) Project Design Matrix

(Operation and Maintenance (O&M) Guideline Establishment) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well utilizing of the O&M guideline.	By the mid 2006, the O&M guideline is utilized at the stage of operation for 80 % of irrigation schemes newly planned by DARI and districts since 2002.	Operation Reports for new irrigation scheme from 2002 to 2006	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose O&M Guideline which is convenient for the works of operation and maintenance of any irrigation schemes is completed. A copy of the O&M Guideline is placed in each district and section related irrigation development.	a) By June 2006, completed O&M Guideline is approved by officials concerned. b) In June 2006, delivered copies of the O&M Guideline are confirmed popularity in their sections (positive for more than 80 %).	Official document on approval of the O&M Guideline. Report on-the-spot investigation (An on-the spot investigation shall be taken)	Good circumstance for utilization of the O&M Guideline is maintained. When revised the O&M Guideline, delivered one should be replaced smoothly.
Outputs 1. Fields and its level of works in O&M of irrigation system to meet requirement for the O&M Guideline are decided. 2. A O&M Guideline is prepared. 3. Handling manual for the O&M Guideline is prepared. 4. Copy of the O&M Guideline is delivered to each district and section related irrigation development.	All technical and sociological items contained into previous similar instructions are included in O&M Guideline. By June 2006, the O&M Guideline is completed for its preparation. By June 2006 or before starting of guideline delivering, the handling manual is completed for its preparation. By the mid 2006, the guideline is completely delivered.	Result of interview survey to personnel concerned on the needs of preparation O&M Guideline for irrigation development O&M Guideline Handling manual Record of delivery of the O&M Guideline	Districts and concerned farmers groups have technical capability and financial resource to fully conduct O&M designated into the O&M Guideline. Management system of the O&M Guideline exists and function properly in every concerned agencies.
Activities 1-1 Study previous failures in operation and maintenance due to lack of necessary technology in O&M. 1-2 Study requirement for operation and maintenance for irrigation development. 1-3 Review previous O&M guidelines prepared by any other projects/programmes.	**Inputs** **Donor** Preparation Team 1) Irrigation system 6 months 2) Structure 6 months 3) Water management 6 months 4) River/Watershed 6 months 5) Structure design 6 months 6) Farmers group 6 months 7) Accounting 6 months 8) Agronomy 6 months 9) Environment 3 months 10)participation 4 months	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S.	All necessary arrangement for the stationing of the management system of the guideline will be fulfilled on schedule by any reliable parties concerned.

2 Prepare the O&M Guideline reflecting identified requirement for the guideline. 3-1 Plan a management and utilizing system of the guideline.. 3-2 Prepare the handling manual in line with the management plan.. 4 Transport copies of the O&M Guideline to the agencies designated in the management plan.	Equipment 1) Vehicles L.S. 2) Office equipment L.S. 3) Others L.S. Budget Some part of expenditures in local activities related to the Project.		Budget 1) Salaries and necessary expenses for counterparts 2) Some portion of the budget for publication of the Guideline 3) Necessary expenditures in operation of the management system of the guideline	**Preconditions** It is clearly confirmed the needs of preparation of the O&M Guideline is recognized in local government agencies and farmers groups.

(3) Implementation Schedule

Component III-3(1): O&M Guideline Establishment Programme

	Activities	Expected results	Schedule 2005 1 2 3 4 5 6 7 8 9 10 11 12	Schedule 2006 1 2 3 4 5 6 7 8 9 10 11 12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Study previous failures in operation and maintenance due to lack of necessary technology in O&M.	Study report			AD(IS)	Consultants		-	
1-2	Study requirement for operation and maintenance for irrigation development.	Study report			AD(IS)	Consultants		-	
1-3	Review previous O&M guidelines prepared by any other projects/programmes	Review note			AD(IS)	Consultants		-	
2-1	Prepare the O&M Guideline reflecting identified requirement for the guideline.	O&M Guideline			AD(IS)	IS, Consultants		-	
3-1	Plan a management and utilizing system of the guideline.	Plan of management and utilizing system			AD(IS)	Consultants		-	
3-2	Prepare the handling manual in line with the management plan.	Handling rules			AD(IS)	Consultants		-	
4-1	Transport copies of the O&M Guideline to the agencies designated in the management plan.	Placement of O&M Guideline			AD(IS)	IS		-	

10. III-4: Farmers' Participation in Irrigation Development Programme

(1) Project Proposal

<table>
<tr><td>(1) Title of Programme</td><td colspan="4">Farmers' Participation in Irrigation Development Programme (Code No. III-4)</td></tr>
<tr><td>(2) Location</td><td colspan="4">Mainland and Zanzibar</td></tr>
<tr><td>(3) Objectives</td><td colspan="4">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 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 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 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 colspan="4">Due to periodic food insecurity in Zanzibar, there is 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 the reason of 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 role for small-scale farmer-managed irrigation strengthening the irrigation development under enthusiastic farmers' participation at the center of movement. In these respects, it should be said that farmers' participation is essential in irrigation development.</td></tr>
<tr><td>(5) PDM for the Programme</td><td colspan="4">See the attached PDM.</td></tr>
<tr><td>(6) Contents of Programme</td><td colspan="4">The proposed contents of the Programme are as follows:</td></tr>
<tr><td></td><td>Activities</td><td>Procurement</td><td>Providing of manpower and training</td><td>Remarks</td></tr>
<tr><td></td><td>To review previous similar references on farmers' participation.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td></td></tr>
<tr><td></td><td>To study on the contents of the guideline for farmers' participation.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td>To be related with the study results on Programme CIII-2(1) and CIII-3(1)</td></tr>
</table>

	To prepare the Farmers' participation Guideline reflecting identified requirements for the guideline.	Not specified	- Consultants having required ability and faculty	To be related with the study results on **Programme CIII-2(1)** and **CIII-3(1)**
	To prepare an inventory of irrigation schemes for farmers' participation in consideration of the irrigation scheme inventory prepared in ZIMP Study.	Not specified	- Consultants having required ability and faculty	To be referred the Irrigation Scheme Inventory prepared within ZIMP
	To propose criteria for scheme selection for the pilot model for strengthening farmers' participation.	Required parts of equipment and additional necessary equipment	- Consultants having required ability and faculty	
	To select pilot model schemes among possible schemes listed in the inventory.	Not specified	- Consultants having required ability and faculty	
	To prepare the Strengthening Plan for farmers participation to the selected pilot schemes.	Not specified	- Consultants having required ability and faculty	
	To arrange necessary resources for implementation of the Strengthening Plan.	Equipment for farmers' activities	Not specified	To be related with the study results on **Programme III-5** and **III-7**
	To implement the Strengthening Plan as planned.	Not specified	- Consultants having required ability and faculty - Training specialists	
	To monitor the performance of farmers' participation in the pilot schemes.	Not specified		To be related with the study results on **Programme IV-2**
	To support O&M of the pilot schemes as required.	Equipment for supporting activities		
	To arrange necessary resources for implementation of villagers tours to the pilot schemes.	Not specified	Not specified	
	To plan tours of visiting pilot schemes.	Not specified	Not specified	
	To conduct the tours as scheduled.	Not specified	Not specified	
	To draft leaflets for the effect of strengthening farmers' participation.	Not specified	- Consultants having required ability and faculty	

	To finalize the draft of leaflets.	Not specified	Not specified	
	To print the required leaflet sheets	Not specified	Not specified	
(7) Required Cost	Not specified			
(8) 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.			
(9) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)			
(10) 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.			
(11) 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.			

(2) Project Design Matrix

(Farmers' Participation in Irrigation Development Programme) under NIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well participation of farmers in irrigation development.	By the mid 2006, for new irrigation schemes of more than 80 % of the schemes started since 2002, PRA is properly conducted. And, all village irrigation schemes are progressed by self-determination and self-reliance of farmers.	Investigation Reports for new irrigation schemes including village irrigation schemes from 2002 to 2006	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose A Guideline for farmers' participation is prepared. Some numbers of pilot model irrigation schemes for farmers' participation are established, and replicable effects of the pilot models for farmers' participation is expanded to other areas.	a) By November 2005, completed Farmers' Participation Guideline is approved by officials concerned. b) Special and appropriate supports for farmers' participation are given in a few irrigation schemes c) Totally and annually more than 2 times of farmers' visiting for learning form other areas to the pilot model schemes are taken. d) The leaflet prepared within NIMP are provided and spread in all over the country.	Official document on approval of the Guideline. Report on-the-spot investigation (An on-the spot investigation shall be taken) Follow-up Report of the special support to the pilot model schemes Record of preparation and treatment of the leaflet	DARI and Districts are strengthened their capability so as to backstop farmers' participation in irrigation development independently. Necessary resources are adequately given in order to implement the pilot model strengthening. The Guideline for farmers' participation is utilized and maintained properly. Several opportunities of other villagers to visit to the pilot model irrigation scheme for farmers' participation.

Outputs			
1-1 Contents for the Farmers' Participation Guideline are decided.	All fields and items contained into previous similar instructions are included in the Farmers' Participation Guideline.	Result of interview survey to personnel concerned on contentment of the Farmers' Participation Guideline for their requirement.	Districts and concerned agencies have technical capability and financial resource to fully support farmers participation in irrigation development.
1-2 The Farmers' Participation Guideline is prepared.	By November 2005, the Farmers' Participation Guideline is completed for its preparation.	Farmers' Participation Guideline	Management system of the Farmers' Participation Guideline exists and function properly in every concerned agencies.
2-1 Typical irrigation schemes for good farmers' participation are selected as the pilot models.	By December 2005, the strengthening Plan for farmers' participation will be completed.	Completion Report for the Strengthening Plan	
2-2 Strengthening Plan for farmers' participation to the selected pilot schemes are made.			
2-3 The Strengthening Plan for farmers' participation is executed in the pilot schemes.			
3-1 Good farmers' participation is maintained in the pilot schemes.	Good farmers participation continues	Follow-up Report of the Strengthening Plan	Villagers participated the tours will soundly reflect the lesson learned through the tours to their own life.
3-2 Tours of other villagers to the pilot schemes are prepared and executed often.	By November 2005, several times tours are scheduled and executed.	Record of Tours	
4 Leaflet propagating pilot model effects for strengthening farmers' participation is prepared as being effective.	By the mid 2006, the leaflet is completed its preparation.	Memorandum on the preparation of the leaflet	Prepared leaflet will be spread effectively.

Activities	Inputs		
	Donor	**GOT**	
1.1.1 Review previous similar references on farmers' participation. 1.1.2 Study on the contents of the guideline for farmers' participation. 1.2 Prepare the Farmers' participation Guideline reflecting identified requirement for the guideline. 2.1.1 Prepare an inventory of irrigation schemes for farmers' participation in consideration with the irrigation scheme inventory prepared in NIMP (ZINP) Study. 2.1.2 Make a criteria of scheme selection for the pilot model for strengthening farmers' participation. 2.1.3 Select pilot model schemes among possible schemes listed in the inventory. 2.2 Prepare the Strengthening Plan for farmers participation to the selected pilot schemes. 2.3.1 Arrange necessary resources for implementation of the Strengthening Plan. 2.3.2 Implement the Strengthening Plan as planned. 3.1.1Montor the performance of farmers' participation in the pilot schemes. 3.1.2 Support in O&M of the pilot schemes as required. 3.2.1 Arrange necessary	Preparation Team 1) Participation 12 months 2) Irrigation 12 months 3) Rural develop't 6 months 4) Extension 12 months 5) Agriculture 6 months 6) Coordinator 12 months Field workers L.S. Equipment 1) Vehicles L.S. 2) GIS L.S. 3) Others L.S. Budget Some part of expenditures in local activities related to the Project.	Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Some portion of the budget for publication of the Guideline 3) Necessary expenditures in operation of the system	All necessary arrangement for acceptance and utilization of the Farmers' Participation Guideline are completed in every districts and organizations concerned.

resources for implementation of villagers tour to the pilot scheme. 3.2.2 Plan tours of visiting pilot schemes. 3.2.3 Conduct the tours as scheduled. 4.1 Draft leaflet for the effect of strengthening farmers' participation. 4.2 Finalize the draft of leaflet. 4.3 Print leaflet at required sheets.		**Preconditions** It is clearly confirmed the needs of strengthening farmers participation is recognized in local government agencies and private groups.

(3) Implementation Schedule

Component III-4: Farmers' Participation in Irrigation Development Programme

Activities		Expected results	Schedule 2005 1 2 3 4 5 6 7 8 9 10 11 12	Schedule 2006 1 2 3 4 5 6 7 8 9 10 11 12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1-1	Review previous similar references on farmers' participation.	Review note			AD(IS)	Consultants		-	
1-1-2	Study on the contents of the guideline for farmers' participation.	Plan of Contents of Guideline			AD(IS)	Consultants		-	
1-2	Prepare the Farmers' participation Guideline reflecting identified requirement for the guideline.	Farmer's Participation Guideline			D(DITS) AD(IS)	Consultants		-	
2-1-1	Prepare an inventory of irrigation schemes for farmers' participation in consideration with the irrigation scheme inventory prepared in NIMP Study.	Inventory of Irrigation Scheme for Farmers' Participation			AD(IS)	IS, Consultants		-	
2-1-2	Make a criteria of scheme selection for the pilot model for strengthening farmers' participation.	Criteria of Scheme Selection			AD(IS)	IS, Consultants		-	
2-1-3	Select pilot model schemes among possible schemes listed in the inventory.	List of Selected Schemes			D(DITS) AD(IS)	IS, Consultants		-	
2-2	Prepare the Strengthening Plan for farmers participation to the selected pilot schemes.	Strengthening Plan for Farmers' Participation			AD(IS)	Consultants		-	
2-3-1	Arrange necessary resources for implementation of the Strengthening Plan.	-			AD(IS)	IS, Consultants	Equipment for farmers' activities	-	
2-3-2	Implement the Strengthening Plan as planned.	Execution report of the Strengthening Plan			AD(IS)	Consultants		-	
3-1-1	Montor the performance of farmers' participation in the pilot schemes.	Monitoring report			AD(IS)	Consultants		-	
3-1-2	Support in O&M of the pilot schemes as required.	-			AD(IS)	IS, Consultants	Equipment for supporting activities	-	
3-2-1	Arrange necessary resources for implementation of villagers tour to the pilot scheme.	-			AD(IS)	IS, Consultants		-	
3-2-2	Plan tours of visiting pilot schemes.	Tour Plan			AD(IS)	IS, Consultants		-	
3-2-3	Conduct the tours as scheduled.	Tour report			AD(IS)	IS, Consultants		-	
4-1	Draft leaflet for the effect of strengthening farmers' participation.	Leaflet of Farmers' Participation (Draft)			AD(IS)	IS, Consultants		-	
4-2	Finalize the draft of leaflet.	Leaflet of Farmers' Participation (Final)			D(DITS) AD(IS)	IS		-	
4-3	Print leaflet at required sheets	Copies of Leaflet of Farmers' Participation			AD(IS)	IS		-	

11. IV-1: Technical Manuals Handling Guideline Establishment Programme

(1) Project Proposal

(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) PDM for the Programme	See the attached PDM
(6) 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
(7) Required Cost	Not specified
(8) 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.
(9) Implementation Schedule	Six months for study and implementation of the related NIMP Programme (January 2005 – June 2005)
(10) 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.
(11) Special Arrangements	The Technical Manual Handling Guideline for Irrigation Development Programme (Programme D.2) will be executed by DITS of MAFS in 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's guideline.

(2) Project Design Matrix

(Technical Manuals Handling Guideline Establishment Programme) under ZIMP

Project Name: Zanzibar Irrigation Master Plan　　Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar　　Target Agency: MANREC　　Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well utilizing of the technical manuals as regulated in the technical manuals handling guideline (TMH Guideline).	By the mid 2005, Parson in charge of the every concerned offices can answer where delivered technical guidelines and manuals are stationed in their office for open use.	Report of interview survey for utilization of technical references	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Technical Manuals Handling TMH Guideline which is convenient for handling and managing all technical references is completed. A copy of the TMH Guideline is placed in each section related irrigation development in central government and districts.	a) By June 2005, completed TMH Guideline is approved by officials concerned. b) In June 2005, delivered copies of the TMH Guideline are confirmed popularity in their sections (positive for more than 80 %).	Official document on approval of the TMH Guideline. Report on-the-spot investigation (An on-the spot investigation shall be taken)	Circumstances for utilization of technical references are improved and maintained as regulated by the TMH Guideline. When revised the TMH Guideline, delivered one should be replaced smoothly.
Outputs 1. Realistic utilization system for technical references is drawn up. 2. A TMH Guideline is prepared. 3. Copy of the TMH Guideline is delivered to each section related irrigation development in central government and districts.	All issues on utilization of technical references which are prevailed in PCM workshop are considered anyhow. By June 2005, the TMH Guideline is completed for its preparation. By the mid 2005, the guideline is completely delivered.	Result of PCM problem analysis on utilization of technical references TMH Guideline Record of delivery of the TMH Guideline	Districts and concerned agencies have technical capability and financial resource to fully manage technical references in accordance with the TMH Guideline.
Activities 1-1 Study previous malfunction of technology management which caused scheme's failure. 1-2 Contrive improvement plan of management system for technical references utilization. 2 Prepare the TMH Guideline reflecting improvement idea for technical references handling. 3. Transport copies of the TMH Guideline to the agencies designated in the management plan.	**Inputs** **Donor** Preparation Team 1) Knowledge Management 3 months 2) Technology training 3 months 3) Irrigation 3 months 4) Institution 3 months Equipment 1) Office equipment L.S. 2) Others L.S. Budget Some part of expenditures in local activities related to the Project.	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S. Budget 1) Salaries and necessary expenses for counterparts 2) Some portion of the budget for publication of the Guideline 3) Necessary expenditures in operation of the system	All necessary arrangement for the stationing of the management system of the guideline will be fulfilled on schedule. **Preconditions** It is clearly confirmed the needs of preparation of the TMH Guideline is recognized in local government agencies.

(3) Implementation Schedule

Component IV-1: Technical Manualis Handling Guideline Establishment Programme

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Study previous malfunction of technology management which caused scheme's failure.	Review note																									AD(IS)	Consultants		-	
1-2	Contrive improvement plan of management system for technical references utilization.	Plan document																									AD(IS)	IS, Consultants		-	
2-1	Prepare the TMH Guideline reflecting improvement idea for technical references handling.	Guideline																									D(DITS) AD(IS)	IS, Consultants		-	
3-1	Transport copies of the TMH Guideline to the agencies designated in the management plan.	Placement of Guideline																									AD(IS)	IS		-	

12. IV-2: Information and Database Improvement Programme

(1) Project Proposal

<table>
<tr><td>(1) Title of Programme</td><td colspan="4">Information and Database Improvement Programme (Code No. IV-2)</td></tr>
<tr><td>(2) Location</td><td colspan="4">Mainland and Zanzibar</td></tr>
<tr><td>(3) Objectives</td><td colspan="4">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.</td></tr>
<tr><td>(4) Programme Description</td><td colspan="4">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) PDM for the Programme</td><td colspan="4">See the attached PDM</td></tr>
<tr><td>(6) Contents of Programme</td><td colspan="4">The proposed contents of the Programme are as follows:</td></tr>
<tr><td></td><td>Activities</td><td>Procurement</td><td>Providing of manpower and training</td><td>Remarks</td></tr>
<tr><td></td><td>To identify necessary kind and modalities of databases to be required for the purpose of irrigation development and management</td><td>Not specified</td><td>Database specialist (outsider)
-Database specialist (inhouse)</td><td></td></tr>
<tr><td></td><td>To prepare all required databases so as to utilize necessary data or GIS information</td><td>- Required instrument for building databases</td><td>-Database specialist (outsider)
-Database specialist (inhouse)</td><td></td></tr>
</table>

	To identify types of computer systems by which established databases are accessed.	-Computer system -Related equipment for opening of the network	-Manpower of computer system installation -Instructor for computer operation	Suitable space for computer system installation should be provided
	To prepare an operation manual for the databases so as to be operational for the specified computer systems.	Not specified	-Database specialist (outsider) -Database specialist (inhouse)	
	To investigate possible resources to be mobilized for database updating under the present institutional conditions.	Not specified	-Database specialist (outsider) -Database specialist (inhouse)	
	To make a cycle plan for updating databases by utilizing possible resources in organizations concerned in irrigation.	Not specified	-Database specialist (outsider) -Database specialist (inhouse)	
(7) Required Cost	Not specified			
(8) 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.			
(9) Implementation Schedule	One and half years for study and implementation of the related NIMP Programme (July 2004 – December 2005)			
(10) 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.			
(11) 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.			

(2) Project Design Matrix

(Information and Database Improvement Programme) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized by means of well facilitation of necessary Information and Database System (I&D) related to irrigation development and management.	By the mid 2006, the I&D system built up by this programme is utilized at any stages for 80 % of irrigation schemes newly planned by DARI and districts since 2002.	Progress Reports for new irrigation scheme from 2002 to 2006.	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Databases related to irrigation development and management are completed and started for its services.	In January 2006, the databases are in condition for open use to personnel of DARI and others.	Report on-the-spot inspection for operational condition of the databases (An on-the-spot inspection shall be taken)	Good circumstance for utilization of the databases and its management system is maintained. When revised the system and database itself, the former ones should be replaced smoothly.
Outputs 1. Databases related to irrigation development and management are constructed. 2. Operation manual for the databases are prepared. 3. Up-dating system for the databases is structured.	The constructed databases are confirmed its workability and demonstrated for commonly use. By October 2005, the operation manual for the databases is completed for its preparation. In the year of passing 3 years after inaugurating of the databases, the up-dating system will be confirmed its function by means of confirming the fact of databases updating.	Report of Briefing Session on utilization of the databases (Several briefing Session for IS personnel and others shall be held) Operational Manual Report on-the-spot investigation for updating of databases.	Districts and concerned agencies have technical capability and financial resource to manage and operate the constructed databases and its system properly.
Activities 1-1 Identify necessary kind and modality of database to be required for the purpose of irrigation development and management. 1-2 Prepare all required kinds of databases so as to utilize necessary data either GIS	**Inputs** **Donor** Preparation Team 1) Database 6 months 2) Computer system 6 months 3) Data processor 6 months 4) GIS specialist 6 months Computer operator (as required)	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Others L.S.	All necessary arrangement for installation of databases will be fulfilled on schedule by concerned section in MAFS.

information. 2-1 Identify types of computer system by which constructed databases are accessed. 2-2 Prepare operation manual for the databases so as to be operational for the identified computer systems. 3-1 Investigate possible resources to be mobilized for database up-dating under the present institutional conditions. 3-2 Make a cycle plan for updating databases by utilizing possible resources in MAFS.	Subject specialist for the subject of database (as required) Equipment 1) Computer system L.S. 2) Office equipment L.S. 3) Others L.S. Budget Some part of expenditures of local activities related to the Project.	Budget 1) Salaries and necessary expenses for counterparts 2) Some portion of the budget for installation of databases. 3) Necessary expenditures in operation of the databases.	**Preconditions** It is clearly confirmed the needs of preparation of the databases and its operation system is recognized in MAFS and local government agencies concerning to irrigation development. MASF can provide necessary resources for operation of database updating, otherwise, strengthen organization of IS so that IS can deal with the updating tasks.

(3) Implementation Schedule

Component IV-2: Information and Database Improvement Programme

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Identify necessary kind and modality of database to be required for the purpose of irrigation development and management.	Review note																									AD(IS)	IS, Consultants		-	
1-2	Prepare all required kinds of databases so as to utilize necessary data either GIS information.	Several series of databases (e.g. scheme inventory, O&M condition of schemes, GIS data concerning irrigation development, parsonnel data of irrigation engineers and technicians, etc.)																									AD(IS), Cell managers	Consultants, Database specialists	as required	-	Utilizing existing databases avaiable
2-1	Identify types of computer system by which constructed databases are accessed.	Specification of computer system																									Computer system specialist	Computer system specialists		-	
2-2	Prepare operation manual for the databases so as to be operational for the identified computer systems.	Operation manual																									Cell managers	Database specialists		-	
3-1	Investigate possible resources to be mobilized for database up-dating under the present institutional conditions.	Investigation report																									AD(IS)	Cell managers		-	
3-2	Make a cycle plan for updating databases by utilizing possible resources in MAFS.	Plan report																									Database specialist	Database specialists	as required	-	

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

(1) Project Proposal

<table>
<tr><td>(1) Title of Programme</td><td>Environmental Assessment Study for Irrigation Practice
(Code No. V-1(5))</td></tr>
<tr><td>(2) Location</td><td>Mainland and Zanzibar</td></tr>
<tr><td>(3) Objectives</td><td>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.</td></tr>
<tr><td>(4) Programme Description</td><td>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 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) PDM for the Programme</td><td>See the attached PDM</td></tr>
<tr><td>(6) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Procurement</th><th>Providing of manpower and training</th><th>Remarks</th></tr>
<tr><td>To select study areas where substantial environmental issues related to the irrigated agriculture occur.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td>To take previous environmental topics relating to irrigation into consideration</td></tr>
<tr><td>To investigate the actual environmental situation of the study areas.</td><td>Not specified</td><td>- Consultants having required ability and faculty</td><td></td></tr>
</table></td></tr>
</table>

	To investigate effects of irrigation practice on the environment.	Not specified	- Consultants having required ability and faculty	
	To clarify causes and mechanisms of the environmental issues	Not specified	- Consultants having required ability and faculty	
	To produce countermeasures so as to avoid or lighten the environmental hazards.	Not specified	- Consultants having required ability and faculty	
	To devise feasible countermeasures.	Not specified	- Consultants having required ability and faculty	
	To formulate improvement measures for the environmental deterioration that irrigators can deal with.	Not specified	- Consultants having required ability and faculty	
	To select study areas where substantial environmental issues related to the irrigated agriculture occur.	Not specified	- Consultants having required ability and faculty	To take previous environmental topics relating to irrigation into consideration
(7) Required Cost	Not specified			
(8) 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.			
(9) Implementation Schedule	Two years for study and implementation of the related NIMP Programme (July 2004 – June 2006)			
(10) Assessment of Possible Problems and Bottlenecks in Implementation	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. 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.			
(11) 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.			

(2) Project Design Matrix

(Environmental Assessment Study for Irrigation Practice in Tanzania) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized fulfilling irrigation development as being environmental friendly.	By the mid 2007, no substantial environmental issues are occurred in existing irrigation schemes.	Result environmental study for existing irrigation schemes in 2006	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Environmental issues affected presently in and by irrigation practice in Tanzania and Zanzibar are elucidated. Measures of avoiding environmental deterioration by irrigation practice are worked out.	Every highlighted irrigated areas having some environmental issues are studied within this Study.	Previous record on environmental issues related to irrigation practice	Stakeholders of irrigated agriculture continuously recognize the importance of consideration in environmental aspect, and carry out their duty properly.
Outputs 1. Environmental issues presented are scientifically analyzed, and causes and mechanism of the issues are found out. 2. Alternatives of improvement measures to the environmental deterioration for which irrigators can deal with, are proposed. 3. The alternatives of improvement measures are finalized so as to be manageable.	The result of the analysis is announced. Several workshops for irrigators are held. In the workshops, the alternatives of improvement measures are discussed and finalized.	Announcement of the study result Record of the workshop for irrigators	Good cooperation is given for the implementation of this Study from any concerned agencies. A series of the technical discussion is held timely and adequately with proper attendance environmentalists concerned.
Activities 1-1 Select study areas where occur substantial environmental issues related to the irrigated agriculture. 1-2 Investigate actual environmental situation of the study areas. 1-3 Investigate effects of irrigation practice in environment.	**Inputs** **Donor** Study Team 1) Leader 1 year 2) Irrigated agriculture 1 year 3) Irrigation water management 1 year 4) Natural environment 1year 5) Social environment 1 year	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Furniture and Acces. L.S. 3) Tel. and business eq. L.S.	IS of DITS in Mainland (DARI of MANREC in Zanzibar) holds adequate power for technical coordination within the concerned environmental studies. Participation of beneficiaries in concerned schemes or areas should be given.

1-4 Clarify causes and mechanism of the environmental issues 2-1 Make ideas of countermeasures so as to avoid or lighten the environmental hazards. 2-2 Devise procedures of the countermeasures as being feasible. 3 Formulate improvement measures to the environmental deterioration for which irrigators can deal with.	Supporters 1) field investigator - 2) farmers moderator - Equipment 1) Vehicles L.S. 2) Environmental testing equipment L.S. 3) GIS equipment. L.S. Budget Some part of expenditures in local activities related to the Project. Training in other countries Training opportunities in abroad for several number of counterparts in related subjects.	Budget 1) Salaries and necessary expenses for counterparts 2) Allowances and expenses of field trips	**Preconditions** IS of DITS and MAFS in Mainland (DARI of MANREC in Zanzibar) admit the necessity of substantial research pursuing actual causes of existing environmental issues in which irrigation is regarded as a major contributor of the issues.

(3) Implementation Schedule

Component V-1(5): Environmental Assessment Study for Irrigation Practice in Tanzania

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	2006 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Select study areas where occur substantial environmental issues related to the irrigated agriculture.	Study report (implied)																																					AD(IS)	Consultants, IS		-	
1-2	Investigate actual environmental situation of the study areas.	Study report (implied)																																					AD(IS)	Consultants, IS		-	
1-3	Investigate effects of irrigation practice in environment.	Study report (implied)																																					AD(IS)	Consultants, IS		-	
1-4	Clarify causes and mechanism of the environmental issues	Study report (implied)																																					AD(IS)	Consultants, IS		-	
2-1	Make ideas of countermeasures so as to avoid or lighten the environmental hazards.	Study report (implied)																																					AD(IS)	Consultants, IS		-	
2-2	Devise procedures of the countermeasures as being feasible.	Study report (implied)																																					AD(IS)	Consultants, IS		-	
3-1	Formulate improvement measures to the environmental deterioration for which irrigators can deal with.	Study report (implied) Executive document																																					D(DITS) AD(IS)	Consultants, IS		-	

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

(1) Project Proposal

(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) PDM for the Programme	See the attached PDM.
(6) Contents of Programme	The proposed contents of the Programme are as follows:

Activities	**Procurement**	**Providing of manpower and training**	**Remarks**
To investigate the present situation of obtaining water rights for irrigators	Not specified	- Consultants having required ability and faculty	To collaborate with related studies carried out by the river-basin offices
To clarify the difficulties and problems for obtaining water rights for irrigators	Not specified	- Consultants having required ability and faculty	

	To devise systematic procedures to easily handle water rights for irrigators	Not specified	- Consultants having required ability and faculty	
	To study technical skills increase allowable water available for irrigation	Not specified	- Consultants having required ability and faculty	
	To study technical skills to reduce the demand for irrigation water.	Not specified	- Consultants having required ability and faculty	
	To study the proper organizational arrangement towards negotiation between water users.	Not specified	- Consultants having required ability and faculty	
	To prepare a guideline for the river basin approach for the irrigation sector.	Not specified	- Consultants having required ability and faculty	
(7) Required Cost	Not specified			
(8) 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.			
(9) Implementation Schedule	One year for study and implementation of the related NIMP Programme (July 2004 – June 2005)			
(10) 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.			
(11) 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.			

(2) Project Design Matrix

(Study of River-Basin Approach in Irrigation Development) under ZIMP

Project Name: Zanzibar Irrigation Master Plan Duration: 2003 - 2020 (18 years)

Project Area: Zanzibar Target Agency: MANREC Date: August 2003

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
Overall Goal The sustainable irrigation development is realized taking appropriate river-basin approach in irrigation development	By the mid 2008, conflicts between irrigators and other water users decrease at less than 50 % comparing to 2002 in number.	Report about water conflict prepared by water-basin offices.	Other related programmes of ZIMP are animatedly implemented as scheduled.
Project Purpose Proper river-basin approach for irrigation sector is established as a form of guideline. And the proper river-basin approach for irrigation sector is expanded for irrigators.	a) The river-basin approach for irrigation sector is circulated to concerned ministry of water and related water users. b) Several times of seminars on the proper river-basin approach are held.	Letter of circulation Report of the seminars	Irrigation engineers concerned and irrigators will follow the river-basin approach for irrigation sector appropriately.
Outputs 1. Procedures of obtaining and/or renewing water right for irrigation water use are routinized within irrigation sector. 2. Technical skills to make allowable water for irrigation increase are developed. 3. Technical skills to make demanding water for irrigation reduce are developed. 4. Organizational arrangement towards negotiation between water users is proposed. 5. A guideline of river-basin approach for irrigation sector is prepared.	The proposed procedure on water right is confirmed to be consistent with the revised Water Accord. By June 2005, a guideline will be completed.	Revised Water Accord Booklet of the guideline	There are no obstacles for this programme implementation from other actors who have different interesting. A series of the technical discussion is held timely and adequately with proper attendance of engineers concerned. Handling of the guide-book should be orderly managed by IS of DITS in Mainland (DARI of MANREC in Zanzibar).
Activities 1-1 Investigate present situation of water right obtaining for irrigators 1-2 Clarify difficulties and problems for obtaining water right for irrigators 1-3 Devise systematic procedures to handle water right easily for irrigators 2-1 Study technical skills to make allowable water for irrigation increase 3-1 Study technical skills to make	**Inputs** **Donor** Study Team 1) River basin development 6 months 2) Irrigation 6 months 3) Water management 6 months 4) Legal specialist 6 months Equipment 1) Vehicles L.S. 2) Office equipment L.S. 3) GIS equipment. L.S.	**GOT** Personnel 1) Counterparts in each subject Equipment 1) Office L.S. 2) Furniture and Acces. L.S. 3) Tel. and business eq. L.S.	Concerned parsons and organizations in irrigation sector should fully cooperate to this programme. IS of DITS in Mainland (DARI of MANREC in Zanzibar) holds adequate power for technical coordination within the concerned organization.

demanding water for irrigation reduce. 4-1 Study proper organizational arrangement towards negotiation between water users. 5-1 Prepare a guideline of river-basin approach for irrigation sector.	Budget Some part of expenditures in local activities related to the Project.	Budget 1) Salaries and necessary expenses for counterparts 2) Allowances and expenses of field investigations	**Preconditions** MAFS in Mainland (MANREC in Zanzibar) admits the necessity of applying river-basin approach in irrigation sector.

(3) Implementation Schedule

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

	Activities	Expected results	Schedule 2004 1	2	3	4	5	6	7	8	9	10	11	12	2005 1	2	3	4	5	6	7	8	9	10	11	12	Person in charge	Implementer	Equipment	Cost (Thousand US$)	Remarks
1-1	Investigate present situation of water right obtaining for irrigators	Study report (implied)																									AD(IS)	Consultants, IS		-	Utilization of latest data available in the River Basin
1-2	Clarify difficulties and problems for obtaining water right for irrigators	Study report (implied)																									AD(IS)	Consultants, IS		-	
1-3	Devise systematic procedures to handle water right easily for irrigators	Study report (implied)																									D(ITSD) AD(IS)	Consultants, IS		-	
2-1	Study technical skills to make allowable water for irrigation increase	Study report (implied)																									AD(IS)	Consultants, IS		-	
3-1	Study technical skills to make demanding water for irrigation reduce.	Study report (implied)																									AD(IS)	Consultants, IS		-	
4-1	Study proper organizational arrangement towards negotiation between water users.	Study report (implied)																									AD(IS)	Consultants, IS		-	
5-1	Prepare a guideline of river-basin approach for irrigation sector.	Study report (implied) Guideline for reiver-basin management for irrigation sector																									D(ITSD) AD(IS)	Consultants, IS		-	

Appendix B

Project Design Matrix and Project Proposal For Model Irrigation Schemes

THE STUDY
ON
THE ZAN ZIBAR IRRIGATION MASTER PLAN
IN
THE UNITED REPUBLIC OF TANZANIA

Action Plan Report

Appendix B

Project Proposal and Project Design Matrix For Model Irrigation Schemes

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Appendix B

Project Proposal and Project Design Matrix For Model Irrigation Schemes

GENERAL

The action plan for the model irrigation schemes is based on the site inspection and RRA, and is summarised in the Project Design Matrix (PDM) and the Project Proposal.

A. 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 consequent to self-reliance of irrigation schemes.

Development Concept to 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 rehabilitation / improvement plan of irrigation infrastructure considering farmers' affordability to O & M. - Preparation of agricultural development plan, which leads to improvement of farmers' profitability, encouraging them to introduce vegetable farming.
Institutional/Organizational Strengthening	- Institutional strengthening for raising 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 fee and O & M cost. - Promotion of farmers' participation in project implementation during planning, design, and construction periods.

B 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 ten model schemes is to improve agricultural productivity and profitability in the irrigation schemes.

(2) Project Purpose

The 'project purpose' is to "ensure to supply stable 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:

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

The 'objectively verifiable indicators' will be: 1) 80% or more farmers participate in the maintenance works, 2) rehabilitation is completed by the specified year, and 3) 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':

1) Capacity of IA management is strengthened.
   - Raise farmers' awareness to the project implementation.
   - Re-organize structure of IA.
   - Enhance leadership of committee members.
   - Strengthen decision making of IA.
   - Prepare by-laws and regulation.
   - Enhance financial management capacity of IA.
   - Promote to register IA.
2) Irrigation infrastructures are rehabilitated or improved.
   - Conduct survey and investigation with farmers' participation.
   - Carry out design works.
   - Make agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.
   - Proceed 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.
3) 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 Tanzanian Government 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.

C Components of the Project

The development plans are formulated for each irrigation scheme, and are summarised in PDM. In the PDM, "activities" indicate the project components to be implemented in the irrigation schemes. These activities are outlined below, and compiled into the implementation program compiled in Appendix B. These were worked out based on the results of "problem analysis" and "objectives analysis".

C.1 Strengthening of IA Management Capacity

(1) General

In accordance with the policy of participatory management of the Project, GOT is now handing over the responsibility of O&M to IA. IA is requested to play more important role for the participatory management of the Project including not only O&M of the irrigation infrastructures but also supporting services for agriculture and community development.

Under such circumstances, securing further development and sustainability of the Project largely depend on the strengthening of the farmers' organisations. Accordingly, the immediate urgent matter to be implemented in the Project is the strengthening of the IA to have enough capacity to carry out relevant activities including O&M of irrigation infrastructures and supporting services by themselves.

(2) Workshop on Awareness Raising

It should be stressed that the awareness raising programme for the government officer as well as the farmers should be carefully implemented to let them the importance of water management and maintenance by farmers themselves. The programme will be carried out in two steps.

First, the programme for the government officer will be carried out in order to let them understand the participatory planning approach, and method and attitude to communicate with the farmers with a proper manner.

Consequently, the workshops, in which the officers, the external staff, and the farmers participate, are held so that the farmers are aware of the responsibility of the scheme implementation such as participation in planning and design works as well as construction, and water management and maintenance of the irrigation infrastructures, which should be carried out by them. The following issues would

be discussed in the workshop to raise farmers' awareness with regards to the scheme management:

- irrigation schedules and methods,
- attendance to IA meeting,
- attendance to preventive maintenance activities,
- participation in maintenance work of irrigation facilities.
- paying O&M cost, and
- participation in training course undertaken by GOT.

(3) Re-organization of IA

Activities on re-organizing the IA includes selection of committee members and establishment of sub-committees considering women's participation. The committee is composed of the following members; Chairman, Secretary, Accountant, and several committee members. Main tasks of the committee are (i) to prepare annual management plans and budget, (ii) to instruct and supervise activities implemented by the service section, (iii) to manage complaints and grievance from the farmers, (iv) to co-ordinate with other agencies and associates, and so on. The chairman would make a good communication channel between the government staff and IA, and co-ordinate the water delivery to all the canals. The accountant would collect the O&M cost from the farmers and keep financial records.

(4) Enhancement of Leadership for Committee Members

For proper management of the IA, leadership of the committee members should be enhanced. The government official are expected to support the members to build capacity for internal communication and conflict management within the members as well as coordination with outside people and the government officials.

(5) Strengthening of decision-making process

Decision-making process to be strengthened through the process of IA establishment is how to hold general and committee meetings with democracy and high transparency. The general meeting is held at least annually, and has the following main activities:

- Election of the executive committee members and auditor,
- Approval of result of auditing,
- Approval of the annual management plan and budget,
- Determination of the amount of irrigation service charge,
- Revision of the contribution for the IA management,
- Revision and enactment of articles and by-laws,
- Specific items requested by the members and committees, and so on.

(6) By-law and regulation

The establishment of articles and by-laws is essential for well functioning organisations as a legal body. They should be accepted and approved by the members of IA. It will be necessary to prepare several standard articles and by-laws covering O&M of irrigation facilities with the relevant activities, so that IAs

can enact easily their own articles based on the standard one.

(7) Financial management

The contribution money collected from the IA members covers all necessary costs of the scheme management. The cost in pump irrigation scheme includes fuel and lubricants, allowance of a pump operator, and maintenance of the pump.

The accountant collects the money directly from the members, and the collected amount is deposited immediately in IA's bank account. The accountant manages all these transactions, and external auditors should check their collection according to needs. The IA committee is responsible for management and use of the collected money.

(8) Registration of IA

Registration of IA as a legal entity would be promoted under guidance of district staff so that the organization makes an agreement with the district office on the implementation of the rehabilitation and improvement works of irrigation infrastructures.

C.2 Rehabilitation / Improvement of Irrigation Infrastructures with Strengthening of Farmers' Participation

(1) Survey, investigation and design

The activities during the survey, investigation and design period are listed below.

Feasibility Study

- Mapping
- Field Investigation with farmers
- Formulation of Development Plan
- Environmental Impact Assessment
- Discussion with farmers

Detailed Design

- Field Investigation with farmers
- Formulation of Definite development plan
- Workshop with IA
- Cost estimate and final development plan

Agreement of Cost sharing and O&M Responsibility of IA

Pre-Implementation Activities

- Tender and its evaluation
- Guidance to IA for construction

In order to promote farmers' participation in the planning and design stage, the "Guideline for Participatory Improvement to Farmer Initiated and Managed Smallholder Irrigation Schemes" specifies that "participatory action planning", "participatory diagnostic study", and "participatory design and feasibility study"

should be conducted. The participatory design and feasibility study would include the following sessions:

- Guidance on participatory planning for the farmers before commencement of the field investigation
- Survey and Investigation in co-operation 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
- Training on construction management for farmers for proper monitoring of the work

(2) Implementation of rehabilitation and improvement works

The construction works for the facilities, such as headworks, pump station and main, secondary, and tertiary irrigation canal system, drainage canals, and farm roads would be carried out by both a private contractor and farmers.

The estimated period for the works ranges from one to three year(s) depending on the command area including mobilisation works. The progress of the construction works will be monitored by the government officials to grasp overall status of the programmes. The data are overall progress of construction of scheme facilities, quality of construction works done by both contactors and farmers, and cost invested to the programmes.

In line with the concept for the participatory approach, parts of the construction works will be contracted out to farmers as much as possible, providing their labour force and construction materials, such as stone, sand, and so on. In such case, it will be required that the government staff would takes necessary quality control measures to keep the works implemented by farmers up to a normally acceptable level.

The quality of the farmer's construction works will be monitored with that progress through the monitoring system. Then, based upon the result of monitoring and evaluation, necessary technical guidance will be provided to farmers' organisations during the rehabilitation works.

(3) Turnover O&M of completed facilities to IA

The following steps are to be taken so that irrigation facilities can be handed over to the satisfaction of farmers:

- Joint inspection by the government officials and farmers to identify defects made by the contractor,
- Rectification work, if any,
- Preparation of documents for the hand-over of the completed infrastructures, such as agreement, irrigation diagram, maps, and so on,
- Turnover of operation and maintenance of the completed facilities to IA.

C.3 Enhancement of Farmers' Skills for Operation and Maintenance

The proposed training programme for proper and efficient operation and maintenance of irrigation facilities are indicated below. The officials of districts as well as farmers, who are engaged in the O&M work in IAs, will attend the training courses.

Training courses for O&M

Category of Scheme	Description of Training
1. Awareness programme for O&M	Understanding of the basic concepts of the Project
	Understanding duties and responsibilities of the staff/officers and farmers
	Understanding participatory planning
2. Irrigation schedule and planning	Knowledge about irrigation methods
	Methods of estimating irrigation water requirement
	Methods of preparing irrigation schedules
	Methods of preparing the irrigation water orders
3. Water distribution	Knowledge about the water management facilities
	Methods of operating the water management facilities
	Methods of conducting rotational irrigation
4. Maintenance system	Knowledge about maintenance system
	Methods of conducting an inventory survey to check defects of facilities
	Methods of preparing the annual maintenance programmes
	Methods of preparing maintenance schedule and cost estimate
	Methods of informing damage to facilities in an emergency
	Methods of keeping maintenance records
	Methods of conducting preventive maintenance
5. Communication	Knowledge on how the irrigation problems are communicated to higher level authorities effectively.
	Knowledge on how decisions from higher level authorities are communicated downwards
	Knowledge on how to contact relevant officials
	Knowledge on how to contact and co-operate with other IAs
6. Monitoring & evaluation	Knowledge about monitoring and evaluation procedures on water management
	Knowledge about administrative reporting procedures
	Methods of preparing reports

It should be stressed that the awareness programmes for the farmers should be carefully implemented to let them understand water saving agriculture with cultivation of vegetables, the importance of water management and maintenance of the irrigation infrastructures, which should be carried out by themselves. The following issues would be taken into consideration in terms of above:

- water management under the 'self-management concept',
- selection of crops as per the soil type,
- keeping irrigation schedules and methods without illicit water tapping,
- payment of O&M cost,
- participation in training course undertaken by GOT
- attendance to the meeting, and
- participation in maintenance work of irrigation facilities.

Further, the O&M activities by farmers will be monitored every cultivation season.

1. Mlemele Irrigation Scheme

(1) Project Proposal

(1) Title of Programme	Mlemele Irrigation Scheme
(2) Location	Seven villages, namely, Matele, Tondooni, Mitamani, Dodo, Kumvini, Kitokame and Pogwa, Chake Chake District, South Pemba Region, Pemba Island. (see attached location map)
(3) Objectives of Project	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.
(4) Site Description	The scheme area comprises most of Chake Chake District on the southern part of the South Pemba Region in Pemba Island. It includes 7 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 (provisionally named Right Mlemele river and Left Mlemele river). Both tributaries are ephemeral rivers, flash water during flood occurs, would be a valuable water source for irrigation to such presently rainfed area.
(5) Scheme Description	The Mlemele Scheme is categorized as a water harvesting scheme. The MANREC recognizes a potential for irrigation development for this area, and has continued necessary investigations. 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 Mlemele river. The proposed plan is to build single dam reservoir in the Right Mlemele river, and to be delivered water to the left side through new diversion canal.
(6) Problems identified in the Study	<u>Institution</u> - No IA. The farmers don't have any experiences of managing a IA. - Weak ownership and financial base of farmers <u>Irrigation and Drainage</u> - No irrigation and drainage infrastructure at present. - No experience of dam construction. - No experience of irrigated farming among farmers. <u>Agriculture</u> - Determination of scheme area only by land resources - Proper Estimation of Project Area - Crop failure due to water shortage during flowering stage Adequate Water Supply - Pests and diseases - Farmers' participation training

	- Unavailability of tractor in time - Ensuring of Inputs - Low affordability to inputs - Ensuring of Inputs - Difficulty in marketing of vegetables due to competition with the products from other area - Establishment of Proper Approach to Marketing
(7) Component of Project	The proposed contents of the Scheme are as follows: 1. Strengthening of Capacity of IA management 1-1 Farmers' awareness to the scheme 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 Prevarication 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 scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 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.
(8) Irrigation and Drainage Development Plan	<u>Basic Approach</u> To exploit additional water source by providing small dam at low cost. <u>Development Plan</u> The proposed scheme area is 65 ha in net. A small dam with a reservoir capacity of about 100,000 m3 is proposed at upstream of the Right Mlemele River to supply irrigation water to the command area of 65 ha. Impounding water is delivered to farm lands through irrigation canal system. Main irrigation canal will run along foot-range of hills to reach the opposite side of the river. Minor irrigation canals are not needed because the farm plots can

	be irrigated from the main irrigation canal directly, or farmers will put ditch from the main irrigation canal to their plots. Drainage canal and farm road are provided along parts of main irrigation canal for operation and maintenance of irrigation facilities. The proposed construction works for the scheme are as follows: (a) Small earthfill dam (height 3m x length 120 m) (b) Main irrigation canal (unlined canal with length 7,220 m) (c) Drainage canal (unlined channel with length 4,620 m) (d) Farm road (length 2,500 m) (e) Related structures (Lump Sum)
(10) Required Cost	Tsh. 447 Million (US$ 421,000)
(11) Executing Agency	DARI, MANREC
(12) Implementation Schedule	Three years for survey, plan, construction and follow-up of the scheme, including training of IA (see attached sheet)
(13) Expected Benefit	- Capacity of IA management is strengthened - Irrigation infrastructures are rehabilitated / improved. - Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced
(14) Assessment of Possible Problems and Bottlenecks in Implementation	- Capacity of district staff for survey, investigation, planning, and design for irrigation development schemes should be strengthened. - Scheme implementation procedure promoting farmers' participation under decentralization should be established. - Process to strengthen IA including capacity building programme for farmers should be standardized.
(15) Special Arrangements	None

<table>
<tr><td>(16) Relevant Information</td><td></td></tr>
<tr><td>(a) Agricultural Development Plan</td><td>
Main Objective:
- The main objective is to change rainfed paddy into irrigated paddy with certain area for dry season paddy according to the water availability.
- The production of vegetables by utilizing residual soil moisture in dry season is continued under the improved manner.

Cropping Outline:
<table>
<tr><th></th><th></th><th>Present</th><th>Proposed</th></tr>
<tr><td>-</td><td>Crops Applied</td><td>Paddy & Vegetables</td><td>Paddy & Vegetables</td></tr>
<tr><td>-</td><td>Paddy Yield</td><td>1.0ton/ha</td><td>4.5ton/ha</td></tr>
<tr><td>-</td><td>Cultivated Area</td><td>80ha</td><td>100ha</td></tr>
<tr><td>-</td><td>Cropping Intensity</td><td>123%</td><td>154%</td></tr>
<tr><td>-</td><td>Paddy Production</td><td>65ton</td><td>383ton</td></tr>
<tr><td>-</td><td>Project Benefit (Financial)</td><td>33MTsh</td><td>95MTsh</td></tr>
</table>
Farm Economy:
- Although the farm income is not sufficient for the living expenses in the present condition, it can cover the living expenses in the proposed condition with certain amount of reserve.
- The net farm income is enough to cover the production cost for the next cropping season and the O/M cost.
- The annual O/M cost per farm household would account for 1% of net farm income from the benefit area.
</td></tr>
<tr><td>(b) Environmental Consideration</td><td>
The potential environmental impacts identified are;
- Possible soil erosion due to clearing perennial vegetation,
- Flooding of farm land,
- Possible increase in water borne diseases,
- Negative impacts on mangrove stand and coral reef,
- Disappearance of specific flora,
- Disruption of faunal communities,
- Siltation of dams due to farming activities in catchment area,
- Population increase due to migration to the scheme area, and
- Loss of arable land due to inundation.
</td></tr>
<tr><td>(c) Evaluation</td><td>EIRR: 11%</td></tr>
</table>

(2) Project Design Matrix

Project Name: Mlemele Irrigation Scheme Duration: (3 years)

Project Area: Chake Chake District, South Pemba Region Target Group: IA members Date: August 2003

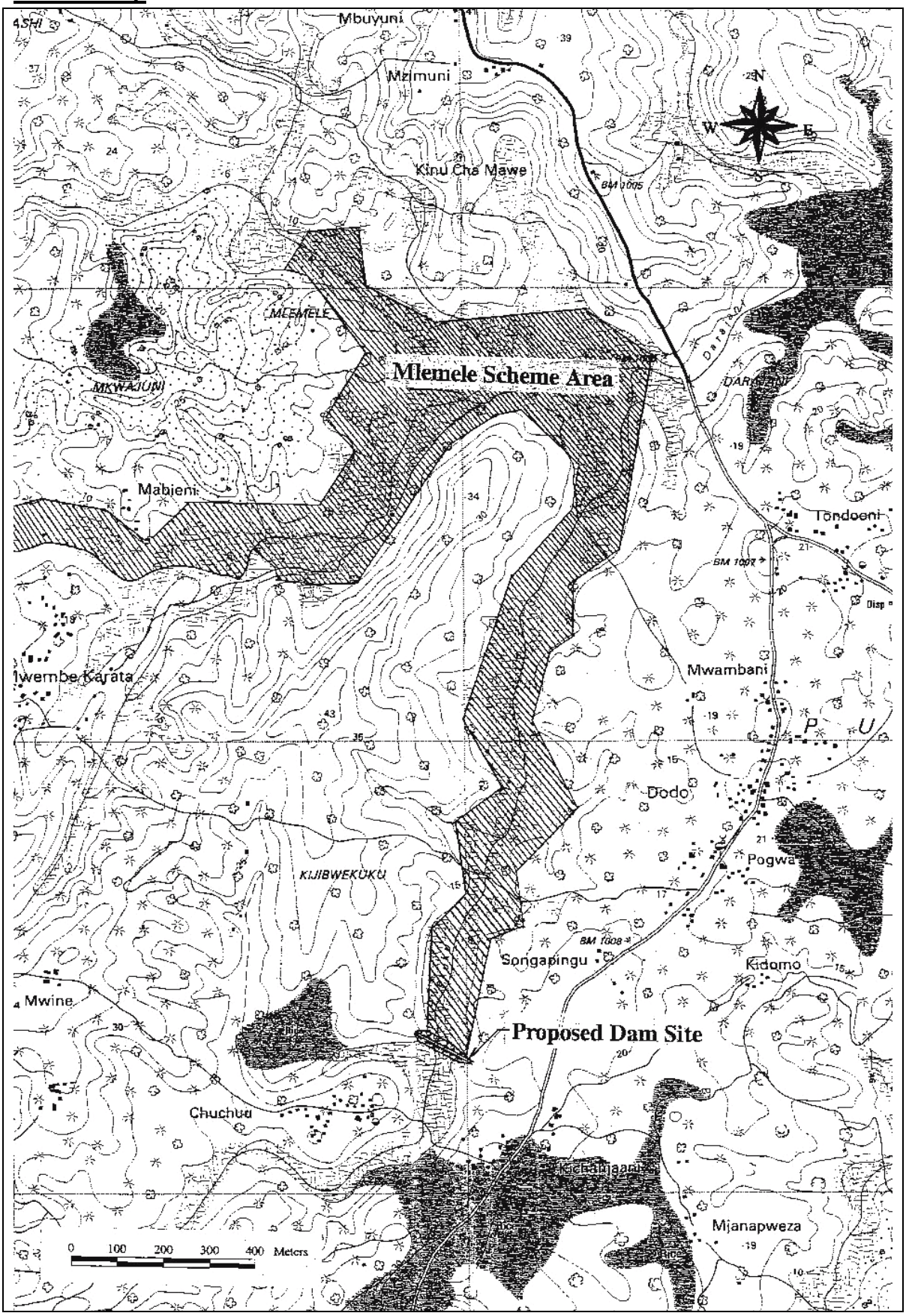
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Productivity and profitability is improved in the irrigation schemes.			
Project Purpose Ensure to supply stable irrigation water to farms	All farmers are enabled to get sufficient water according to schedule	- Scheme monitoring report	- Other agricultural sub-sectors continue to coordinate with irrigation sub-sector. - There is no drastic change of price of agricultural products.
Outputs 1. Capacity of IA management is strengthened 2. Irrigation infrastructures are rehabilitated / improved 3. Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced.	1. 80% or more farmers participate in the maintenance works 2. Rehabilitation is completed by the end of 2nd year 3. 100% of committee members are trained for O&M	- Scheme monitoring report	- There is no extreme natural disaster. - Government enforces existing rules and regulations to support IA.
Activities 1-1 Raise farmers' awareness to the scheme implementation. 1-2 Re-organize structure of IA. 1-3 Enhance leadership of committee members. 1-4 Strengthen decision making of IA. 1-5 Prepare by-laws and regulation. 1-6 Enhance financial management capacity of IA. 1-7 Promote to register IA. 2-1 Conduct survey and investigation with farmers' participation. 2-2 Carry out design works. 2-3 Make agreement on the scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 2-4 Proceed pre-implementation activities including tendering and its evaluation. 2-5 Construct irrigation infrastructures with farmers' participation. 2-6 Turn-over O&M of completed irrigation facilities to IA. 3-1 Prepare irrigation schedule and maintenance plan. 3-2 Conduct water distribution. 3-3 Conduct maintenance works. 3-4 Enhance skills to mediate and resolve water disputes among members and with outside people. 3-5 Monitor performance of scheme.	**Inputs** **Donor** - Training cost - Rehabilitation and improvement cost - Vehicles and Equipment - Cost for engineering services	**GOZ** (1) DARI Manpower - Technical Staff in DARI (2) DADO Manpower - District officer Others Project office space Recurrent cost for scheme implementation (3) Farmers - 20% of rehabilitation and improvement cost	- Local government staff continuously supports IA. **Pre-conditions** - GOZ raises all project funds including foreign currency portion, local currency portion, and recurrent expenditures. - Necessary officer and facilities are provided by donors and GOZ.

Implementation Schedule for Mlemele Irrigation Scheme

	Activities	Expected Results	Month and Year: 1st Year (1 2 3 4 5 6 7 8 9 10 11 12) / 2nd Year (1 2 3 4 5 6 7 8 9 10 11 12) / 3rd Year (1 2 3 4 5 6 7 8 9 10 11 12)	Agencies in charge	Input	Remarks
1-1	Raise farmers' awareness to the project implementation.	Capacity of IA management is strengthened		DARI	Manpower DARI, DADO, Consultants, Equipment Training facilities, Vehicles, and Training Equipment	·Capacity of DARI staff for IA establishment and management will be strengthened by training Programme
1-2	Re-organize structure of IA.		Follow-up; Follow-up			
1-3	Enhance leadership of committee members.					
1-4	Strengthen decision making of IA.					
1-5	Prepare by-laws and regulation.					
1-6	Enhance financial management capacity of IA.		Training			
1-7	Promote to register IA.					
2-1	Conduct survey and investigation with farmers' participation.	Irrigation infrastructures are rehabilitated / improved.		DARI	Manpower DARI, DADO, Consultants, and Contractor Equipment Vehicles and Survey Equipment	·Technical Support will be provided by DARI ·Farmers participate in parts of civil works, such as excavation of irrigation and drainage canals
2-2	Carry out design works.					
2-3	Make agreement on the project implementation					
2-4	Proceed pre-implementation activities including tendering and its evaluation.					
2-5	Construct irrigation infrastructures with farmers' participation.					
2-6	Turn-over O&M of completed irrigation facilities to IA.		Follow-up			
3-1	Prepare irrigation schedule and maintenance plan.	Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced		DARI	Manpower DARI, DADO, Farmers, Consultants Equipment Training facilities, Vehicles, and Training Equipment	·Technical Support will be provided by DARI
3-2	Conduct water distribution.					
3-3	Conduct maintenance works.		Training			
3-4	Enhance skills to mediate and resolve water disputes					
3-5	Monitor performance of scheme.					
	Relevant Activities to the Project					
A	Conduct EIA.			MANREC	MANREC, Consultants	
B	Conduct farmers' training for farming practice			DARI	DARI, DADO, Consultants	

Remarks :

Scheme Map


Mbuyuni
Mzimuni
Kinu Cha Mawe
MLEMELE
MKWAJUNI
Mlemele Scheme Area
Mabieni
Tondoeni
Mwambani
Iwembe Kyata
Dodo
Pogwa
KIJIBWEKUKU
Songapingu
Kidomo
Mwine
Proposed Dam Site
Chuchuu
Mjanapweza
0 100 200 300 400 Meters

Photographs

Ephemeral River

Proposed pond site

Burning of plant residue

Seeding

Interview with farmers

Washing beside small pond

2. Makwararani Irrigation Scheme

(1) Project Proposal

(1) Title of Programme	Makwararani Irrigation Scheme
(2) Location	Six villages, namely, Mtakao, Kivugo, Kichangani, Michungani, Njuguni and Mapofu, Micheweni District, North Pemba Region, Pemba Island. (see attached location map)
(3) Objectives of Project	To ensure irrigation water for the scheme through construction of small dam and rehabilitation of existing irrigation canal system, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
(4) Site Description	The scheme area occupies most of Micheweni District lying on the eastern part of the North Pemba Region in 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.
(5) Scheme Description	The Makwararani Scheme is characterized as a water harvesting scheme. In 1993, ILO gave a financial support to the implementation of Makwararani Scheme, namely construction of dam for irrigation purpose. The constructed dam was however collapsed by flood occurred after six months from its completion, and since then the scheme has not functioned. In consideration of high potential for irrigation development of the area, MANREC proposed a rehabilitation plan for the area. Total number of farmers related to the scheme is approximated at 280. While presently no IA was organized, necessary farmers' activities for irrigated agriculture should be carried out as a group of IA.
(6) Problems identified in the Study	<u>Institution</u> - No IA. The farmers don't have any experiences of managing a IA. - Weak ownership and financial base of farmers <u>Irrigation and Drainage</u> - Deterioration of small dam due to less technical consideration during planning and design periods. - Suspension of irrigation canal construction. - No experience of irrigated farming. <u>Agriculture</u> - Determination of scheme area only by land resources - Proper Estimation of Project Area - Crop failure due to water shortage during flowering stage Adequate Water Supply

	- Flood - Proper Flood Protection - Low affordability to inputs such as fertilizer - Ensuring of Inputs - Difficulty in marketing of fruit crops due to poor transportation means - Establishment of Proper Approach to Marketing
(7) Component of Project	The proposed contents of the Scheme are as follows: 1. Strengthening of Capacity of IA management 1-1 Farmers' awareness to the scheme 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 Prevarication 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 scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 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.
(8) Irrigation and Drainage Development Plan	<u>Basic Approach</u> To exploit the limited water source by re-constructing small dam. <u>Development Plan</u> The proposed scheme area is 72 ha in net. The scheme exploits new water source for irrigation development by re-constructing a small dam. A small dam with a reservoir capacity of about 200,000 m3 is proposed at same dam axis with the collapsed dam although proper foundation treatment is essential. The proposed main irrigation canals will run along foot-range of both side hills toward downstream. No minor irrigation canals are required because of direct supply to fields from main irrigation canal through field ditches to be constructed by farmers. In addition, the scheme includes construction of drainage canal and farm road. The

<table>
<tr><td></td><td>proposed construction works for the scheme are as follows:
(a) Small earthfill dam (height 2m x length 150 m)
(b) Main irrigation canal (unlined canal with length 8,950 m)
(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>(10) Required Cost</td><td>Tsh. 580 Million (US$ 546,000)</td></tr>
<tr><td>(11) Executing Agency</td><td>DARI, MANREC</td></tr>
<tr><td>(12) Implementation Schedule</td><td>Three years for survey, plan, construction and follow-up of the scheme, including training of IA
(see attached sheet)</td></tr>
<tr><td>(13) Expected Benefit</td><td>- Capacity of IA management is strengthened
- Irrigation infrastructures are rehabilitated / improved.
- Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced</td></tr>
<tr><td>(14) Assessment of Possible Problems and Bottlenecks in Implementation</td><td>- Capacity of district staff for survey, investigation, planning, and design for irrigation development schemes should be strengthened.
- Scheme implementation procedure promoting farmers' participation under decentralization should be established.
- Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
<tr><td>(15) Special Arrangements</td><td>None</td></tr>
<tr><td>(16) Relevant Information</td><td></td></tr>
<tr><td>(a) Agricultural Development Plan</td><td><u>Main Objective:</u>
- The main objective is to change rainfed paddy into irrigated paddy with certain area for dry season paddy according to the water availability.
- The production of vegetables by utilizing residual soil moisture in dry season is introduced.

<u>Cropping Outline:</u>
<table><tr><th></th><th></th><th><u>Present</u></th><th><u>Proposed</u></th></tr><tr><td>-</td><td>Crops Applied</td><td>Paddy</td><td>Paddy & Vegetables</td></tr><tr><td>-</td><td>Paddy Yield</td><td>2.0ton/ha</td><td>4.5ton/ha</td></tr><tr><td>-</td><td>Cultivated Area</td><td>72ha</td><td>126ha</td></tr><tr><td>-</td><td>Cropping Intensity</td><td>100%</td><td>175%</td></tr><tr><td>-</td><td>Paddy Production</td><td>144ton</td><td>486ton</td></tr><tr><td>-</td><td>Project Benefit (Financial)</td><td>6MTsh</td><td>118MTsh</td></tr></table>
<u>Farm Economy:</u>
- The farm income is sufficient for the living expenses even in the present condition and the reserve can be increased about 40% under the proposed condition.
- The net farm income is enough to cover the production cost for the next cropping season and the O/M cost.
- The annual O/M cost per farm household would account for</td></tr>
</table>

	1.5% of net farm income from the benefit area.
(b) Environmental Consideration	The potential environmental impacts identified are; - Possible soil erosion due to clearing perennial vegetation, - Land use conflict between crop producers and livestock keepers, - Possible increase in water borne diseases, - Disappearance of specific flora, - Disruption of faunal communities, - Siltation of dams due to farming activities in catchment area, - Population increase due to migration to the scheme area, and - Loss of arable land due to inundation.
(c) Evaluation	EIRR: 14%

(2) Project Design Matrix

Project Name: Makwararani Irrigation Scheme Duration: (3 years)

Project Area:Micheweni District, North Pemba Region Target Group: IA members Date: August 2003

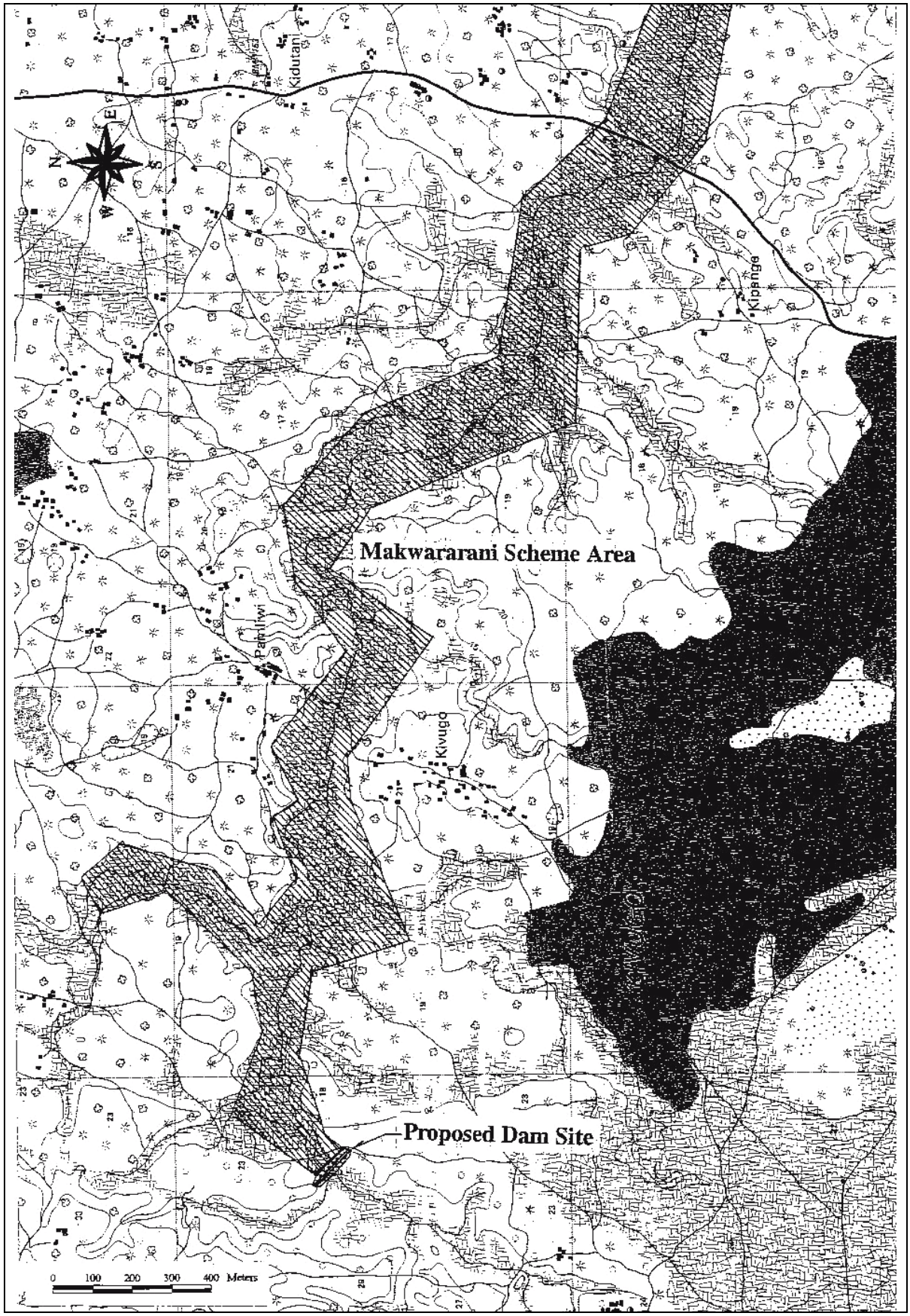
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Productivity and profitability is improved in the irrigation schemes.			
Project Purpose Ensure to supply stable irrigation water to farms	All farmers are enabled to get sufficient water according to schedule	- Scheme monitoring report	- Other agricultural sub-sectors continue to coordinate with irrigation sub-sector. - There is no drastic change of price of agricultural products.
Outputs 1. Capacity of IA management is strengthened 2. Irrigation infrastructures are rehabilitated / improved 3. Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced.	1. 80% or more farmers participate in the maintenance works 2. Rehabilitation is completed by the end of 2nd year 3. 100% of committee members are trained for O&M	- Scheme monitoring report	- There is no extreme natural disaster. - Government enforces existing rules and regulations to support IA.
Activities 1-1 Raise farmers' awareness to the scheme implementation. 1-2 Re-organize structure of IA. 1-3 Enhance leadership of committee members. 1-4 Strengthen decision making of IA. 1-5 Prepare by-laws and regulation. 1-6 Enhance financial management capacity of IA. 1-7 Promote to register IA. 2-1 Conduct survey and investigation with farmers' participation. 2-2 Carry out design works. 2-3 Make agreement on the scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 2-4 Proceed pre-implementation activities including tendering and its evaluation. 2-5 Construct irrigation infrastructures with farmers' participation. 2-6 Turn-over O&M of completed irrigation facilities to IA. 3-1 Prepare irrigation schedule and maintenance plan. 3-2 Conduct water distribution. 3-3 Conduct maintenance works. 3-4 Enhance skills to mediate and resolve water disputes among members and with outside people. 3-5 Monitor performance of scheme.	**Inputs** **Donor** - Training cost - Rehabilitation and improvement cost - Vehicles and Equipment - Cost for engineering services	**GOZ** (1) DARI Manpower - Technical Staff in DARI (2) DADO Manpower - District officer Others Project office space Recurrent cost for scheme implementation (3) Farmers - 20% of rehabilitation and improvement cost	- Local government staff continuously supports IA. **Pre-conditions** - GOZ raises all project funds including foreign currency portion, local currency portion, and recurrent expenditures. - Necessary officer and facilities are provided by donors and GOZ.

Implementation Schedule for Makwararani Irrigation Scheme

	Activities	Expected Results	Month and Year	Agencies in charge	Input	Remarks
			1st Year: 1 2 3 4 5 6 7 8 9 10 11 12 / 2nd Year: 1 2 3 4 5 6 7 8 9 10 11 12 / 3rd Year: 1 2 3 4 5 6 7 8 9 10 11 12			
1-1	Raise farmers' awareness to the project implementation.	Capacity of IA management is strengthened		DARI	Manpower DARI, DADO, Consultants, Equipment Training facilities, Vehicles, and Training Equipment	·Capacity of DARI staff for IA establishment and management will be strengthened by training Programme
1-2	Re-organize structure of IA.		Follow-up; Follow-up			
1-3	Enhance leadership of committee members.					
1-4	Strengthen decision making of IA.					
1-5	Prepare by-laws and regulation.					
1-6	Enhance financial management capacity of IA.		Training			
1-7	Promote to register IA.					
2-1	Conduct survey and investigation with farmers' participation.	Irrigation infrastructures are rehabilitated / improved.		DARI	Manpower DARI, DADO, Consultants, and Contractor Equipment Vehicles and Survey Equipment	·Technical Support will be provided by DARI ·Farmers participate in parts of civil works, such as excavation of irrigation and drainage canals
2-2	Carry out design works.					
2-3	Make agreement on the project implementation					
2-4	Proceed pre-implementation activities including tendering and its evaluation.					
2-5	Construct irrigation infrastructures with farmers' participation.					
2-6	Turn-over O&M of completed irrigation facilities to IA.		Follow-up			
3-1	Prepare irrigation schedule and maintenance plan.	Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced		DARI	Manpower DARI, DADO, Farmers, Consultants Equipment Training facilities, Vehicles, and Training Equipment	·Technical Support will be provided by DARI
3-2	Conduct water distribution.		Training			
3-3	Conduct maintenance works.					
3-4	Enhance skills to mediate and resolve water disputes					
3-5	Monitor performance of scheme.					
	Relevant Activities to the Project					
A	Conduct EIA.			MANREC	MANREC, DADO, Consultants	
B	Conduct farmers' training for farming practice			DARI	DARI, DADO, Consultants	

Remarks :

Scheme Map


Kidutani
Kipange
Makwararani Scheme Area
Pamilwi
Kivuga
Proposed Dam Site
0 100 200 300 400 Meters

Photographs

Original water course

Reservoir area

Constructed spillway

Command area

Land preparation before rainy season

Interview with farmers

3. Bumbwi Sudi Irrigation Scheme

(1) Project Proposal

(1) Title of Programme	Bumbwi Sudi Irrigation Scheme
(2) Location	Eleven villages, namely, Mwache-Alale, Dole, Bumbwi-Sudi, Mguzuni, Kitundu, Ndagaa, Mwakaje, Kiboje, Mfenesini, Kizimbani and Miwani, West District, Urban West Region, Unguja Island. (see attached location map)
(3) Objectives of Project	To ensure irrigation water for the scheme through rehabilitation of pump system and construction of pond to store surface water, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
(4) Site Description	The Bumbwi Sudi Scheme is characterized as a pump irrigation scheme. The scheme area occupies most area of West District located at the northern part of Urban West Region in Unguja Island. Administratively, it includes 11 villages such as 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 all-weathered 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 rather plentiful aquifer underground, groundwater has been extracted for various purposes including irrigation since old times. Flush water flows into the scheme area from surrounded hilly areas during flood, however no stable watercourses exist because of irregularity of 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. While having rather abundant precipitation in quantity in a year, irrigation is definitely essential for crop cultivation in the dry season and also in the rainy season as supplemental purpose.
(5) Scheme Description	Total number of farmers related to the scheme is approximated at 469 with 22 IAs. The scheme area is composed of 7 Irrigation Fields. Moreover, each Irrigation Field is subdivided into several irrigation blocks. Water users are grouped at the basis of each irrigation block unit covered by concerned irrigation canal. Currently 4 pumps out of 12 existing pumps are operational, so that 30 ha only are supplied with irrigation water in spite of the total irrigable area of 560 ha. The scheme plan aims to improve the existing irrigation system, to utilize the existing bore-holes effectively, and to promote the use of surface water positively, to minimize operation cost of pump. Since presently irrigated area is far below from total potential irrigable area of 560 ha, it is highly required to execute improvement work to make present unused active bore-holes utilize effectively. Also, it is worth considering a remodelling of the present irrigation system in a concept of conjunctive use of groundwater and surface water from a viewpoint of effective use of limited water source.

(6) Problems identified in the Study	Institution - 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 the farmers. - The management of IA is still insufficient. There is no general meeting. The bylaw 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, meeting and etc. 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 due to illicit water tapping. - Damage of canals by livestock. - Lack of O&M fund. Agriculture - Inappropriate distribution size of holding under irrigation condition - Appropriate Holding Size - Water shortage due to poor water management - Adequate Water Supply - Laborious weed control - Proper Farming Practice - Input problems such as unavailability of tractor, high fertilizer cost and seed impurity - Ensuring of Inputs - Lack of storage facilities for farm products - Establishment of Proper Approach to Marketing
(7) Component of Project	The proposed contents of the Scheme are as follows: 1. Strengthening of Capacity of IA management 1-1 Farmers' awareness to the scheme 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 Prevarication 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 scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 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.
(8) Irrigation and Drainage Development Plan	Basic Approach To apply conjunctive use of groundwater and surface water to minimize operation cost for pump. Development Plan The proposed scheme area is 560 ha in net. Major works in pump irrigation system consist of installation of submergible pump, bore-hole drilling and rehabilitation of irrigation canal with lining. Since the cost of irrigation water by pump is high, canal lining is important to minimize conveyance loss. In addition, a measuring device should be installed at beginning of main canal and division points, to make strict water management. A pond which is regarded as an additional water source for conjunctive use of surface water, is constructed. Drainage canal is constructed to eliminate excess water from fields. Farm road is also constructed for easy transportation of agricultural products. The proposed construction works for the scheme are as follows: (a) Submergible 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) (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)
(10) Required Cost	Tsh. 1,965 Million (US$ 1,849,000)
(11) Executing Agency	DARI, MANREC
(12) Implementation	Three years for survey, plan, construction and follow-up of the scheme, including training of IA

Schedule	(see attached sheet)
(13) Expected Benefit	- Capacity of IA management is strengthened - Irrigation infrastructures are rehabilitated / improved. - Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced
(14) Assessment of Possible Problems and Bottlenecks in Implementation	- Capacity of district staff for survey, investigation, planning, and design for irrigation development schemes should be strengthened. - Scheme implementation procedure promoting farmers' participation under decentralization should be established. - Process to strengthen IA including capacity building programme for farmers should be standardized.
(15) Special Arrangements	None
(16) Relevant Information	
(a) Agricultural Development Plan	Main Objective: - The main objective is to increase the area of irrigated paddy by changing the surrounding rainfed field into irrigated condition with higher cropping intensity. - The production of vegetables under irrigation condition is introduced during dry season for the area with high infiltration rate that is about 25% of the total area. Cropping Outline: - Crops Applied: Present: Paddy; Proposed: Paddy & Vegetables - Paddy Yield: Present: 2.0/3.2ton/ha; Proposed: 4.5ton/ha - Cultivated Area: Present: 448ha; Proposed: 670ha - Cropping Intensity: Present: 117%; Proposed: 175% - Paddy Production: Present: 1,134ton; Proposed: 2,700ton - Project Benefit (Financial): Present: 101MTsh; Proposed: 554MTsh Farm Economy: - Although the farm income hardly sustains the living expenses in the present condition, considerable amount of reserve can be kept under the proposed condition. - The net farm income is enough to cover the production cost for the next cropping season and the O/M cost. - The annual O/M cost per farm household would account for 4.5% of net farm income from the benefit area.
(b) Environmental Consideration	The potential environmental impacts identified are; - Decreasing habitat of migratory birds, - Possible soil erosion due to clearing perennial vegetation, - Land use conflict between crop producers and livestock keepers, - Possible increase in water borne diseases, - Disruption of faunal communities, and - Population increase due to migration to the scheme area.
(c) Evaluation	EIRR: 16%

(2) Project Design Matrix

Project Name: Bumbwi Sudi Irrigation Scheme Duration: (3 years)

Project Area: West District, Urban West Region Target Group: IA members Date: August 2003

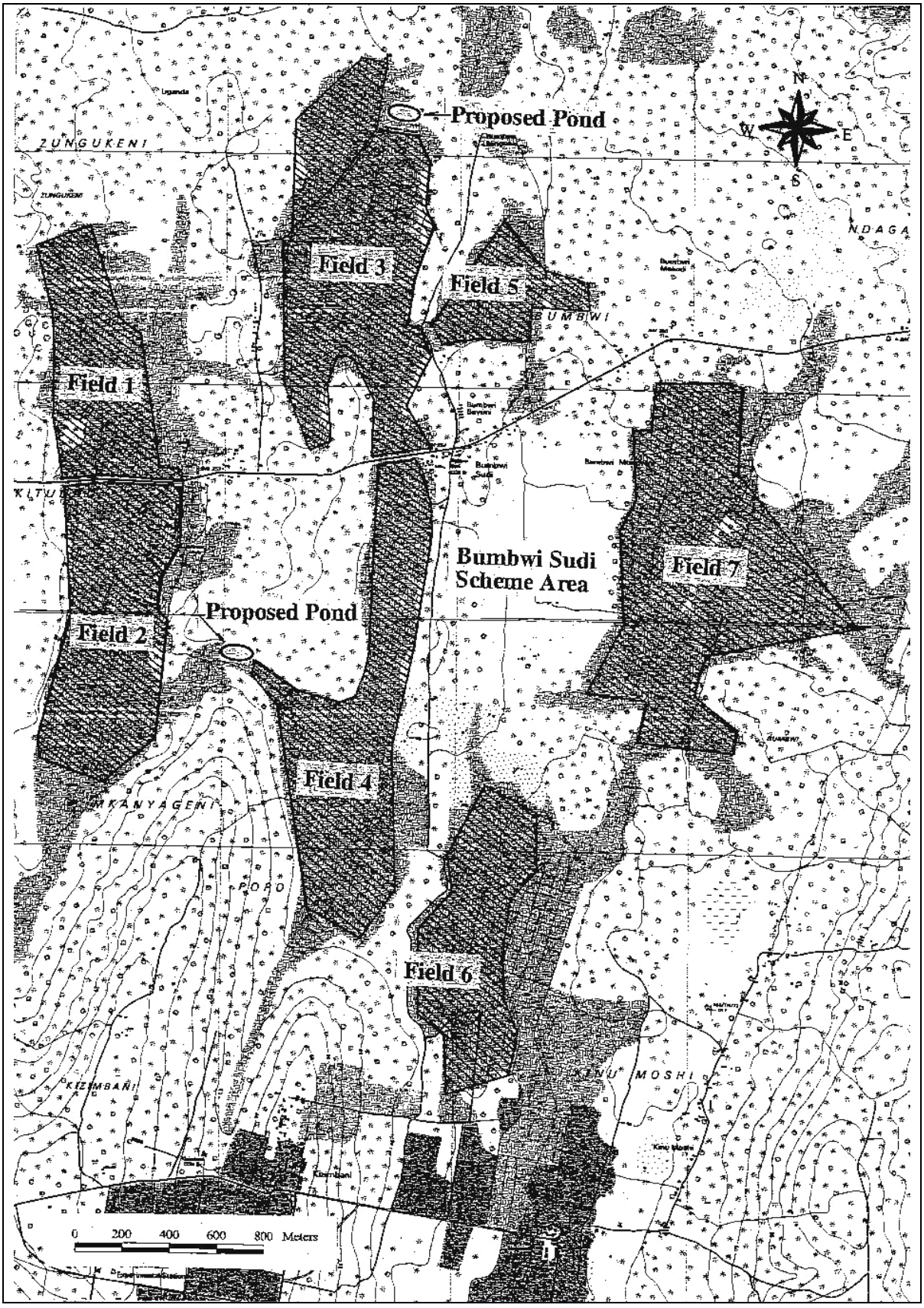
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Productivity and profitability is improved in the irrigation schemes.			
Project Purpose Ensure to supply stable irrigation water to farms	All farmers are enabled to get sufficient water according to schedule	- Scheme monitoring report	- Other agricultural sub-sectors continue to coordinate with irrigation sub-sector. - There is no drastic change of price of agricultural products.
Outputs 1. Capacity of IA management is strengthened 2. Irrigation infrastructures are rehabilitated / improved 3. Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced.	1. 80% or more farmers participate in the maintenance works 2. Rehabilitation is completed by the end of 2nd year 3. 100% of committee members are trained for O&M	- Scheme monitoring report	- There is no extreme natural disaster. - Government enforces existing rules and regulations to support IA.
Activities 1-1 Raise farmers' awareness to the scheme implementation. 1-2 Re-organize structure of IA. 1-3 Enhance leadership of committee members. 1-4 Strengthen decision making of IA. 1-5 Prepare by-laws and regulation. 1-6 Enhance financial management capacity of IA. 1-7 Promote to register IA. 2-1 Conduct survey and investigation with farmers' participation. 2-2 Carry out design works. 2-3 Make agreement on the scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 2-4 Proceed pre-implementation activities including tendering and its evaluation. 2-5 Construct irrigation infrastructures with farmers' participation. 2-6 Turn-over O&M of completed irrigation facilities to IA. 3-1 Prepare irrigation schedule and maintenance plan. 3-2 Conduct water distribution. 3-3 Conduct maintenance works. 3-4 Enhance skills to mediate and resolve water disputes among members and with outside people. 3-5 Monitor performance of scheme.	**Inputs** **Donor** - Training cost - Rehabilitation and improvement cost - Vehicles and Equipment - Cost for engineering services **GOZ** (1) DARI Manpower - Technical Staff in DARI (2) DADO Manpower - District officer Others Project office space Recurrent cost for scheme implementation (3) Farmers - 20% of rehabilitation and improvement cost		- Local government staff continuously supports IA. **Pre-conditions** - GOZ raises all project funds including foreign currency portion, local currency portion, and recurrent expenditures. - Necessary officer and facilities are provided by donors and GOZ.

Implementation Schedule for Bumbwi Sudi Irrigation Scheme

	Activities	Expected Results	Month and Year (1st Year / 2nd Year / 3rd Year)	Agencies in charge	Input	Remarks
1-1	Raise farmers' awareness to the project implementation.	Capacity of IA management is strengthened		DARI	Manpower DARI, DADO, Consultants, Equipment Training facilities, Vehicles, and Training Equipment	·Capacity of DARI staff for IA establishment and management will be strengthened by training Programme
1-2	Re-organize structure of IA.		Follow-up / Follow-up			
1-3	Enhance leadership of committee members.					
1-4	Strengthen decision making of IA.					
1-5	Prepare by-laws and regulation.					
1-6	Enhance financial management capacity of IA.		Training			
1-7	Promote to register IA.					
2-1	Conduct survey and investigation with farmers' participation.	Irrigation infrastructures are rehabilitated / improved.		DARI	Manpower DARI, DADO, Consultants, and Contractor Equipment Vehicles and Survey Equipment	·Technical Support will be provided by DARI ·Farmers participate in parts of civil works, such as excavation of irrigation and drainage canals
2-2	Carry out design works.					
2-3	Make agreement on the project implementation					
2-4	Proceed pre-implementation activities including tendering and its evaluation.					
2-5	Construct irrigation infrastructures with farmers' participation.					
2-6	Turn-over O&M of completed irrigation facilities to IA.		Follow-up			
3-1	Prepare irrigation schedule and maintenance plan.	Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced		DARI	Manpower DARI, DADO, Farmers, Consultants Equipment Training facilities, Vehicles, and Training Equipment	·Technical Support will be provided by DARI
3-2	Conduct water distribution.		Training			
3-3	Conduct maintenance works.					
3-4	Enhance skills to mediate and resolve water disputes					
3-5	Monitor performance of scheme.					
	Relevant Activities to the Project					
A	Conduct EIA.			MANREC	MANREC, DADO, Consultants	
B	Conduct farmers' training for farming practice			DARI	DARI, DADO, Consultants	

Remarks :

Scheme Map


Proposed Pond
ZUNGUKENI
N
W
E
S
NDAGA
Field 3
Field 5
BUMBWI
Field 1
Bumbwi Sudi
Scheme Area
Field 7
Proposed Pond
Field 2
Field 4
MKANYAGENI
PORO
Field 6
KIZIMBANI
KINU
MOSHI
0 200 400 600 800 Meters

Photographs

Active pump station

Damaged pump station

Proposed pond site

Transplanting of rainy season paddy

RRA meeting with farmers

Farmers and JICA Study Team

4. Chaani Irrigation Scheme

(1) Project Proposal

(1) Title of Programme	Chaani Irrigation Scheme
(2) Location	Seven villages, namely, Chaani, Kentwa, Mbuzini, Gamba, Kandwi, Kivunge and Mkwajuni, North-A District, North-Unguja Region, Unguja Island. (see attached location map)
(3) Objectives of Project	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.
(4) Site Description	The scheme area covers most of North-A District situated at the southern part of the North-Unguja Region in Unguja Island. It administratively includes 7 villages: Chaani, Kentwa, Mbuzini, Gamba, Kandwi, Kivunge and Mkwajuni. Access to the scheme area in the Chaani village is 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 distinctively peaked 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 undersized catchment area of 3.6 km2, it has relative long spell of flowing period due to gushing out of sub-surface water flow. Low plane suitable for rice cultivation extends the mouth of gouge 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 Kibokwa irrigation scheme.
(5) Scheme Description	Paying attention to the higher availability of surface water of the river, Chaani Scheme was come up with, and a basic planning and designing was carried out in 1999 by an Indian ITEC expert. Total number of farmers related to the scheme is approximated at 600 households. There are two farmers groups who are taking river water by temporary weirs for irrigation purpose, in Kishima-fedha and Kijamba. The group of Kishima-fedha consists of 60 farmers with 20 acre farmlands, and Kijamba consists of 50 farmers with 40 acre farmlands.
(6) Problems identified in the Study	<u>Institution</u> - The IA is a registered association. However, it is not an optimum legal form for the IA. - The bylaw 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, meeting and etc.

	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. Agriculture - Laborious weed control - Ensuring of Inputs - Input problems such as unavailability of tractor and high fertilizer cost - Ensuring of Inputs
(7) Component of Project	The proposed contents of the Scheme are as follows: 1. Strengthening of Capacity of IA management 1-1 Farmers' awareness to the scheme 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 Prevarication 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 scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 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.
(8) Irrigation and Drainage Development Plan	Basic Approach To exploit additional water source by providing small dam at low cost. Development Plan The proposed scheme area is 250 ha in net. A small dam with a reservoir capacity of about 80,000 m3 is proposed at new axis crossing the Bwabwaja river, to supply irrigation water to the command area. Impounded water is delivered through canal

	system. Main irrigation canals will run along higher edge of the command area toward downstream. Secondary irrigation canals are also constructed up to the points where farmers can supply water to their farm plots through small ditch. Drainage canal is required to eliminate excess water from fields. Farm roads will be constructed for O & M of irrigation facilities and conveyance of agricultural products. The proposed construction works for the scheme are as follows: (a) Small earthfill dam (height 4m x length 38 m) (b) Main irrigation canal (lining canal with length 6,600 m) (c) Secondary irrigation canal (unlined canal with length 11,100 m) (d) Drainage canal (unlined canal with length 1,600 m) (e) Farm road (length 6,600 m) (f) Related structures (Lump Sum)
(10) Required Cost	Tsh. 1,477 Million (US$ 1,390,000)
(11) Executing Agency	DARI, MANREC
(12) Implementation Schedule	Three years for survey, plan, construction and follow-up of the scheme, including training of IA (see attached sheet)
(13) Expected Benefit	- Capacity of IA management is strengthened - Irrigation infrastructures are rehabilitated / improved. - Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced
(14) Assessment of Possible Problems and Bottlenecks in Implementation	- Capacity of district staff for survey, investigation, planning, and design for irrigation development schemes should be strengthened. - Scheme implementation procedure promoting farmers' participation under decentralization should be established. - Process to strengthen IA including capacity building programme for farmers should be standardized.
(15) Special Arrangements	None
(16) Relevant Information	
(a) Agricultural Development Plan	Main Objective: - The main objective is to change rainfed paddy into irrigated paddy with certain area for dry season paddy according to the water availability. - The production of vegetables by utilizing residual soil moisture in dry season is changed into vegetable production under irrigated condition. Cropping Outline: - Crops Applied: Present: Paddy & Vegetables; Proposed: Paddy & Vegetables - Paddy Yield: Present: 1.7ton/ha; Proposed: 4.5ton/ha - Cultivated Area: Present: 300ha; Proposed: 375ha - Cropping Intensity: Present: 120%; Proposed: 150% - Paddy Production: Present: 425ton; Proposed: 1,575ton

	- Project Benefit (Financial) 48MTsh 273MTsh <u>Farm Economy:</u> - Although the farm income just sustains the living expenses in the present condition, considerable amount of reserve can be kept under the proposed condition. - The net farm income is enough to cover the production cost for the next cropping season and the O/M cost. - The annual O/M cost per farm household would account for 1% of net farm income from the benefit area.
(b) Environmental Consideration	The potential environmental impacts identified are; - Decreasing habitat of migratory birds, - Possible soil erosion due to clearing perennial vegetation, - Land use conflict between crop producers and livestock keepers, - Possible increase in water borne diseases, - Frequent eruption of rats, - Disruption of faunal communities, - Siltation of dams due to farming activities in catchment area, - Population increase due to migration to the scheme area, and - Loss of arable land due to inundation.
(c) Evaluation	EIRR: 12%

(2) Project Design Matrix

Project Name: Chaani Irrigation Scheme Duration: (3 years)

Project Area: North-A District, North-Unguja Region Target Group: IA members Date: August 2003

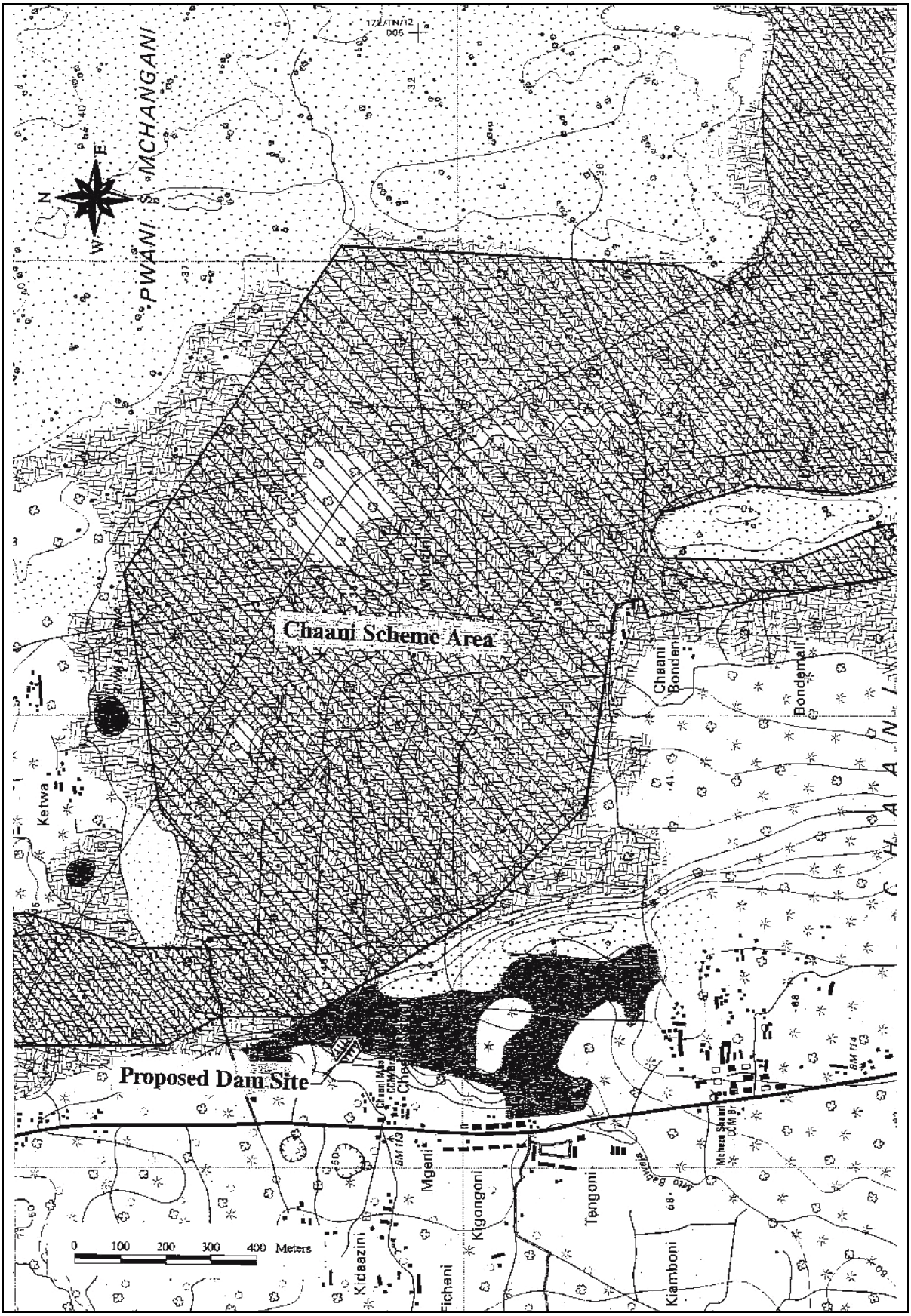
Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Productivity and profitability is improved in the irrigation schemes.			
Project Purpose Ensure to supply stable irrigation water to farms	All farmers are enabled to get sufficient water according to schedule	- Scheme monitoring report	- Other agricultural sub-sectors continue to coordinate with irrigation sub-sector. - There is no drastic change of price of agricultural products.
Outputs 1. Capacity of IA management is strengthened 2. Irrigation infrastructures are rehabilitated / improved 3. Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced.	1. 80% or more farmers participate in the maintenance works 2. Rehabilitation is completed by the end of 2nd year 3. 100% of committee members are trained for O&M	- Scheme monitoring report	- There is no extreme natural disaster. - Government enforces existing rules and regulations to support IA.
Activities 1-1 Raise farmers' awareness to the scheme implementation. 1-2 Re-organize structure of IA. 1-3 Enhance leadership of committee members. 1-4 Strengthen decision making of IA. 1-5 Prepare by-laws and regulation. 1-6 Enhance financial management capacity of IA. 1-7 Promote to register IA. 2-1 Conduct survey and investigation with farmers' participation. 2-2 Carry out design works. 2-3 Make agreement on the scheme implementation including components of rehabilitation / improvement works and farmers' contribution to the works. 2-4 Proceed pre-implementation activities including tendering and its evaluation. 2-5 Construct irrigation infrastructures with farmers' participation. 2-6 Turn-over O&M of completed irrigation facilities to IA. 3-1 Prepare irrigation schedule and maintenance plan. 3-2 Conduct water distribution. 3-3 Conduct maintenance works. 3-4 Enhance skills to mediate and resolve water disputes among members and with outside people. 3-5 Monitor performance of scheme.	**Inputs** **Donor** - Training cost - Rehabilitation and improvement cost - Vehicles and Equipment - Cost for engineering services **GOZ** (1) DARI Manpower - Technical Staff in DARI (2) DADO Manpower - District officer Others Project office space Recurrent cost for scheme implementation (3) Farmers - 20% of rehabilitation and improvement cost		- Local government staff continuously supports IA. **Pre-conditions** - GOZ raises all project funds including foreign currency portion, local currency portion, and recurrent expenditures. - Necessary officer and facilities are provided by donors and GOZ.

Implementation Schedule for Chaani Irrigation Scheme

	Activities	Expected Results	Month and Year: 1st Year (1 2 3 4 5 6 7 8 9 10 11 12) / 2nd Year (1 2 3 4 5 6 7 8 9 10 11 12) / 3rd Year (1 2 3 4 5 6 7 8 9 10 11 12)	Agencies in charge	Input	Remarks
1-1	Raise farmers' awareness to the project implementation.	Capacity of IA management is strengthened		DARI	Manpower DARI, DADO, Consultants, Equipment Training facilities, Vehicles, and Training Equipment	·Capacity of DARI staff for IA establishment and management will be strengthened by training Programme
1-2	Re-organize structure of IA.		Follow-up; Follow-up			
1-3	Enhance leadership of committee members.					
1-4	Strengthen decision making of IA.					
1-5	Prepare by-laws and regulation.					
1-6	Enhance financial management capacity of IA.		Training			
1-7	Promote to register IA.					
2-1	Conduct survey and investigation with farmers' participation.	Irrigation infrastructures are rehabilitated / improved.		DARI	Manpower DARI, DADO, Consultants, and Contractor Equipment Vehicles and Survey Equipment	·Technical Support will be provided by DARI ·Farmers participate in parts of civil works, such as excavation of irrigation and drainage canals
2-2	Carry out design works.					
2-3	Make agreement on the project implementation					
2-4	Proceed pre-implementation activities including tendering and its evaluation.					
2-5	Construct irrigation infrastructures with farmers' participation.					
2-6	Turn-over O&M of completed irrigation facilities to IA.		Follow-up			
3-1	Prepare irrigation schedule and maintenance plan.	Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced		DARI	Manpower DARI, DADO, Farmers, Consultants Equipment Training facilities, Vehicles, and Training Equipment	·Technical Support will be provided by DARI
3-2	Conduct water distribution.		Training			
3-3	Conduct maintenance works.					
3-4	Enhance skills to mediate and resolve water disputes					
3-5	Monitor performance of scheme.					
	Relevant Activities to the Project					
A	Conduct EIA.			MANREC	MANREC, DADO, Consultants	
B	Conduct farmers' training for farming practice			DARI	DARI, DADO, Consultants	

Remarks :

Scheme Map


MCHANGANI
PWANI
Chaani Scheme Area
Proposed Dam Site
Kelwa
Chaani Bondeni
Bondemari
Mgeni
Kigongoni
Tengoni
Kiamboni
Kidaazini
Fichani
0 100 200 300 400 Meters

Photographs

Proposed dam site

Original river

Command Area

Command Area

RRA meeting with farmers

A shot of RRA meeting

Appendix C

Analysis of Model Irrigation Schemes

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

Action Plan Report

APPENDIX C

ANALYSIS OF MODEL IRRIGATION SCHEMES

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APPENDIX C ANALYSIS OF MODEL IRRIGATION SCHEMES

CHAPTER 1 GENERAL

1.1 General

Field survey works such as RRA, site inspection and preliminary environmental assessment were performed for the selected 4 Model Schemes in the Master Plan Study. These are the Mlemele Irrigation Scheme and Makwararani Irrigation Scheme in Pemba Island, and the Bumbwi Sudi Irrigation Scheme and Chaani Irrigation Scheme in Unguja Island.

The MANREC has had or has prepared preliminary development plans for these schemes. The said survey works have been therefore conducted for the MANREC' development plans.

1.2 Rapid Rural Appraisal

The JICA Study Team conducted the RRA and site inspection for the Bumbwi Sudi Irrigation Scheme and Chaani Irrigation Scheme in Unguja Island, to collect the necessary data and information for preparation of Action Plan.

The purposes of Rapid Rural Appraisal (RRA) in the Study are:

- To clarify operation and maintenance on the selected irrigation schemes including water management, operation, maintenance, cost for maintenance,
- To grasp present activities of farmers' organizations including Water Users Association with linkage between the groups and government authorities, and
- To collect data and information agriculture, such as land use, agricultural production, farm inputs, production cost, and so on.

The JICA Study Team conducted RRA for Bumbwi Sudi, and Chaani Irrigation Schemes. Two days were allocated for each RRA. The general procedure in conducting RRA is as follows:

1st Day

- Opening and ice breaking
- Group works for 5 groups, such as mapping, custom related to irrigation, farming calendar by gender, gender issue, and farming calendar

- Presentation of the group discussion results by representatives of the farmers
- Group discussion for institution, operation and maintenance, and agriculture and land use

2nd Day

- Continuation of the group discussion
- Presentation of the group discussion results
- Venn diagram to identify present situation and constraint of linkage between the farmers and the government officials
- Closing

All of the RRA sessions were proceeded by two facilitators according to the above-mentioned programme. The numbers 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.

1.3 Problem and Objective Analysis

Based on the results of the site inspection and RRA in the 10 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 schemes are 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.

1.4 Development Approaches

Based on the results of the objective analyses, three approaches are identified as follows:

- Strengthening of IA management capacity,

- Construction, rehabilitation and improvement of irrigation infrastructures
- Enhancement of farmers' skills for operation and maintenance of irrigation infrastructures.

The above approaches would be the main components of the projects.

CHAPTER 2 MLEMELE IRRIGATION SCHEME

2.1 Institution

There is no farmer's organization in the area, as presently there are no irrigation facilities. Besides, there is a registered cooperative of carpenters in the village.

2.2 Irrigation and Drainage System

No irrigation practice has been seen in the scheme area, and rainfed cultivation is prevailing. Rudimentary water harvesting is possibly applicable, which is to regulate unforeseen flood flow utilizing for supplementary irrigation during dry spell in the rainy season. During field inspection, no current was observed in the two related tributaries at all. River-course of the tributaries is not distinct in the same section, river flow spreads with wide range in the valley whenever flood occurs. From the scale of catchment area, flow regime of the concerned tributaries and topographic condition, it is said that the planned storage volume of 0.33 MCM would be too large although further analysis is needed. The present dam plan would be totally examined accordingly. Complete irrigation could be hardly introduced but a supplementary irrigation is applicable, however it is effective to stable higher production level in rainy season from the present production fluctuated year by year at low level.

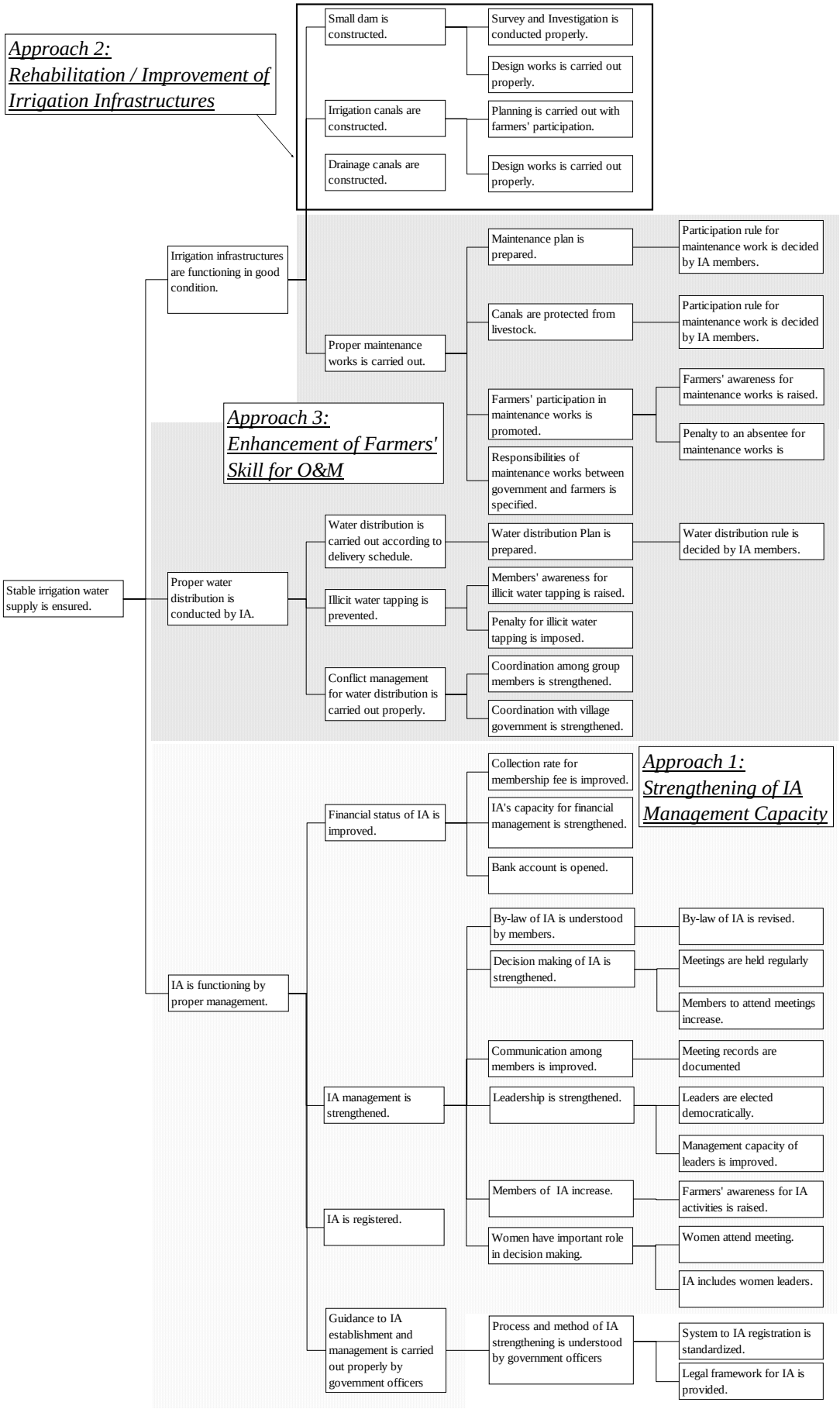
Drainage is not a critical issue in the scheme area. During flood time, flood flows in whole width of valley even in the farmlands. However, such flood flow does not bring about serious damages to cultivated farmlands because of its low velocity and short duration of passing.

2.3 Water Management, Operation and Maintenance

Farmers living in the scheme area have no experience of irrigated farming practices. After implementation of the Scheme, it is essential to conduct the training for the farmers on operation and maintenance of the irrigation scheme by the MANREC.

2.4 Objective Analysis and Development Approach

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



Mlemele Irrigation Scheme - Objective Tree

CHAPTER 3 MAKWARARANI IRRIGATION SCHEME

3.1 Institution

There is no farmer's group and organization in the area. They have only a youth group of sports in their village. According to them, however, they are ready to organize an irrigator's group to operate and maintain the irrigation facilities, if they are constructed in the future.

3.2 Irrigation and Drainage System

The constructed low fill-type dam exists at the upstream of Makwararani river with catchment area of about 5.12 km^2. The collapsed portion of the dam body was near its right abutment. The river water presently flows to the downstream through the collapsed part. The dam site is topographically suitable for reserving water effectively since it is surrounded by undulated range of hills. At present, various upland crops are cultivated in the reservoir area. Reservoir bed around dam site is composed of much saturated histic soil layer. Though it is suitable for cultivation, it is unfavourable for foundation of dam embankment. The dam collapse would be caused by piping phenomenon due to improper treatment of the foundation. Appurtenant facilities like spillway and intake are neither functional now. These facilities should be reconstructed based on the proper design.

Downstream of the dam site lies gentle-sloped valley extending over fertile farmlands. It is suitable for irrigated agriculture. The irrigation canals should be aligned at foot of hills of both sides along the river, to effectively cover the scheme area. Since the scheme area is superior suitable for irrigation development, the existing damaged dam and its appurtenant facilities should be rehabilitated as earlier as possible.

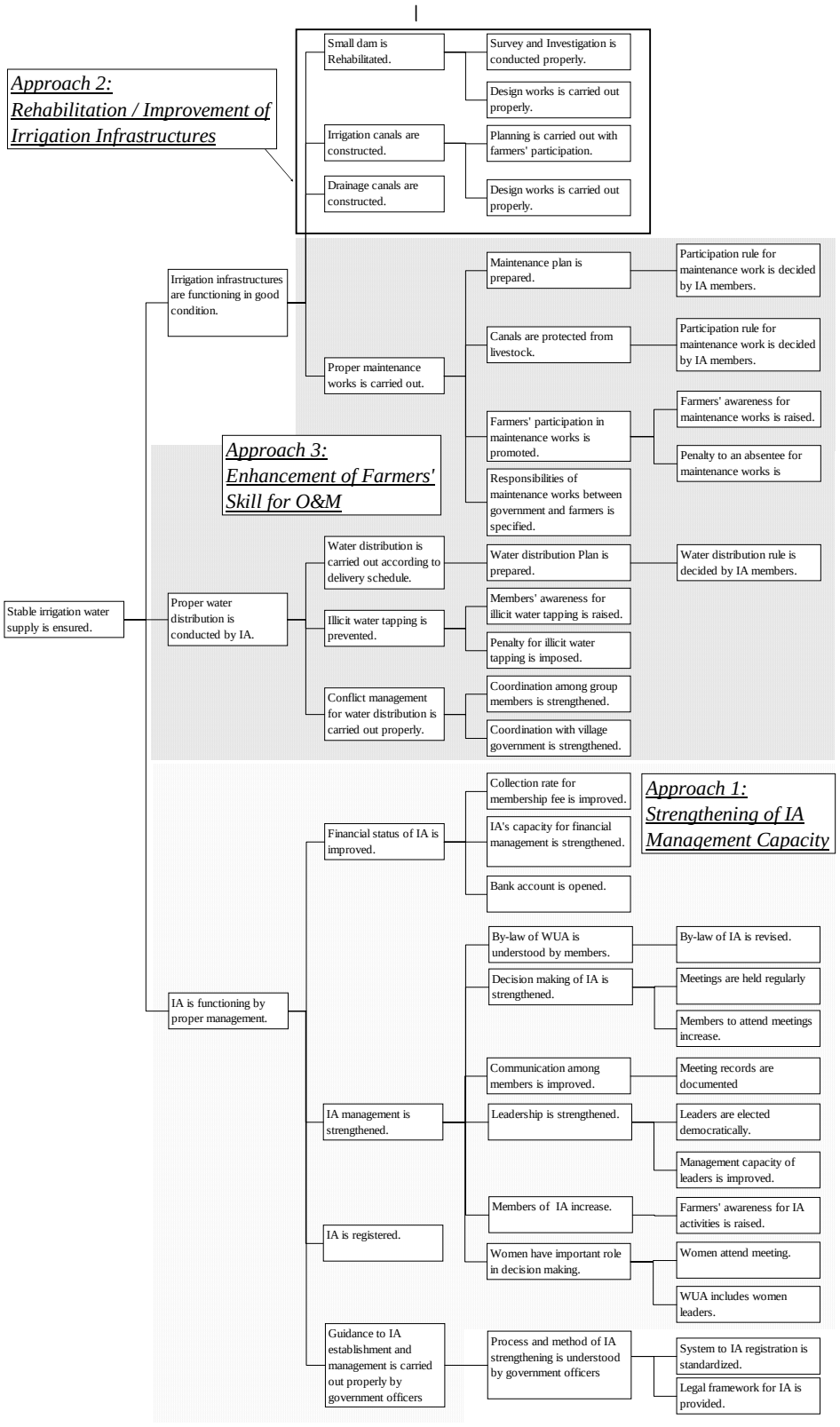
Dam collapse was due to insufficient technical considerations. In order to construct a safe and stable dam structure, comprehensive investigation in several fields is needed for sound planning and designing, and also proper construction is essential. New technology for dam construction which may not be much sophisticated but be indispensable, have to be introduced.

3.3 Water Management, Operation and Maintenance

No irrigation activity is being conducted. Farmers' training for operation and maintenance of the irrigation scheme will be essential so as to realize the sustainable management of the Scheme.

3.4 Objective Analysis and Development Approach

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



Makwararani Irrigation Scheme - Objective Tree

CHAPTER 4 BUMBWI SUDI IRRIGATION SCHEME

4.1 Institution

Bumbwi Sudi Valley Executive Committee which is a non-registered irrigator's group was founded in 1999. Under the committee there are 11 subgroups called associations, i.e. Association A to Association K. As 12 pumps were installed in the area, each association has one pump except Association A having 2 pumps.

The executive committee consists of 22 members including a chairperson, a secretary and a treasurer who were selected by secret ballot. The total number of members is 469 (male 204 and female 265) at present. Each subgroup, i.e. association, also has an executive committee which consists of 5 members including a chairperson, a secretary and a treasurer. The chairperson and the secretary of each association become the committee members of the Bumbwi Sudi Valley Executive Committee.

As for registration, they don't have any concrete plan yet. However, they prefer association to cooperative because of their past negative experience of cooperative activity. Besides, the DARI also thinks the form of association is more appropriate for irrigator's group under the present circumstances, because the association is more general and open than the cooperative in terms of membership. Generally speaking, however, the differences between the cooperative and association including their application procedures are not clearly understood by the farmers.

There is no general meeting at present. The executive committee, however, meets twice a year. As for the subgroups (associations), they meet quarterly. Their main issues for discussion cover water shortage, broken pumps, illicit water tapping and poor participation in operation and maintenance. They have the bylaw and the regulations which, however, are not always well understood by the members.

The membership is given to a farmer (male and female) by each association, who owns a cultivation right in the area entitled by the village council. The selection criteria of member, however, are not clearly defined yet and rather ambiguous.

No registration fee and membership fee are collected, but the water charge, Tsh. 400 per season and a quarter of an acre is collected by the government revenue collector. Around 150 from 469 members paid it last year. In

addition to that, some of the associations whose pumps are working collect money for expenses of lubricant oil for their pumps.

Communication with the government staffs (the village extension officer, the village council chairperson, the DADO, the site supervisor from the DARI) is generally well maintained. Issues discussed cover conflict between farmers and livestock keepers, tractor renting, pest and disease control, irrigation techniques and etc.

As for training, farmers have had several opportunities to attend the programs (paddy production) in Mkindo Farmers Training Centre (7 farmers), Kilimanjaro Agriculture Training Centre (3 farmers) and Indonesia (1 farmer) since 1997. 45 farmers also received a scheme level training on site last year. The farmers' priority subjects for future are paddy production, pest management and leadership.

4.2 Irrigation and Drainage System

The Bumbwi Sudi Irrigation Scheme was implemented as a modern pump irrigation scheme in two phases, aiming to provide stable irrigation water through a year. First phase of the Scheme was to construct five productive wells under the Development Project of Rice Cultivation and Extension in Vegetation Production cooperated by FAO/UNDP from 1974 to 1984. The constructed facilities were rehabilitated during 1982 to 1989 financed by the World Food Programme. In succession to the first phase, the second phase was additionally implemented under the Project of Smallholder Irrigated Rice Cultivations Zanzibar from 1992 to 1994, by setting up additional seven wells including several numbers of test bore-holes. As the results of these progress, a total of twenty seven bore-holes including test holes was drilled, and twelve wells out of them were installed with diesel engine driven pumps, which were later replaced with electric motors. At the moment, only four pumps out of twelve are still functional by which about only 30 ha has been irrigated. Presently design unit water requirement of 3.0 l/sec/ha has been uniformly employed for the whole scheme area. As there is a room to save water through more intensive water management, it is required for farmers to improve their skills in water management.

High operation cost of pumps is a hindrance for attaining sustainability of the scheme. As extending electricity line into the scheme area, power source of those pumps had been replaced with electric motors to save expenses in operation. However, governmental subsidiary support for the

pump operation might be unavoidable in order to keep farmers' financial viability although further study would be required.

A major reason for the dysfunction of many pumps is trouble in bore-holes. Eight bore-holes out of pump installed wells were collapsed due to rapid draw-down into the wells. As these damaged bore-holes are located closely each other, it is deemed that the collapses of bore-holes would be caused by interferences of lifting groundwater through bore-holes each other.

The elevated water tanks in the pump houses are also providing water for domestic use. Village people sometimes use the outlet basin of the pump houses as a washing place. The existing irrigation facilities of the scheme play a role of domestic use.

Drainage is a problematic issue in the scheme area. Existence of few distinctive drainage courses aggravates flooding in the rainy season. Drainage improvement is also required to reduce flood damage and to perform effective cultivation with sound mobility.

4.3 Water Management, Operation and Maintenance

4.3.1 Water Management

The irrigation schedule is decided at the meeting among farmers' group with government staff. Every active four pumps have two operators appointed by the government. The operation hour of the pump is around 10 to 11 hours per day, but no operation record is available. There is no serious problem at pump operation. The rotation irrigation is adopted in every irrigation block with two or three-day interval. The canals are operated by farmers themselves.

According to the farmers, water supply is not enough due to the low capacity of pumps and water seepage at canals. During the Vuli (the short rainy season), water conflicts occur among the farmers, and they settle insufficient water by reducing their cultivation area. The farmers informed this matter to the MANREC through the site supervisor.

4.3.2 Operation and Maintenance

The active pumps are now operated by electricity. Before electrification of pumps, the farmers' group purchased fuel with their collected money for diesel pumps. Maintenance works, being carried out by the farmers before starting cultivation, are cleaning of

pumps, desilting of canals, clearing of canals, bank forming of canals, repairing of structures, and clearing of drainage canals. Pump maintenance is a task of the government, and regular maintenance is done according to running time of the pumps. While the pump technicians at the sites are responsible for minor repairs, the other major repairs are carried out by the technician of the MANREC head office. The spare parts are managed and stocked at the MANREC head office.

Irrigation canals are maintained by farmers themselves, and maintenance work is communal. Most of the farmers attend the maintenance work, but the penalty of more than Tsh. 500 or stop of water supply is imposed if the farmer skips the attendance. The farmers pointed out that the animal intrusion to irrigation canal was a serious problem against canal maintenance, and that flood also caused canal destruction. Some of the irrigation blocks suffer from inundation for one month, and the farmers are eager for improvement of drainage system. The farmers suggest their contribution by labour force to improvement of drainage, and expect the government of equipment.

4.3.3 O&M cost:

O&M cost is collected by farmers according to the needs, and no budget is saved. O&M cost for pump is shouldered by the government, and the farmers pay only Tsh. 400 / one plot (0.1 ha) to the government every season. The farmers bear the cost of lubricants and cheap spare parts only.

Farmers express their intention to bear maximum Tsh. 1,000 of O&M cost, if the production is increased. However, the farmers think that transfer of O&M of irrigation scheme from the government to themselves is unrealistic, because O&M cost for pumps is not affordable to the farmers.

4.4 Other Special Issues

4.4.1 Farmers' expectation to government for scheme development

In connection with rehabilitation and improvement of the irrigation infrastructure, from the discussion through RRA, it was revealed that the farmers expected the government to conduct the following works:

- Construction of new boreholes and replacement of pumps,

- Canal lining to prevent leakage,
- Construction of reservoir utilized for rainwater harvesting, and
- Improvement of drainage canals.

4.4.2 Farmers' contribution for development

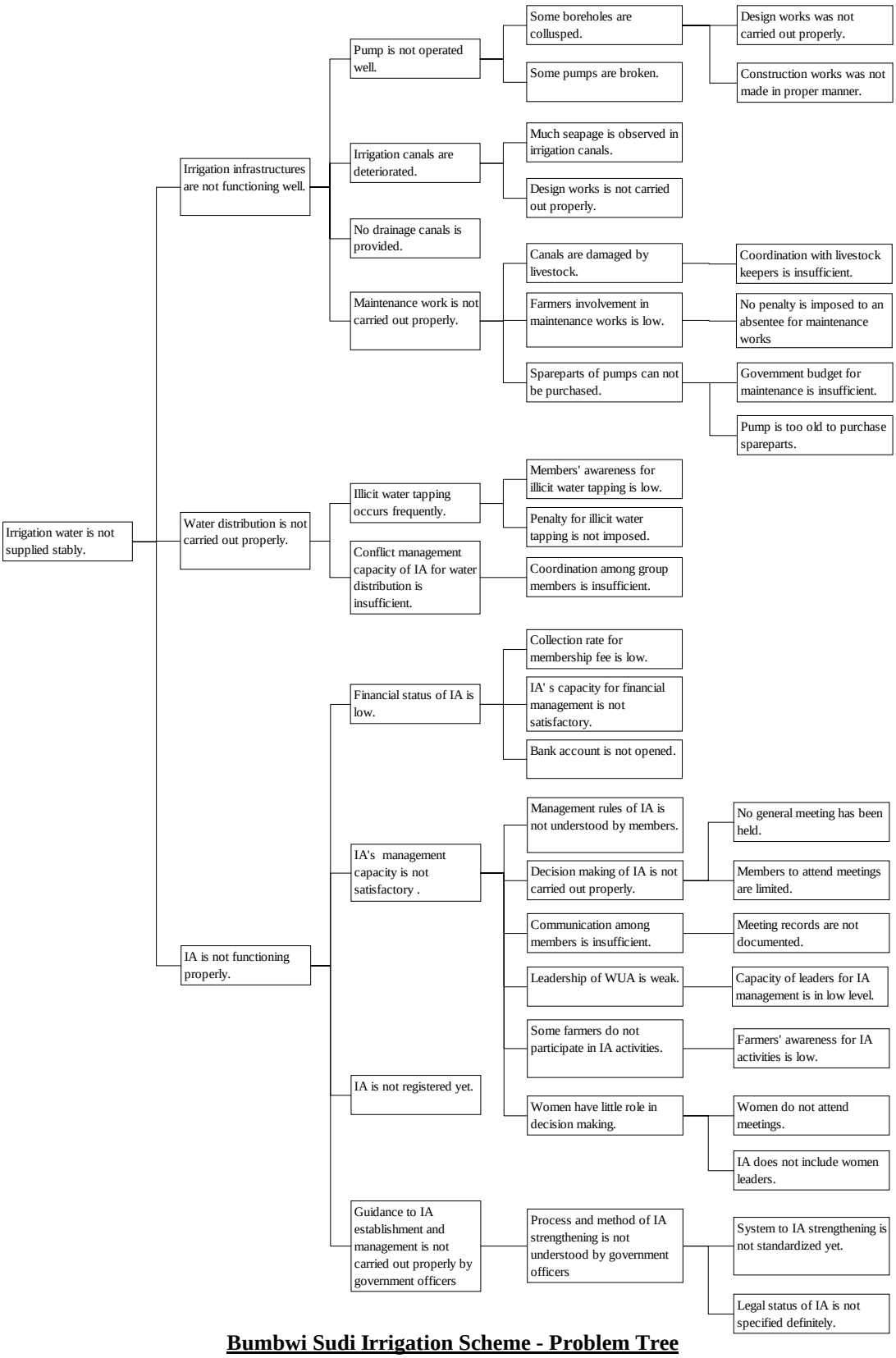
The farmers express their intention to participate in planning of canal route and construction of canals (excavation, etc.).

4.4.3 Previous farmers' participation in planning and implementation

Neither discussion with the farmers in the planning stage nor farmers' participation in construction works was conducted since the scheme was formulated and implemented as a national estate farm assisted by FAO.

4.5 Problem Analysis

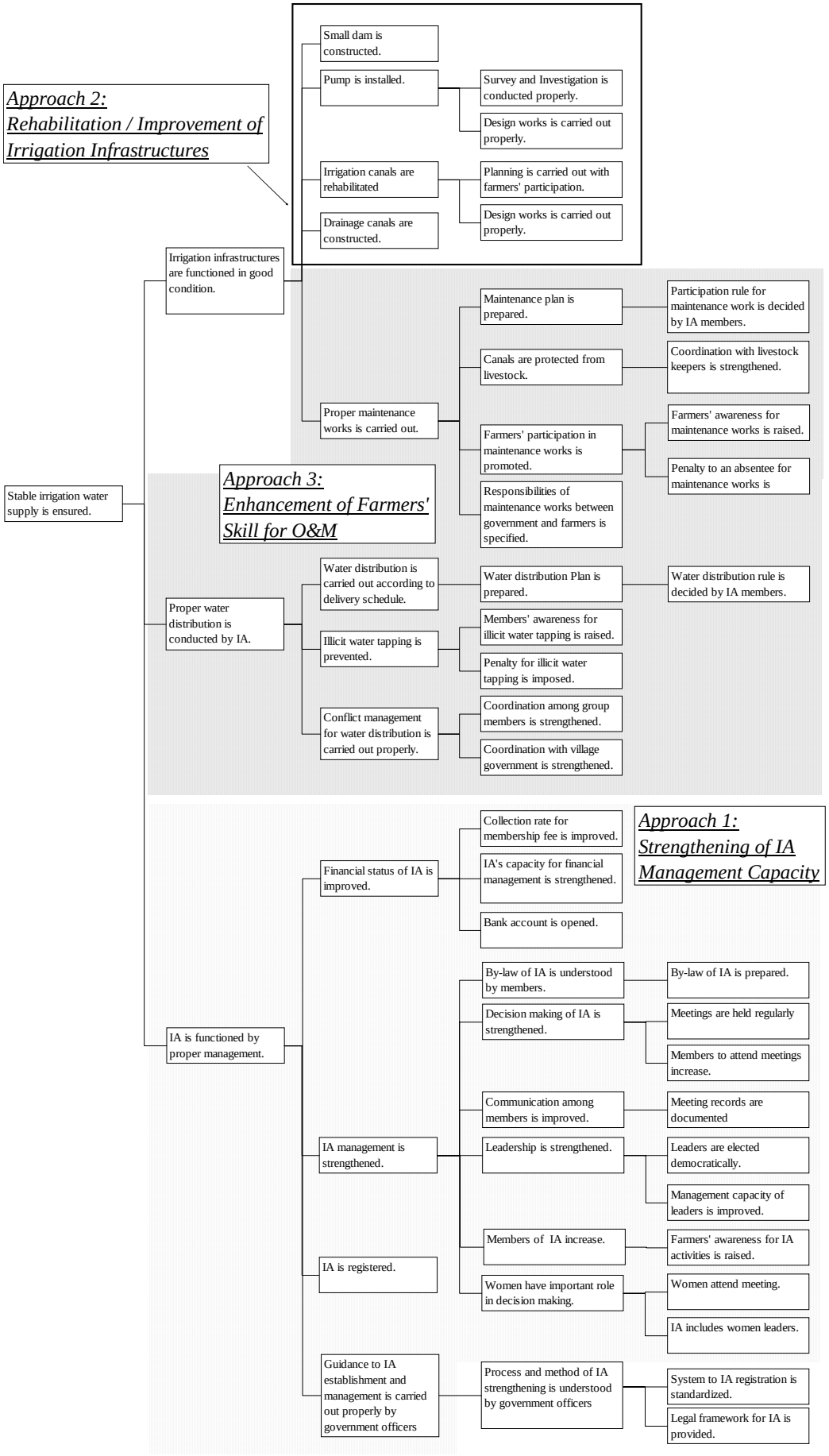
Problem tree of Bumbwi Sudi Irrigation Scheme is shown below.



Bumbwi Sudi Irrigation Scheme - Problem Tree

4.6 Objective Analysis and Development Approach

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



Bumbwi Sudi Irrigation Scheme - Objective Tree

CHAPTER 5 CHAANI IRRIGATION SCHEME

5.1 Institution

There is a registered association, the Association of Kibokwa Valley Paddy Farmers which was founded in July, 1998 and registered in October, 1998 (Registration Number 84). The reason why the farmers selected association rather than cooperative is that a dividend must be paid to the members at the end of each year in the case of cooperative but it is not required of the association. Under the association there are 24 subgroups. However, only some of the subgroup members have become members of the association who are 350 (male 230 and female 120) at present.

The executive committee of the association consists of 12 members including a chairperson, a vice chairperson, a secretary, an assistant secretary and a treasurer selected by secret ballot. It has the following three subcommittees: the planning and finance, the management and guidance of agricultural activities and the farm inputs. The 24 subgroups also have their own executive committees. Each of them has 7 members including a chairperson, a secretary and a treasurer selected by secret ballot.

The general meeting of the association is held once a year regularly and, besides, according to needs. The executive committee is held monthly and also the subgroups' committees are held according to needs. The issues discussed cover a harvest evaluation of the previous season, farm inputs (tractor, fertilizer and etc.), payment of tractor charges, farmer's poor participation of irrigation facilities maintenance and poor contribution to the association, and etc.

The association has the bylaw and the regulations which were discussed and approved at the general meeting. However, they haven't been fully understood by the all members yet. There are three types of the membership: (i) founder of the association (18 members), (ii) regular member (332 members) and (iii) honourable member (0 member at present). The qualifications of regular member are to have a cultivation right in the area and to follow the bylaw and the regulations.

The association collects the registration fee, Tsh. 200 and the annual fee, Tsh. 200. However, only about 50 from 350 members paid the annual fee last year. The association has its bank account in People's Bank of Zanzibar and its balance is at present Tsh. 338,774. In addition, the association

received a loan of Tsh. 600,000 from the central government for purchasing a milling machine. Therefore the association prepares a financial report monthly and its account is audited regularly by the district cooperative officer.

Communication with the government staffs (the village extension officer, the village council chairperson, the DADO, the site supervisor from the DARI) is generally well maintained. Issues such as water conflicts and other disputes among farmers, a tractor rotation schedule, farm inputs (tractor, fertilizer and etc.), agricultural activities, and etc. are discussed with them.

As for training, the farmers have opportunities to attend the programs at Kizimbani Agricultural Training Institute. However, their present evaluation of the programs is not satisfactory. Their priority subjects in future are paddy production, upland crop production, pest management, financial management, and water management.

5.2 Irrigation and Drainage System

Traditional water abstractions for irrigation purpose have practiced at two sites in Kishima-fedha and Kijamba along the river course, covering acreages of 20 acre and 40 acre, respectively. Because those abstractions are done by temporary weirs composed of wood and graces, the simple structures have been rebuilt in every season. Besides those practices, no other activities in irrigation have been seen in the scheme area.

Drainage is a serious issue in the scheme area especially eastern low land. The Bwabwaja river is disappeared at around eastern edge of the scheme area getting into *pokezi* layer. Around end of the river course, water-logging is conspicuous due to no outlet of drainage way. Existence of few distinctive drainage courses aggravates flooding during rainy season in other portions of the scheme area. Drainage improvement is also required to reduce flood damage and to perform productive cultivation during the rainy season.

5.3 Water Management, Operation and Maintenance

Two traditional irrigators' groups are identified in the area, namely Kisima Fedha, and Kijambani, abstracting water from the Bwebwaja River by temporary diversion weir made of woods, debris, and iron sheets. The irrigated area upstream is located in Kisima fedha village with an area of 40 acres and 50 members while irrigation has been practiced in Kijambani,

being 20 acres with 60 members.

In the dry season, scarcity of water in the river causes conflict among the presently irrigated areas. Although, at present, the conflict is being mitigated adopting the rotational irrigation method among the areas, the farmers assure themselves that construction of a permanent diversion weir on the River will be sole measure to ensure stable irrigated farming in the area.

Asked what is required to manage the irrigation scheme, the farmers replied such items as establishment of a by-law, selection of office bearers, maintenance of facilities, and training for irrigated farming.

5.4 Other Special Issues

5.4.1 Farmers' intension for irrigation development

Farmers' intension obtained from the discussion through RRA is summarized below.

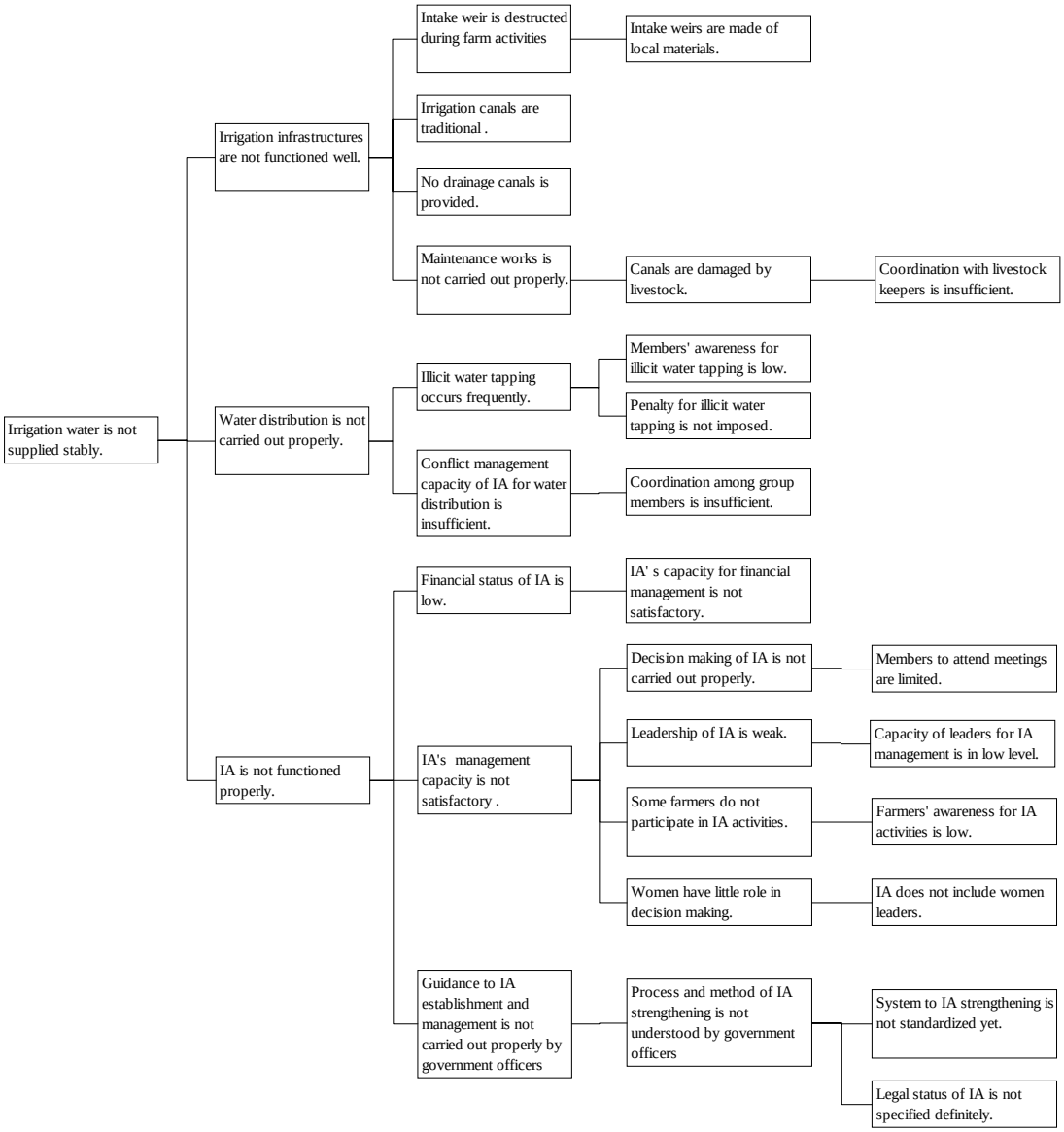
- Construction of intake weir on the river to ensure stable irrigation
- Construction of irrigation canals,
- Improvement of drainage condition providing new drainage channel to reclaim a new farm land, which is inundated every rainy season, and
- Improvement of farm roads with bridge construction to make transportation of farm inputs and products easier.

5.4.2 Farmers' contribution for development

Farmers are ready for contributing labour force to such construction works, as excavation of channels, and collection of sand and stone, adding that they have experienced the contribution to construction of the hospital and school in the village.

5.5 Problem Analysis

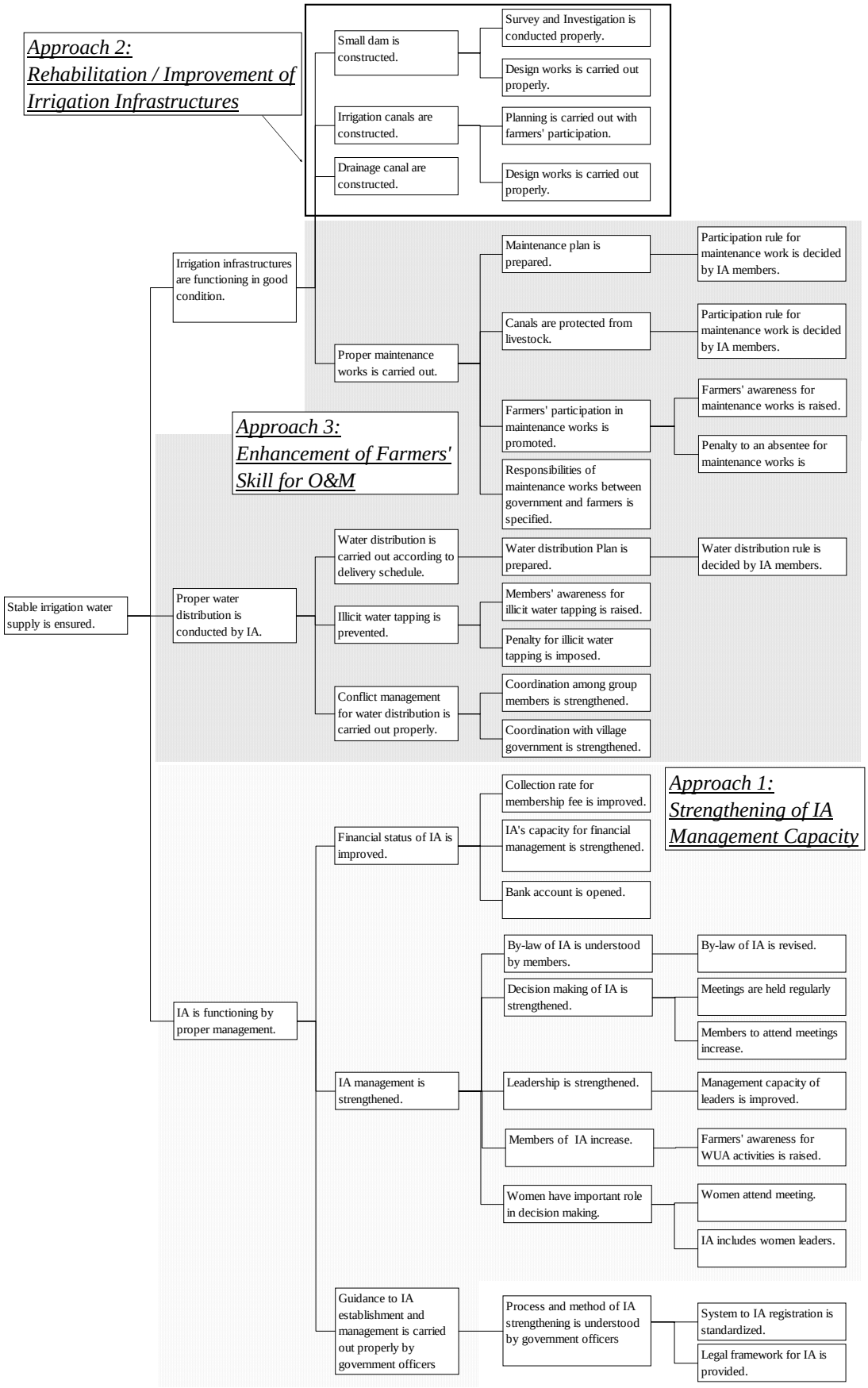
Problem tree of Chaani Irrigation Scheme is shown below.



Chaani Irrigation Scheme - Problem Tree

5.6 Objective Analysis and Development Approach

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



Chaani Irrigation Scheme - Objective Tree