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

ACTION PLAN REPORT

CHAPTER 1 INTRODUCTION

1.1 Authority

This Action Plan Report was prepared in accordance with the Scope of Work for the Study agreed between the Ministry of Agriculture and Food Security, the United Republic of Tanzania (MAFS) and the Japan International Cooperation Agency (JICA) on April 10, 2001 (Attachments 1 and 2). The report presents the results of problem analysis and special study on major issues identified through problem analysis, and the Action Plan for the selected 18 Priority Programmes of the Subject-wise Improvement Programme and 10 Model Irrigation Schemes of the Scheme-wise Development Programme. The report also shows the selected objective items and preliminary plan of operation for the Verification Study.

1.2 Objectives of the Study

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

Phase 1

- Formulate the Master Plan for Irrigation Development at the national level with target year of 2017.

Phase 2

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

Phase 3

- Conduct the Verification Study for the bottleneck items for the successful implementation of irrigation schemes.

Phase 1 to Phase 3

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

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

1.3 Technology Transfer

In the Phase 2 Study, the following staff of MAFS was assigned as counterpart personnel:

Counterpart Personnel Assigned

JICA Study Team	Position	Counterpart Personnel
Mr.H.Shimazaki	Team Leader/Development Policy	Eng.A.H.Simba*
Dr.S.Matsushima	Irrigation Drainage Plan/Water Management	Eng. M. Futakamba
Mr.H.Ohnuma	Farm Management	Ms.R.Kweka
	Land Use Plan	Mr.R.Rushomesa
Dr.M.Osada	Institution/Organization/Management	Mr.R.R.Komanga
Mr.T.Igawa	Irrigation and Drainage Facilities	Eng.Masenza
Mr..T.Kuroda/Y.Ishikawa	Coordinator/Agro-economist	Not Assigned

** : Chief Counterpart Personnel*

The technology transfer was mainly carried out through the on-the-job training such as site inspection and RRA, and also the regular meetings.

1.4 Steering Committee Meetings

On December 17, 2002, the Steering Committee meeting was held for the Inception Report 2 showing the basic concept and plan of operation for action plan preparation. The meeting was attended by staff of the Ministry of Water and Livestock Development, Vice Presidents' Office, Prime Minister's Office, PORALG, and MAFS. The JICA Tanzania Office and DANIDA sent the staff to the meetings. In the Meeting, the Inception Report 2 was in principle agreed on by the Steering Committee (Attachment 3).

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

1.5 Website for the Study

The website for the Study has been updated based on the results of Master Plan study and parts of the results of Action Plan study. It presents the basic concept of the master plan, results of irrigation potential study, a development programme by the year 2017 for the selected schemes and programmes, and findings obtained through the Action Plan study. The updated website for the Study can be approached using the following URL:

http://www.kilimo.go.tz/projects/nimp/nimp.htm

CHAPTER 2 CURRENT SITUATIONS OF RELEVANT DEVELOPMENT PLANS/PROJECTS TO IRRIGATION DEVELOPMENT

2.1 Agricultural Sector Development Strategy (ASDS)

The ASDS was completed in October 2001. The primary objective of the ASDS is to create an enabling and cooperative environment for improving productivity and profitability of the agricultural sector as the basis for improved farm incomes and rural poverty reduction in the medium and long-term. Various innovative and practical actions are included in the ASDS as parts of its strategy. Among them a focus on agricultural productivity and profitability comes first. Other actions are: (i) the promotion of private sector/public sector and processor/contract grower partnerships; and (ii) the participatory implementation of the strategy through District Agricultural Development Plans (DADPs). The ASDS is supposed to assist the attainment of the objectives envisaged in the PRSP. It proposed a realistic target for the overall agricultural sector to be 5 % growth per year on an average over the 3-year period 2005/07. The total indicative costs of implementing the ASDS would be estimated at US$ 255.3 million.

2.2 Agricultural Sector Development Programme (ASDP)

The ASDP prepared in November 2002, is a 5-year rolling plan to implement the ASDS. The ASDP presents a sector-wide framework for overseeing the institutional, expenditure and investment development of the agricultural sector, which was worked out taking into consideration (i) poverty reduction, (ii) decentralization of many public sector responsibilities to Local Government Authorities (LGAs), (iii) increased participation and involvement of local communities in decision making and (iv) a shift towards private sector leadership in production, making, processing and service delivery, which were stressed in national policies.

The ASDP recommends five strategic areas of intervention. Those are (i) strengthening the institutional framework, (ii) creating a favorable environment for commercial activities, (iii) identifying public and private sector roles in improving supporting services, (iv) strengthening marketing efficiency for inputs and outputs, and (v) mainstreaming planning for agricultural development in other sectors, which lead to the following three Sub-Programmes:

(1) Sub-Programme A presents agricultural sector support and implementation at District and field levels (approximately 75 % investment of public resources).

(2) Sub-Programme B presents agricultural sector support at national level

(approximately 20 % investment of public resources).

(3) Sub-Programme C presents cross-cutting issues with other sectors at national level (approximately 5 % investment of public resources).

These Sub-Programmes have a series of programmes, sub-programmes and possible interventions. Irrigation development is included in Sub-programme "Irrigation and Water Development" in Programme A1: Investment and Implementation through the Implementation of District Agricultural Development Plans (DADPs) and District Development Plans (DDPs). In irrigation development, the proposed possible interventions are (i) rehabilitation of existing irrigation schemes, (ii) new irrigation schemes' development and (iii) Acquisition of individual low lift pumps (treadle pumps or motorized pumps).

As for financial arrangements for the ASDP, it discusses public investment and private sector investment. The public investment will be through a mixture of funding sources and financial mechanisms. Those include treasury funds, donor funding through Basket funds (general or earmarked) and Non-Basket funds, LGA funds, and village and community funds. On the other hand, private sector investment, which contributes crucially to ASDP success, is not regarded as the ASDP fund, although the ASDP will carefully track and support the private sector investment. Total funding requirements for the first five years amount to approximately US$ 645 million.

In November 2002, the First Phase formulation of the ASDP was completed with the approval of the Framework and Process Documents presenting (i) approach and underlying principles of the ASDP Second Phase detailed formulation process, (ii) proposed TOR for Task Force 1 and (iii) the studies proposed to be undertaken to support the activities of Task Force 1 and its Working Group.

In succession, the Second Phase of the ASDP has been started. In December 2002, three priority Task Forces which are at the core of ASDP formulation, were identified:

- Task Force 1: Investment and Implementation at District and Field Level
- Task Force 2: Policy, Regulatory and Institutional Framework
- Task Force 3: Agricultural Research, Extension, Training and Technical Services

The Task Force is the top of a three-tiered system, and followed by specialist Working Groups and further by Formulation Teams. The Working Group 2 "Irrigation Development" belongs to the Task Force 1. The given TOR to the Working Group 2 is to review the current performance of the existing irrigation schemes and the introduction of low cost technology for irrigation from viewpoints

of institutional support, capacity building, irrigation agronomy, environmental assessment, irrigation scheme-market linkages, scheme viability, community participation and irrigation infrastructure development, with a view to lead to the following expected outputs:

- A specific recommendation on irrigation development with particular emphasis on small holder irrigation schemes using low cost appropriate technology.
- A set of guidelines for setting up institutions for managing irrigation development
- Modalities for developing the necessary irrigation development capacity.
- Guidelines for site specific environmental assessment.
- Irrigation Policy and legal framework
- Guidelines for irrigation development under DADPs and other systems.

Following the Sub-Programme A, the first DADP was prepared by each District Office based on the Guidelines for the District Agricultural Development Plan, January 2003, and submitted to the ASDP Inter-ministerial Coordinating Committee in March 2003.

2.3 Other Relevant Projects

2.3.1 Relevant Institutional and Legal Programmes

(1) Decentralization Programme

The Government of Tanzania (GOT) started on reforming its public service in the early 1990s. In the first step its efforts toward the reform were concentrated at the Central Government level. It soon became clear, however, that the reform of the local government system should also be executed to improve the services and their access to the public.

The GOT developed a separate decentralization programme in 1996, the Local Government Reform Agenda 1996-2000 with a view of empowering the LGAs and allowing them more autonomy for socio-economic development and services provision. In addition, in 1998, the GOT released the Policy Paper on Local Government Reform. The policy framework of the local government reform in Tanzania is made up of these two documents. In order to implement the policy, the Local Government Reform Programme (LGRP) was established and the Action Plan and Budget, July 1999-June 2004 was developed by the GOT. It has been updated each year in the form of an annual Action Plan and Budget, approved by the Programme's Common Basket Fund Steering Committee.

(2) Reform of Water Sector

In parallel with the decentralization movement, the GOT is pursuing a series of

sector specific reforms. The water sector reform is one of them. In July 2002 the GOT issued the National Water Policy, whose main goal is to establish a comprehensive framework for sustainable development and management of the water resources. Under this framework the role of central government and its institutions is focused on law making, policy formulation, standard setting and quality control, monitoring, capacity building and enforcing compliance. On the other hand, the LGAs have overall task and responsibility for the actual delivery of public services to the local people.

The decentralization by devolution strategy through the LGAs aims at strengthening the LGAs and building their capacity to initiate and coordinate development in their areas of jurisdiction. But it does not mean weakening the central government level at all. A strong central level is obviously crucial to define policy frameworks, put in place appropriate legal framework, and monitor the operations of all public service providers including the LGAs. Furthermore the central government will continue to be responsible for handling major national and inter-regional issues and programmes.

As a part of the LGAs reform, major changes will be introduced in the following areas:

- Financial management
- Human Resource management
- Organizational structures and functions
- Central-local relations

In the area of finance, the GOT will provide funding for recurrent expenditures to the LGAs to allow them more autonomy in planning and budgeting in line with the vision for LGAs. This will be by way of conditional and unconditional block grants. Conditional block grants will be provided for the more sensitive pro-poor sectors including water and agricultural services, education, health and roads.

Management of staff will be decentralized so that the LGAs can appoint, promote, develop and discipline their own staffs. Each local authority will also revise its structure and functions to ensure that they reflect the local needs and conditions in their area of jurisdiction. The changes in central-local relations will be in line with the vision of the Civil Service Reform Programme, which requires changes in the roles and functions of the central ministries so that they become (i) effective in policy making, (ii) supportive and facilitative, (iii) effective in monitoring and quality assurance, and (iv) control bodies.

(3) Role of Local Government in Water Resources Management

Under the reformed LGA system the role and responsibilities of the LGAs in water resources management will include:

- Formulation, approval and implementation of budgets to finance water services delivery and attendant development plans
- Imposition, regulation and control of water use charges at local levels
- Enactment of bylaws that are necessary to provide a framework for implementation of water sector policies and legislation at local levels
- Formulation, coordination and supervision of the implementation of plans for economic, commercial, industrial and social development in which water management plans are an integral part
- Acceleration of social and economic development and amelioration of life
- Taking all necessary measures to provide protection and proper utilization of the environment for sustainable development
- Promotion of social welfare and economic wellbeing of all persons within its area of jurisdiction,
- Subject to national policy and plans for rural and urban development of its area of jurisdiction

In spite of the local government policy and legal framework on the role and responsibilities of LGA stated above, the National Water Policy and legislation are rather silent in this regard. Therefore, the Water Policy and legislation call for comprehensive review and amendment in order to be in line with the government policy on decentralization.

Stakeholder's participation is one of the key principles guiding the current government initiatives to reform the public sector. Another mechanism which has been introduced in the law to guarantee people's participation is the system of "public hearings". Furthermore, under the National Framework on Participatory Planning and Budgeting at local government level the LGAs are required to implement participatory bottom up approaches in developing sector specific and integrated district development plans.

Although LGAs will have an overall implementation mandate on water resources management and infrastructure development, the actual production and delivery of water services will be open to other producers in the public, private and community sectors.

In addition, a process to review and harmonize sector laws in line with the government policy on decentralization has already commenced. Priority in the review and harmonization has been given to laws of six pro-poor sectors including Water, Education, Health, Roads, and Agriculture and Lands.

The review and subsequent amendment of water policy and legislation will ensure:

- The current concentrated governance is changed to devolved governance by relocating in law the responsibility relating to provision of basic local service to the appropriate level of LG
- The existing conflict between the Water Policy and legislation, and the Policy Paper on Local Government Reform will be removed by giving the LGAs mandate to set local priorities and operational decisions on the water resources management and delivery.

The review of the recent institutional movements is here based on "The role of reformed local government authorities in water resources management for attaining Vision 2025", a paper presented at a National Workshop on the contribution of Water Resources Management to Food Security, Poverty Reduction and Economic Growth held in Dar es Salaam in January 2003.

2.3.2 Agricultural Sector Programme Support (ASPS)

The ASPS, which is assisted by the DANIDA, is to be carried out phase-wise; Phase I and Phase II. The Phase-I of ASPS was started in January 1998, with the development objective to increase income and improve nutrition of the poorer sections of smallholders, in particular female farmers. The ASPS includes the five components of (i) institutional strengthening, (ii) on-farm seed production, (iii) small-scale irrigation, (iv) phosphate rock research, and (v) continuation of the ongoing soil and conservation project in Iringa region.

Out of these, the component of small-scale irrigation is to improve crop husbandry practices and water management in small traditional irrigation schemes under the smallholder irrigation improvement programme. The programme covers the four traditional irrigation schemes; Lumuma irrigation schemes, Nyanzwa and Iringa irrigation schemes, Utengule Usongwe irrigation scheme and Naming'ongo irrigation scheme. The programme also has launched the preparation of guidelines describing a step-by-step approach to participatory planning and implementation of cost-effective, profitable, farmer initiated and managed smallholder irrigation schemes. The improvement of the legal framework for registration of Irrigators Associations (IAs), efficient coordination mechanisms of various stakeholders and proper treatment of collected water fees, which is one of the recommendations of the Master Plan study, is also discussed in the guidelines. A workshop on legal framework was held at Morogoro in June 2003. Its results are reflected in the Action Plan. The investments in these irrigation schemes will be completed in 2003/04.

2.3.3 River Basin Management and Smallholder Irrigation Improvement Project (RBMSIIP)

The RBMSIIP was launched in December 1996 and will be completed by the end of December 2003. The RBMSIIP consists of two components: the River Basin Management Component (RBMC) implemented by the MWLD and the Smallholder Irrigation Improvement Component (SIIP) implemented by the MAFS. The targeted areas are the Pangani and Rufiji basins, which are identified as priority basins in the Rapid Water Resources Assessment executed in 1994 and also in the NIDP.

The overall objectives of the RBMSIIP are to (i) strengthen the Government capacity to manage its water resources and address water related-environmental concerns at the national level and in the said basins, and (ii) improve irrigation efficiency of selected smallholder traditional irrigation schemes in the two basins.

In particular, specific objectives of the SIIP are to (i) support comprehensive river basin management by improving management of the demand for irrigation water, (ii) improve water use efficiency, (iii) increase crop yield and scheme productivity, (iv) improve small farmer incomes, (v) reduce susceptibility to draught, and (vi) reduce government's involvement in smallholder traditional irrigation to a more "hands off" approach. With such objectives, 16 traditional smallholder irrigation schemes have been completed.

In connection with completion of Phase I of RBMSIIP, it is planned to start the Phase II of RBMSIIP. Major elements of SIIP Component of Phase II of RBMSIIP are to (i) prepare a comprehensive irrigation policy, (ii) execute scheme improvement on a catchment/sub-catchment basis, (iii) establish a proper scheme management system and enhance sustainable agricultural production, (iv) promote private involvement in providing support services, and (v) promote irrigation activities in Lower Rufiji and address environmental issues in the targeted catchments.

2.3.4 Participatory Irrigation Development Programme (PIDP)

The PIDP is a multi-financed project by the International Fund for Agricultural Development (IFAD), the Government of Ireland, the World Food Programme and the GOT. The PIDP became effective on February 18, 2000 and will be completed by March 31, 2006.

The PIDP has the main objectives to (i) increase availability and reliability of water for irrigation and domestic use; (ii) improve support for farmers using irrigation water; (iii) enhance Target Group and in-country capacity to plan, construct and

operate irrigation schemes; and (iv) develop efficient coordination and management structure. To fulfill these objectives, the PIDP covers four components; (i) irrigation development; (ii) support to agricultural development; (iii) farmer organization and local institutions; and (iv) programme coordination.

The irrigation development component indicates the completion of 22 irrigation schemes, and 16 schemes have been constructed by October 2002. The remaining schemes are on-going. It is not apparent whether these schemes are included in the said DADP or not.

CHAPTER 3 DEVELOPMENT PROGRAMME FOR THE YEAR 2017

3.1 General

In the formulation of the Master Plan, the programmes of Subject-wise Improvement and Scheme-wise Development were studied and elaborated based on the results of the inventory survey, PCM workshop and review on relevant policies, plans and projects. This chapter presents the outline of development programmes prepared in the Master Plan study, since those are closely related to the preparation of the Action Plan.

3.2 Development Scenario

In light of the ASDS with a time period of five years and the ASDP of a five-year rolling programme, the development programme for the Master Plan with the target year 2017, produced the approach to the stage-wise development: Short Term (2003 – 2007), Medium Term (2003 – 2012) and Long Term (2003 – 2017).

The ASDS proposes three new critical interventions for innovative and practical actions toward the sustainable agricultural development. These are (i) focus on agricultural productivity and profitability, (ii) promotion of private sector/public sector partnership, and (iii) implementation of ASDS through DADPs.

In due consideration of the phasing, new critical interventions proposed, and full use of possibly available financial resources, the following stage-wise development scenario was elaborated:

Stage-wise Irrigation Development Scenario

	Short Term (2003 -2007)	Medium Term (by 2012)	Long Term (by 2017)
Development Target	**To Establish Sustainable Irrigation Development System by 2017**		
Key Issue for each Term	**Reform**	**Decentralization**	**Self-reliance**
Subject-wise Improvement			
Strategic Approach	- Reform of environment for promotion of decentralization and involvement of private sector - Establishment of appropriate technologies on irrigation development in cost-effective concept - Dissemination of concept of river basin approach - Establishment of irrigation development system by participatory approach	- Actualization of irrigation development by LGA's initiatives under decetralization - Application of appropriate technologies on irrigation development in cost-effective concept - Establishment of environmental protection method on irrigation - Establishment of farmers-oriented irrigation development system	- Establishment of easy access system from farmers on technical support - Spred of environmental protection method established - Establishment of self-reliant irrigation development by private sector-oriented with public sector partnership
Activities	Prepare and apply tailor-made improvement programme for project sustainability		
Scheme-wise Development			
Strategic Approach	Expand the irrigated area through development of irrigation schemes in effective use of national resources		
Activities	Give priority to rehabilitation of small-scale irrigation and water harvesting schemes		
Expected Annual Growth Rate of GDP	**5.8 % to 6.0 %**		

3.3 Subject-wise Improvement Programme

3.3.1 Objectives

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

3.3.2 Preparation of Subject-wise Improvement Programme

The Subject-wise Improvement Programme is worked out through the process of; (i) identifying the problems and constraints of irrigation development, (ii) classifying the problems and constraints thus clarified, (iii) integrating problems and constraints into themes in consideration of their nature, (iv) formulating subject programmes so that signified problems and constraints are reflected without unnecessary omissions. Following this process and considering on-going projects, 37 programmes are worked out in the Master Plan.

3.3.3 Implementation of Subject-wise Improvement Programme

(1) Concept

The Subject-wise Improvement is to create the foundation for establishment of self-reliant irrigation development by appropriate public sector and private sector partnership. Accordingly, the Subject-wise Improvement will be mostly executed in the Short Term and Medium Term. In the Short Term, the executed programme focus on fundamental themes such as institutional aspects and technical matters for the central governments and farmers. Creation of an environment toward decentralization is also included in this Term. In the Medium Term, consideration is given the strengthening of local governments on irrigation development in the light of the decentralization implementation schedule.

(2) Stage-wise Development

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

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

As a result, 29 programmes will be executed or started in the Short Term and the remaining eight programmes in the Medium Term as shown below:

List of Subject-wise Improvement Programmes in the Short Term

No.	Ref.	Programmes
1	A1	IS Institutional Improvement Programme
2	B1	IS Working Mandate Formulation Programme
3	B2	Contract Management System Improvement programme
4	B5	Cooperation Channeling within Irrigation-Sector Establishment Programme
5	B6	Sub-sectors Coordination System Establishment
6	C1	Survey and Investigation Guideline Establishment Programme
7	C2.1	Planning Guideline Establishment Programme
8	C2.2	Design Guideline Establishment Programme
9	C3.1	O&M Guideline Establishment Programme
10	C3.2	Monitoring & Evaluation Guideline Establishment Programme
11	C4	Farmers' Participation in Irrigation Development Programme
12	C6	Farmers' O&M Manual Establishment Programme
13	C7	Establishment of DADP Formulation Guideline for Irrigated Agriculture Development
14	D1	Web-site and Networking Establishment Programme
15	D2	Technical Manuals Handling Guideline Establishment Programme
16	D3	Information and Database Improvement Programme
17	D4	Irrigation Development Contractors and Consultants' Listing Programme
18	D7	Existing-scheme Monitoring System Establishment Programme
19	E1.1	Irrigation Technology Research Center Establishment Programme
20	E1.2	Perennial Irrigation Method Improvement Programme
21	E1.3	Flood Irrigation Development Programme
22	E1.4	Small Dam Technology for Irrigation Development Establishment Programme
23	E1.5	Environmental Assessment Study for Irrigation Practice in Tanzania
24	E1.6	Study of River-Basin Approach in Irrigation Development
25	E3	IS's Equipment Management Programme
26	E4	Irrigation Development Contractors and Contractors' Training Programme
27	E5	Farmers' Participation Training Programme
28	E6.1	Irrigated Agriculture Training Programme for Rice Production Increase
29	E6.2	Irrigated Agriculture Training Programme for Cash Crops Production Increase

List of Subject-wise Improvement Programmes in the Medium Term

No.	Ref.	Programmes
1	A2	LGA Institutional Strengthening Programme for Irrigation Development
2	B3	Regulatory Networking System Establishment between LGAs and IS
3	B4	NGOs' Intervention in Irrigation Development Encourage Programme
4	C5	Village Irrigation Development Guideline Establishment Programme
5	D5	LGAs' Data Organization Programme
6	D6	LGA Networking System Establishment Programme
7	E2	Hydraulic Experimental Center Establishment Programme
8	E7	Integrated Irrigation Development Model establishment Programme

Source: JICA Study Team

3.4 Scheme-wise Development Programme

3.4.1 Basic Approach

A development programme for irrigation schemes was prepared based on the results of priority ranking of inventorized irrigation schemes and review on possibly available financial sources. The development programme, however, should finally be expressed for each term on the development area basis, not the scheme basis considering the limited data and information of irrigation schemes inventorized at

the master plan level, no application of bottom-up approach reflecting village government intension due to limited time, and use of results of existing inventory survey conducted under RBSIIP in 1995.

3.4.2 Classification of Inventorized Irrigation Schemes

The inventorized irrigation schemes classified by irrigation scheme types are as follows.

Inventorized Schemes by Type of Irrigation

Type of Irrigation	Nos. of Schemes	Existing Area (ha)	Estimated Irri. Area (ha)
Existing Schemes	1,189	191,900	670,400
Traditional Irrigation	962	122,200	510,300
Water Harvesting	41	7,900	27,600
Modern Irrigation	44	34,900	53,900
Improved Traditional Irrigation	106	25,500	48,900
Pump Irrigation	36	1,400	29,700
Newly Proposed Schemes	239	-	183,900
Water Harvesting	163	-	123,100
Modern Irrigation	30	-	35,400
Pump Irrigation	46	-	25,400
Total	**1,428**	**191,900**	**854,300**

Source: Inventory survey conducted by NIMP and RBMSIIP

3.4.3 Priority Grouping of Inventorized Schemes

(1) Criteria for Prioritization of Inventorized Schemes

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

Criteria for Scheme Prioritization

Factors	Items to be Evaluated
(1) Technical Factors (15 points)	Slope, Salinity/Alkalinity of soil, Damage by flood, Drainage problems
(2) Economic Factors (30 points)	Size of potential area, Water abstraction method, EIRR, Financial viability
(3) Environmental Factors (10 points)	Sedimentation, Water-borne disease, Water quality
(4) Ease of Implementation (5 points)	Accessibility to site
(5) Social Factors (20 points)	Organization set-up, Establishment of O & M committee, Linkage with village, Operation body of schemes, Training for O & M, Maintenance of scheme, Existence of water rights, Average farm size
(6) Regional Conditions (20 points)	Ratio of potential area to existing irrigated area, Self-sufficiency ratio of food crop, Poverty index (BHN)

Source: JICA Study Team

(2) Results of Priority Grouping

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

Summary of Priority Grouping

Grouping	Points	Nos.	Estimated Areas (ha)
(1) On-going schemes Group	-	29	13,600
(2) "A" Group	Over 70	50	34,800
(3) "B" Group	61 - 70	411	199,000
(4) "C" Group	51- 60	538	158,700
(5) "D" Group	Below 50	108	19,300
(6) "E" Group*	-	127	343,100
(7) "Excluded" Group**	-	165	85,800
Total		**1,428**	**854,300**

Source: JICA Study Team

** : Rehabilitation was executed within 5 years and/or no sufficient basic data*

*** : No need of rehabilitation, and /or NAFCO/Private farm*

3.4.4 Development Programme for the Year 2017

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

Accumulated Irrigation Development Area

Type of Irrigation Schemes to Be Developed	Short Term 2003 - 2007	Medium Term by 2012	Long Term by 2017
(a) Rehabilitation of Traditional Irrigation Schemes	180,000 ha	216,000 ha	274,000 ha
(b) Development of Water Harvesting Schemes	42,000 ha	57,000 ha	68,000 ha
(c) New Smallholder Schemes	44,000 ha	52,000 ha	63,000 ha
Total	**266,000 ha**	**325,000 ha**	**405,000 ha**

Source: JICA Study Team

3.4.5 Involved Conditions of Government and Relevant Parties for Irrigation Development Target for Each Term

Involved conditions of government and relevant parties for irrigation development targeted for respective terms in the stage-wise development scenario are as follows:

Involved Conditions of Government and Relevant Parties for Irrigation Development Target for Each Term

Description	Short Term Target Irrigation Development by Farmers' Participatory	Medium Term Target Farmers-oriented Irrigation Development	Long Term Target Self-reliant Irrigation Development
(1) Technical Self-reliance			
Government	◎	△	△
Private Sector			
Farmers	○	◎	◎
Private Firms	△	○	◎
(2) Financial Self-reliance			
Government	○	△	△
Private Sector			
Farmers	○	◎	◎
Private Firms	―	○	◎
(3) Strengthening of institution and organization necessary for attaining the targets ― Definition on roles and responsibility of Irrigation Section, LGA, and IAs under decentralization (Strengthening/reform of DITS, Zonal Irrigation Offices and LGA) ― Legal framework strengthening for IAs (legal status, land tenure, water right, ownership and responsibility of irrigation infrastructure) ― Institutional strengthening for raising technical ability (extension services and training) ― Institutional strengthening for raising financial capability (collection of water fee and O & M cost, micro-finance) ― Promotion and support programme of private sector (creation of attractive climate for investment, Incentive of tax for BOT introduction, long and stable security of tenure)			

Note:

◎ : Large involvement ○ : Medium involvement △ : Small involvement

3.5 Cost Estimate for Implementation and O & M

(1) Total Implementation Cost

The total implementation cost for the NIMP are estimated at US$ 593.9 million including US$ 110.6 million of farmers' contribution, which consists of US$ 23.0 million for the subject-wise improvement, US$ 553.1 million for the scheme-wise development and US$ 17.8 million for on-going irrigation projects.

(2) Operation and Maintenance Cost

The operation and maintenance cost is assumed to be US$ 20.0 million for the GOT and US$ 39.9 million for the farmers.

CHAPTER 4 OBJECTIVES AND BASIC CONCEPT OF ACTION PLAN

4.1 Objectives

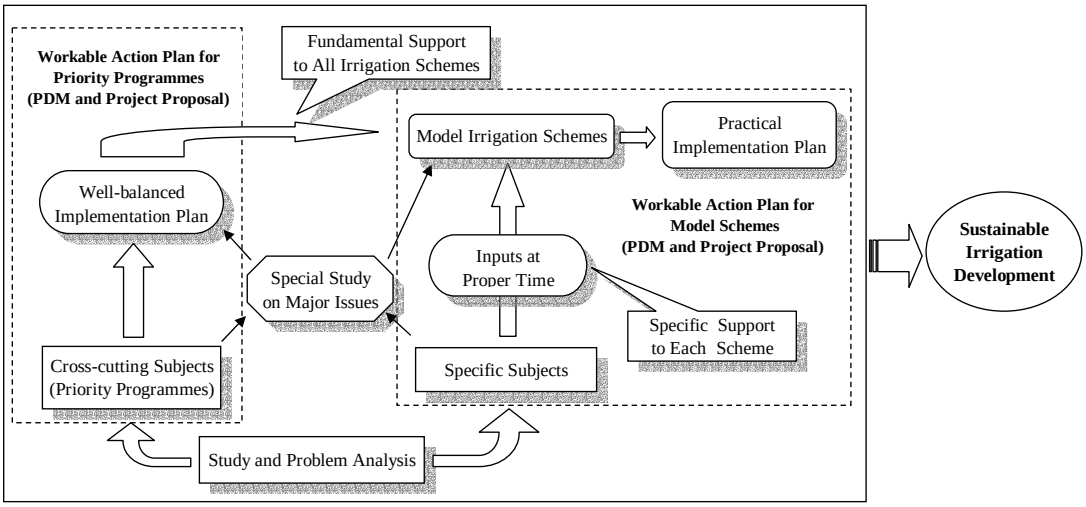
The purpose of the Action Plan is to clarify 5W1H (Who, Why, When, Where, What, How) on implementation of the selected Priority Programmes for the Subject-wise Improvement Programme and the Model Irrigation Schemes for the Scheme-wise Development.

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

4.2 Basic Concept

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

Basic Concept of Action Plan



(1) Two groups of Action Plans are prepared. One is for the selected Priority Programmes from the Subject-wise Improvement Programme, and the other is for the selected Model Irrigation Schemes from the Scheme-wise Development Programme.

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

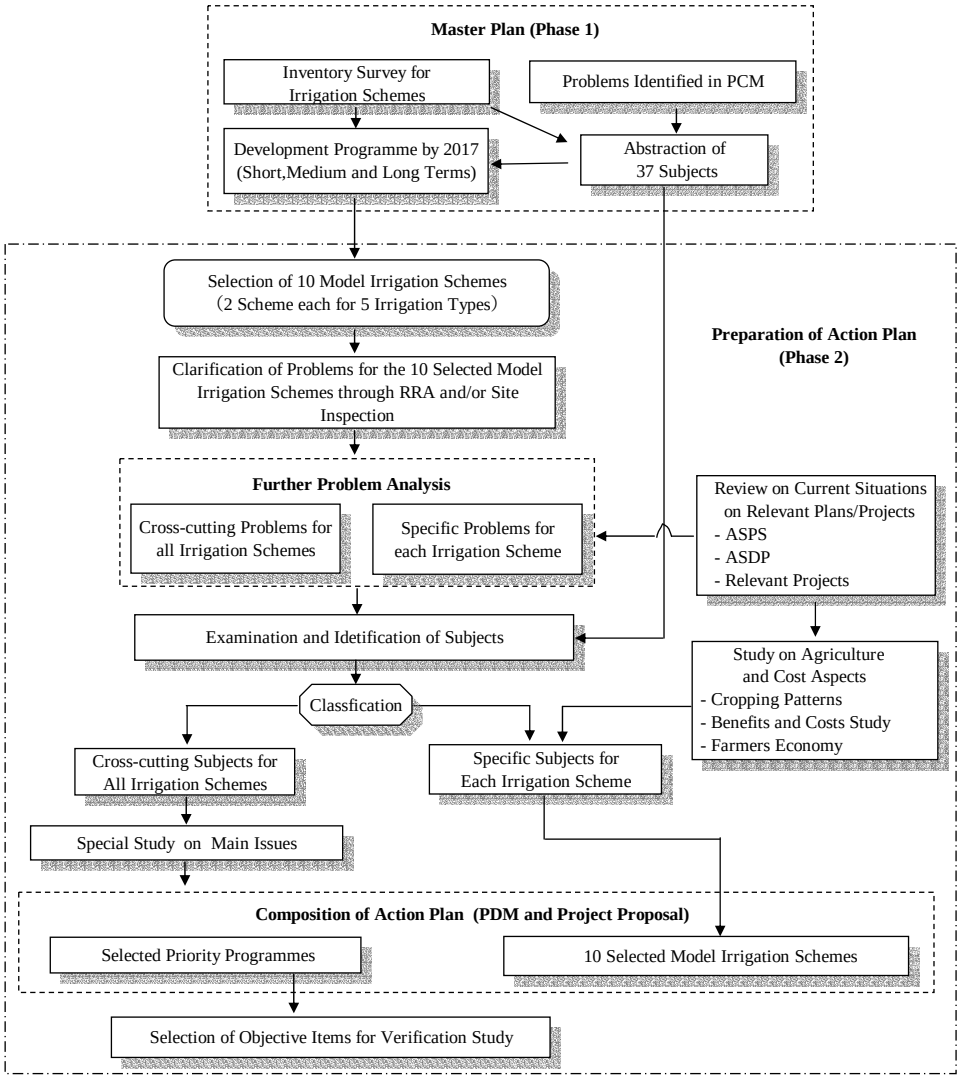
(3) The number of Model Irrigation Schemes is determined at ten in total, through discussion with the DITS of MAFS based on the number of irrigation types

prevailing in the Mainland and the available time for the Action Plan study. Thus, two Model Irrigation Schemes are selected for each of the five irrigation types. Respective Model Irrigation Schemes come up against specific problems. In preparation of the implementation plan for the selected Model Irrigation Schemes, therefore, care should be paid to timely inputs of supporting programmes to settle the specific problems.

4.3 Study Procedure of Action Plan Preparation

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

Study Procedure for Action Plan Preparation



4.4 Selection of Model Irrigation Schemes

4.4.1 Selection Purposes of Model Irrigation Schemes

The “Model Irrigation Schemes” to be selected in the Action Plan study does not mean a priority irrigation scheme but rather a standard irrigation scheme for five irrigation types prevailing in the Mainland. Purposes of Model Irrigation Schemes are to show the workable Action Plan for five irrigation types taking into account suitable application time of the specific subject components, and to confirm the appropriateness of the Programmes of the Subject-wise Improvement Programme proposed in the Master Plan, based on the results of RRA and/or site inspection for them.

4.4.2 Selection Criteria

In the Master Plan Study, 626 schemes were selected from the 1,428 inventorized schemes, which will be implemented by 2017. Then, the ten Model Irrigation Schemes were selected from the 626 schemes based on the following conditions and criteria:

(1) Conditions

Two irrigation schemes should be selected each from the following irrigation types

- Traditional schemes
- Improved traditional schemes
- Water harvesting schemes
- Modern schemes
- Pump schemes

(2) Selection Criteria

- High demonstration effect to other similar schemes
- Rehabilitation and/or expansion scheme
- No overlapping with other donors/agencies projects
- No concentration on specific areas or regions
- Good access to the site
- Availability of topographic maps (1/50,000 or more detail)
- Adequate data and information by the past study

4.4.3 Selected Model Irrigation Schemes

Based on the said conditions and selection criteria, the following Model Irrigation Schemes were selected under the initiatives of MAFS:

Finally Selected Model Irrigation Schemes

Irrigation Type	Region	District	Scheme Name	Expected Effect as Model
Traditional Scheme	Lindi	Lindi Rural	Kinyope	Typical improvement of traditional scheme at low cost
	Tanga	Korogwe	Magoma	Improvement in flooded area
Improved Traditional Scheme	Kilimanjaro	Hai	Musa Mwinjanga	Low-cost rehabilitation of traditional scheme once improved
	Iringa	Iringa Rural	Pawaga	Rehabilitation of large-scale traditional scheme once improved
Water Harvesting Scheme	Kigoma	Kigoma Rural	Pamila	Pilot scheme of new water harvesting technology
	Dodoma	Kondoa	Kisese	Appropriate approach to water harvesting scheme for vegetable cultivation in large area
Modern Scheme	Kilimanjaro	Moshi Rural	Lower Moshi	Measures to resolve water conflict in river basin
	Morogoro	Morogoro Rural	Mgongola	Expansion scheme centering pilot scheme
Pump Scheme	Mwanza	Sengerema	Luchili-Nyakasungwa	Effective approach to pump scheme using lake water
	Kagera	Bukoba	Nkenge	Use of groundwater and surface water in conjunction

At first, Liyuni and Bagamoyo Schemes were selected as traditional schemes and pump schemes, respectively. However, Liyuni Scheme was cancelled because it was not a rehabilitation scheme. Bagamoyo Scheme also was cancelled since it had been given a counterpart fund for rehabilitation.

Table 4.4.1 shows the scheme profiles for the selected Model Irrigation Schemes. The existing development plans for those that are prepared by the GOT are also mentioned in the same table.

CHAPTER 5 ANALYSIS ON MODEL IRRIGATION SCHEMES AND SELECTION OF PRIORITY PROGRAMMES

5.1 Analysis of Model Irrigation Schemes

5.1.1 General

(1) Site Inspection

To collect the data and information, the ten selected Model Irrigation Schemes were inspected by the JICA Study Team, counterpart personnel, and District office staff. Concurrently, interviews were also made with about 10 to 20 farmers for each irrigation scheme using the detailed check sheet which was prepared for respective irrigation categories. Major data and information to be collected through interview are as follows:

(a) Socio-economy

- Land tenure
- Household

(b) Agriculture

- Cultivation area
- Crop yield and production
- Farming calendar
- Farmers supporting system (post harvest, input supply and extension services)

(c) Farmers' organization

- General information (name of farmers' organization and scheme)
- Institution (date of formation, registration under Cooperative Act or Association Act, number of members, existence of by-laws)
- Activities (frequency of meetings, collection of water fee, existence of book-keeping, regulation of O & M, mechanism of internal disputes)
- Farmers' contribution to construction/rehabilitation and maintenance of facilities
- Experience of Farmers' participation in planning and implementation

(d) O & M for Irrigation and drainage facilities

- Regulation of O & M
- Situation of O & M for facilities

(e) Support by GOT

- Support by GOT to farmers' organization (contents of support,

frequency of support)

In addition, the presently available development plan for the scheme, which was mostly prepared by the Local Government Agencies (LGA), was examined for assessment and also for preparation of the Action Plan.

The results of these site inspections and interviews with farmers are discussed hereinafter.

(2) Rapid Rural Appraisal (RRA)

RRA was conducted for the selected 5 Model Irrigation Schemes, namely Kinyope in Lindi Region, Luchili-Nyakasungwa in Mwanza Region, Kisese in Dodoma Region, Mgongola in Morogoro Region, and Musa Mwinjanga in Kilimanjaro Region.

The purpose of RRA in the study is;

- To clarify operation and maintenance on the selected irrigation schemes including water management and financial sources;
- To determine present activities of farmers' organizations and their relation with government authorities; and
- To collect agricultural data and information such as land use, agricultural production, farm inputs, and production cost.

Taking into consideration the total number of schemes where RRA was carried out and required data to be obtained through RRA, two days were allocated for each RRA. The applied procedure in RRA is as follows:

1st Day

- Opening and ice breaking
- Group works for 5 groups, such as mapping, customs related to irrigation, farming calendar by gender, gender issues, 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 constraints of linkage between the farmers and the Government officials
- Closing

All of the RRA sessions were executed by two facilitators according to the above-mentioned programme. The number of farmer participants were some 30 including committee members of the farmers' groups. Irrigation technicians as well as officers in the Districts and the counterparts in the MAFS were present as observers of RRA. All results of RRA are presented in Appendix E.

(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, defining common core problems and objectives as shown below:

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

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

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

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

(4) Development Approaches

Based on the results of the objective analyses, 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 schemes. Details of analysis for each Model Irrigation Scheme are shown in Appendix C.

5.1.2 Kinyope Irrigation Scheme

(1) Site Description

The scheme area occupies most of Rutamba Ward (Lindi Rural District) situated in the eastern part of the Lindi Region. Administratively it includes 3 villages, namely, Kimyope, Ruhoma and Myangara. Access to the scheme area in the Kimyope village is by an unmetaled feeder road from Lindi, the length of which is about 36

km. The scheme area could be accessible even by normal vehicle, while being difficult or sometimes impossible during the rainy season.

Annual rainfall of the scheme area is relatively abundant, and ranges from 600 mm to 920 mm having a single peak in April. The Milola River, water source for the Kinyope Irrigation Scheme, is perennial in flow discharge. The scheme area is located at the loose valley formed by the river running in a direction of west to east.

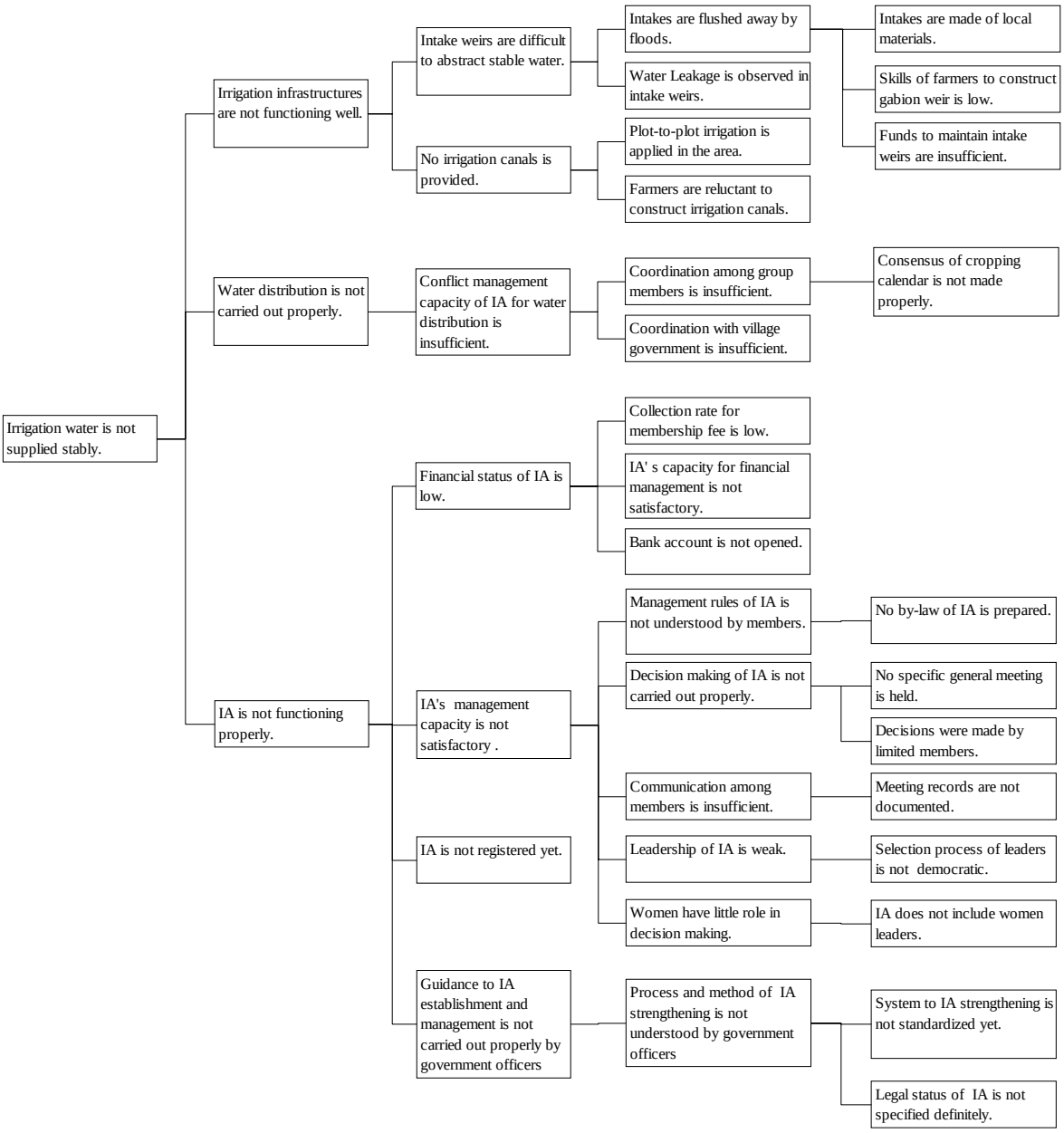
Villagers are keen on the development of irrigated paddy production in this scheme. The dry season paddy is, however, grown only in 7% of the irrigated area. To increase the area of dry season paddy through the improvement of irrigation facilities is judged important even from the results of farm economics analysis. The Ministry of Agriculture is requested to establish an effective information management system for the better use of the results of past surveys and studies.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Top-down intervention of the district cooperative officer in the registration of IA
	The farmers' insufficient skill of managing an IA: no bylaws or regulations, poor financial management, no women leaders, high rate of fee non-payment, and etc.
Irrigation and Drainage	Fragile existing intake weirs.
	Water conflict among farmers on water abstractions.
	Ineffective water distribution due to lack of canal system.
	Lack of knowledge on water management on “canal irrigation”.
	Water stagnant due to poor drainage system
	Poor knowledge on a participatory gabion weir construction due to lack of dissemination to farmers.
	No compilation on data and information on the previously implemented works.

(3) Problem Analysis

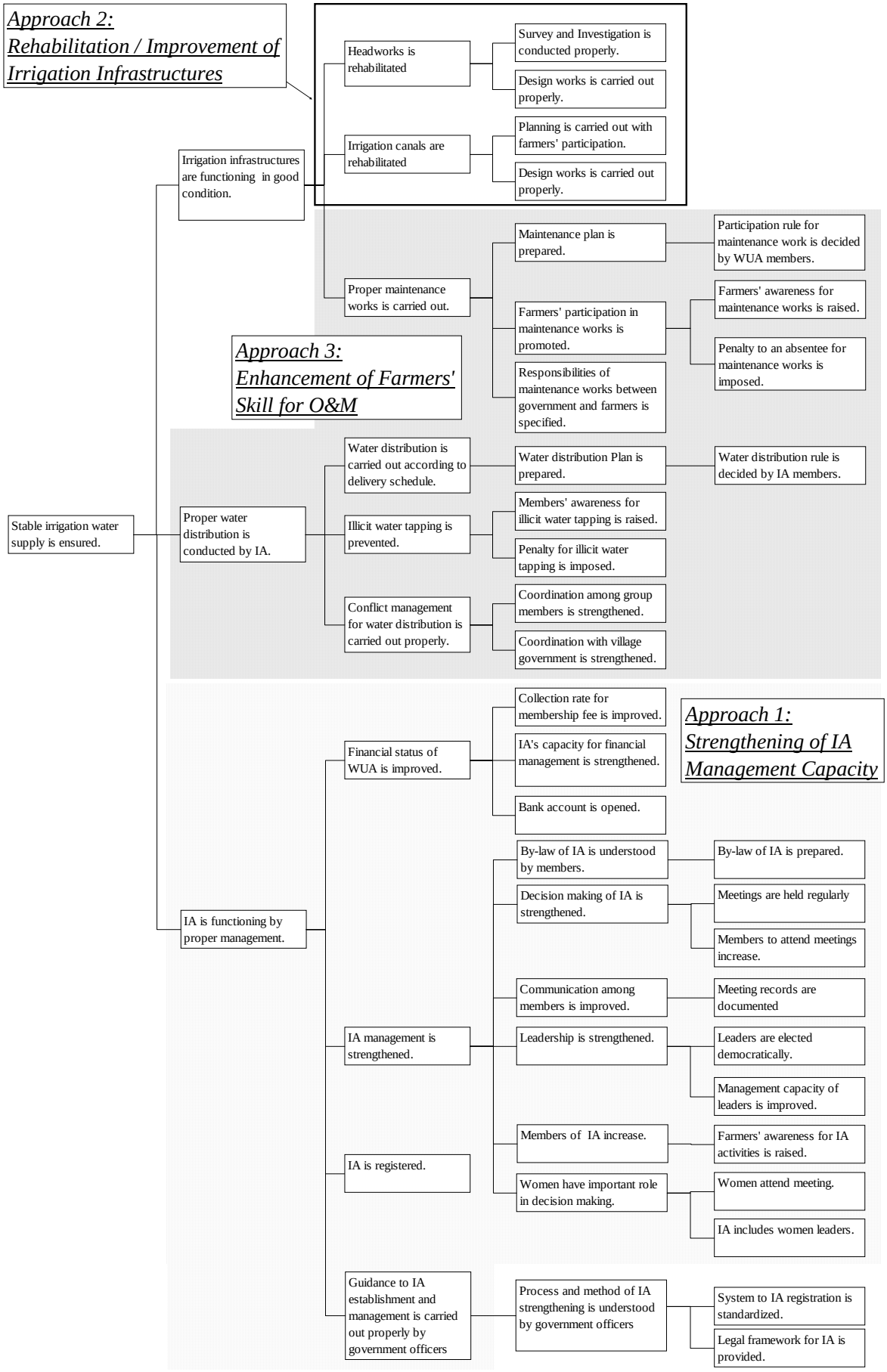
Problem analysis of Kinyope Irrigation Scheme is shown below.



Kinyope Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Results of objective analysis with three development approaches such as (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity, are indicated below.



Kinyope Irrigation Scheme - Objective Tree

5.1.3 Magoma Irrigation Scheme

(1) Site Description

The scheme area extends over Makangara and Mkuajuni villages in Magoma Ward, Magoma Division in Korogwe District. Access to the scheme area is by an unpaved road and it is about 50 km distant from Krogwe. The scheme area is accessible by any type automobile even in the rainy season.

The scheme area is influenced by the Indian Ocean in specific climate characteristics. Average temperature is approximately 30 ºC to 32 ºC during hot months (December to March), while it is approximately 23 ºC to 28 ºC during cool months (May to October). High atmospheric humidity is a characteristic factor in this area, showing 100 % maximum and 65 to 70 % minimum. The amount of rainfall is about 1,100 to 1,400 mm per year in the area, however, it may exceed 2,000 mm per year in the catchment area of Lwengera river. The annual pattern of mean monthly rainfall is bi-mode with maximum monthly rainfall occurring in April and May.

According to the farmers living near the scheme area, flood attacks the part of scheme area every year, and brought inundation a half meter deep for about a week. The Lwengera River has a tendency of changing its river course at the foot of Usambara Mountains during floods.

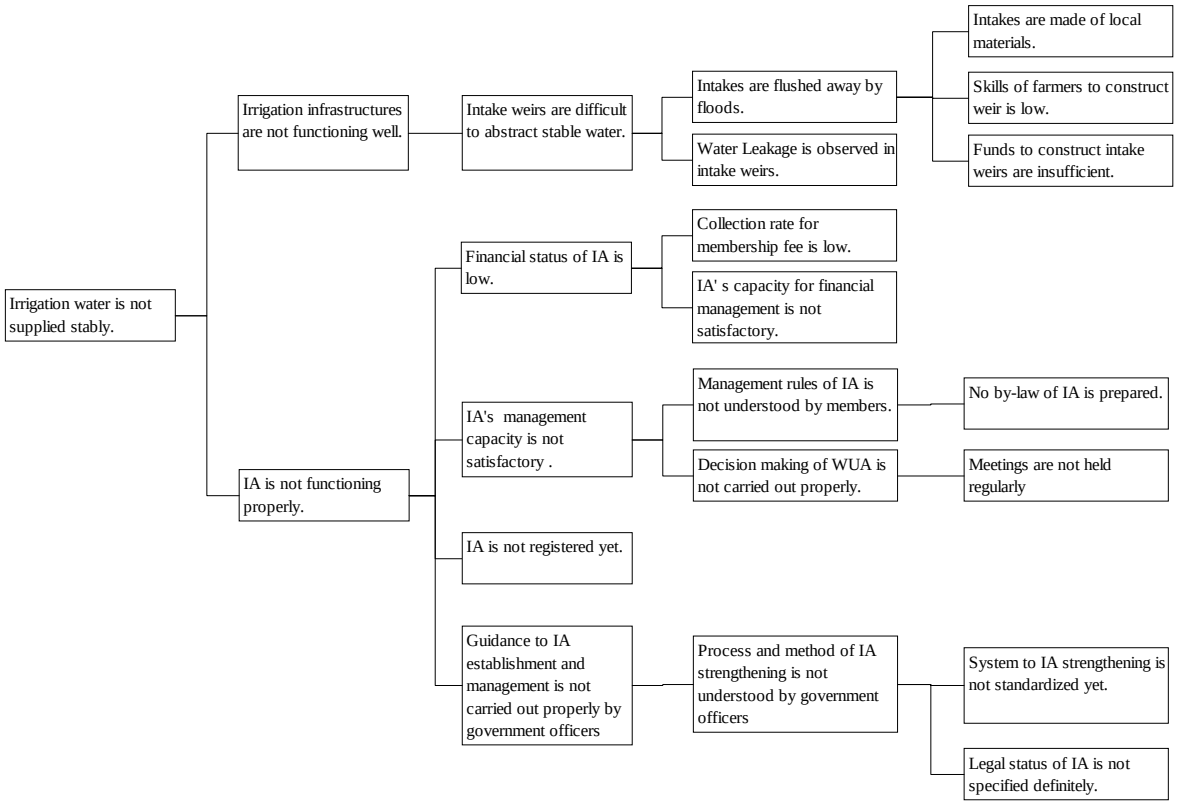
The major crop cultivated is maize under rainfed condition in the area of about 500ha where is not affected by flood. Irrigated paddy is cultivated in about 100ha of low land scattered along the river course after flooding. Due to rather fertile soil brought by flood, the average yield of paddy sometimes exceed 6.0ton/ha even without proper inputs when high yield variety is used. The potentially irrigable area is estimated at 250ha along the river course within Magoma village. An appropriate water management including flood protection and drainage improvement is strongly needed by farmers.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Non registered IA.
	The farmers' insufficient skill of managing an IA: no bylaws or regulations, poor financial management, no women leaders, high rate of fee non-payment, and etc.
Irrigation and Drainage	No irrigation practice in the rainy season due to area inundation.
	Farmers' burden to repeat construction of intake weir every cultivation season.

(3) Problem Analysis

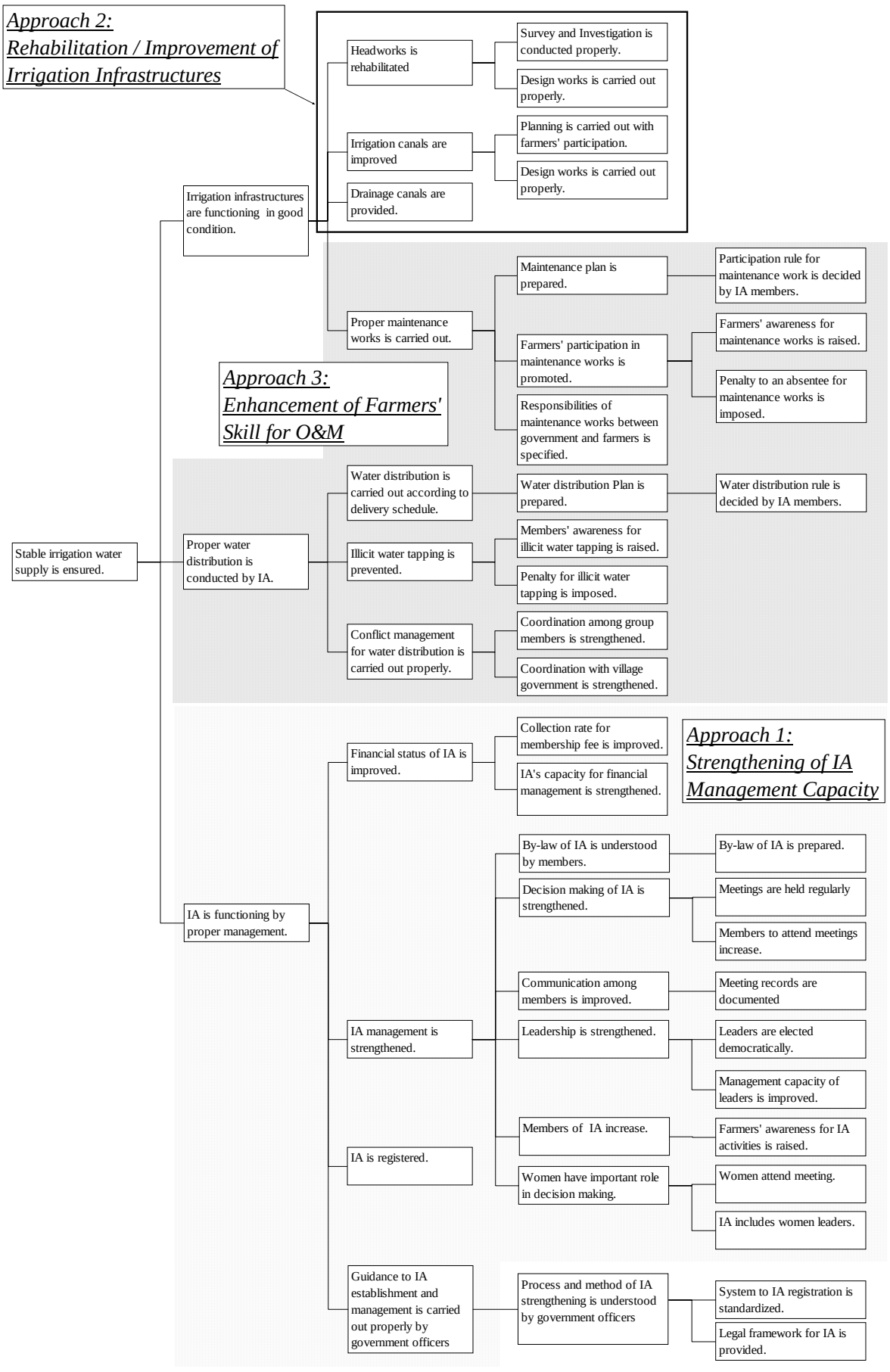
Problem analysis of Magoma Irrigation Scheme is shown below.



Magoma Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Below are indicated results of objective analysis with three development approaches such as (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity.



Magoma Irrigation Scheme - Objective Tree

5.1.4 Pawaga Irrigation Scheme

(1) Site Description

The scheme area covers most of Itunundu Ward (Iringa District) on the west bank of the little Ruaha river. It administratively includes 6 villages: Itunundu, Kimande, Kisanga, Isele, Ndolea and Kisoloka. Access to the scheme area is mostly unpaved road, but possible even in the rainy season. Its distance from Iringa, is approximately 80 km.

Average annual rainfall in the scheme area is 375 mm, so that agriculture is virtually dependent on irrigation. Originally, irrigation in the project area had started for some areas by diverting water from the tributaries of the Little Ruaha River. In the alluvial plain of the Little Ruaha River of about 7,000 ha, the irrigated area had come to around 2,000 ha with paddy cultivation through traditional irrigation systems in the same manner mentioned above.

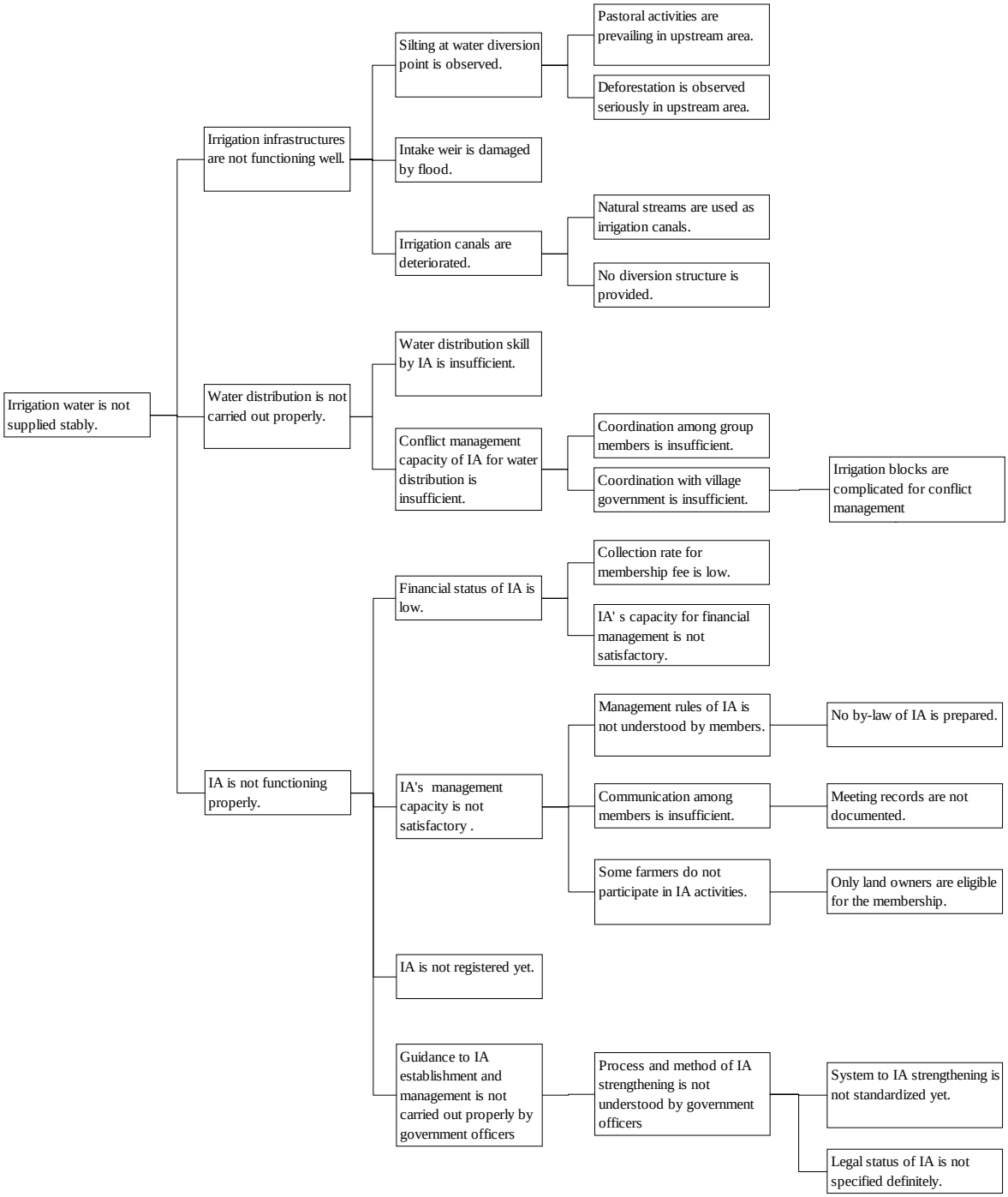
Farmers continue to apply their traditional farming system, which includes neither the use of fertilizers nor machineries. Nevertheless, farmers maintain reasonable yields, if sufficient water is available, because generally soils have high fertility levels due to annual flooding. Although the production of crops hardly go beyond home consumption, farmers pointed out that the farm gate prices of products are extremely low and unstable.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Non registered IA.
	No financial report. The farmers don't have sufficient experiences of managing an IA.
	Irrigation sub blocks are not identical to the boundaries of the IA subgroups
Irrigation and Drainage	Huge sedimentation diverted into canal due to improper facilities design.
	No capability of farmers on repair for gabion weir.
	Insufficient water supply due to use of natural channels as irrigation canals.
	Difficult water management due to canal network based on administrative boundaries.
	Poor drainage due to double function irrigation canal and drain.

(3) Problem Analysis

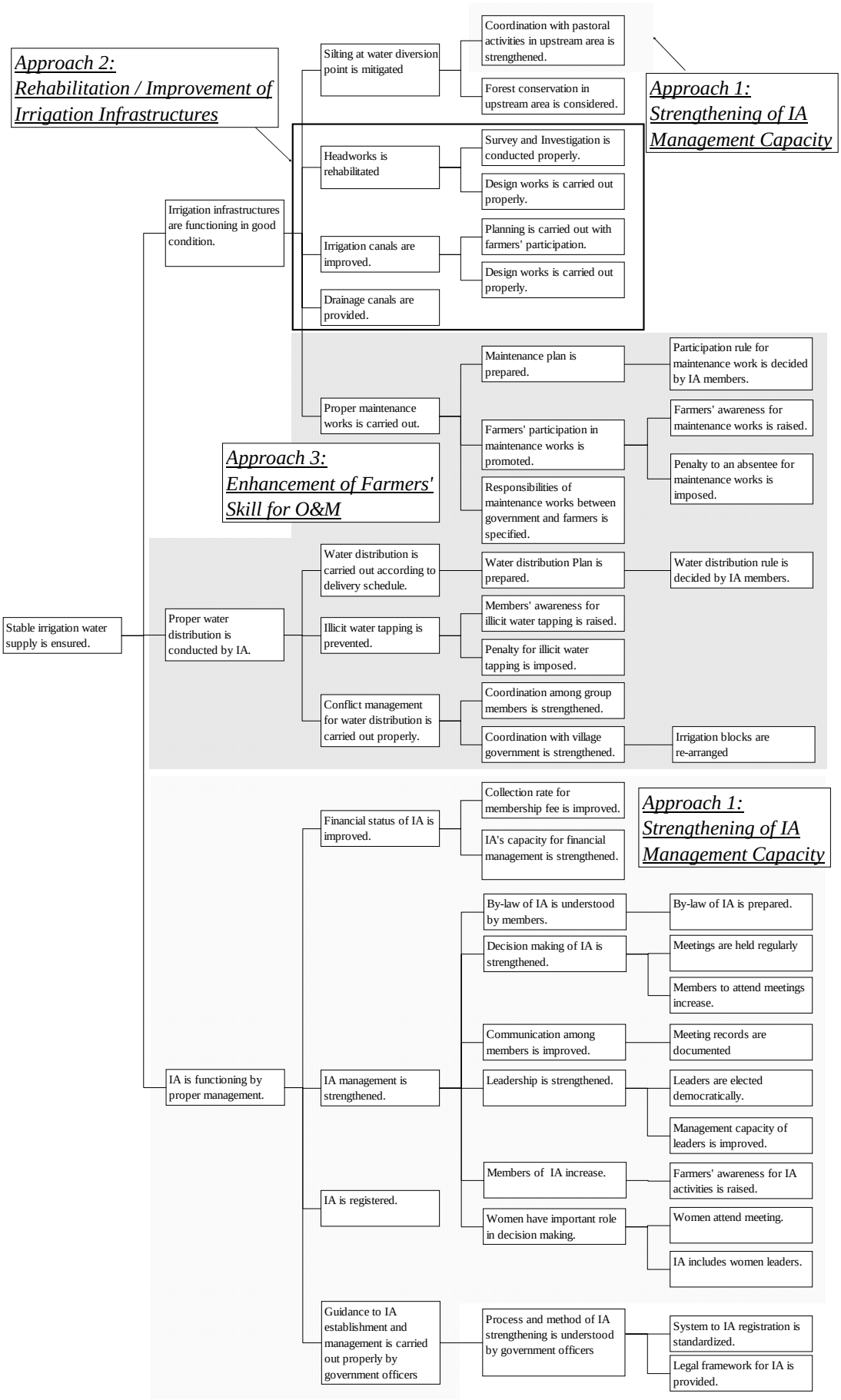
Problem analysis of Pawaga Irrigation Scheme is shown below.



Pawaga Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

The figure on the next page shows results of objective analysis with three development approaches such as (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity.



Pawaga Irrigation Scheme - Objective Tree

5.1.5 Musa Mwinjanga Irrigation Scheme

(1) Site Description

The scheme area is located in Mijongweni village, Machame South Ward (Hai District) in the low land agro-ecological zone of the Kikimanjaro Region. It lies at the border of Moshi Rural-Hai District. Access to the scheme area in the Mijongweni village is by an unmetaled all-weather road from the center of Moshi town, of which distance is about 7 km.

Annual rainfall of the scheme area is relatively scarce ranging between 400 mm to 570 mm having two rainy seasons, a major one in April to May and a minor one in September to November. Catching that precipitation, Weruweru River is perennial with certain flow over the year.

The scheme area extends over the alluvial plain located on the right bank of Weruweru river. The area is very suitable for cultivation because of fertile soil having a gentle slope of 0 – 2 %.

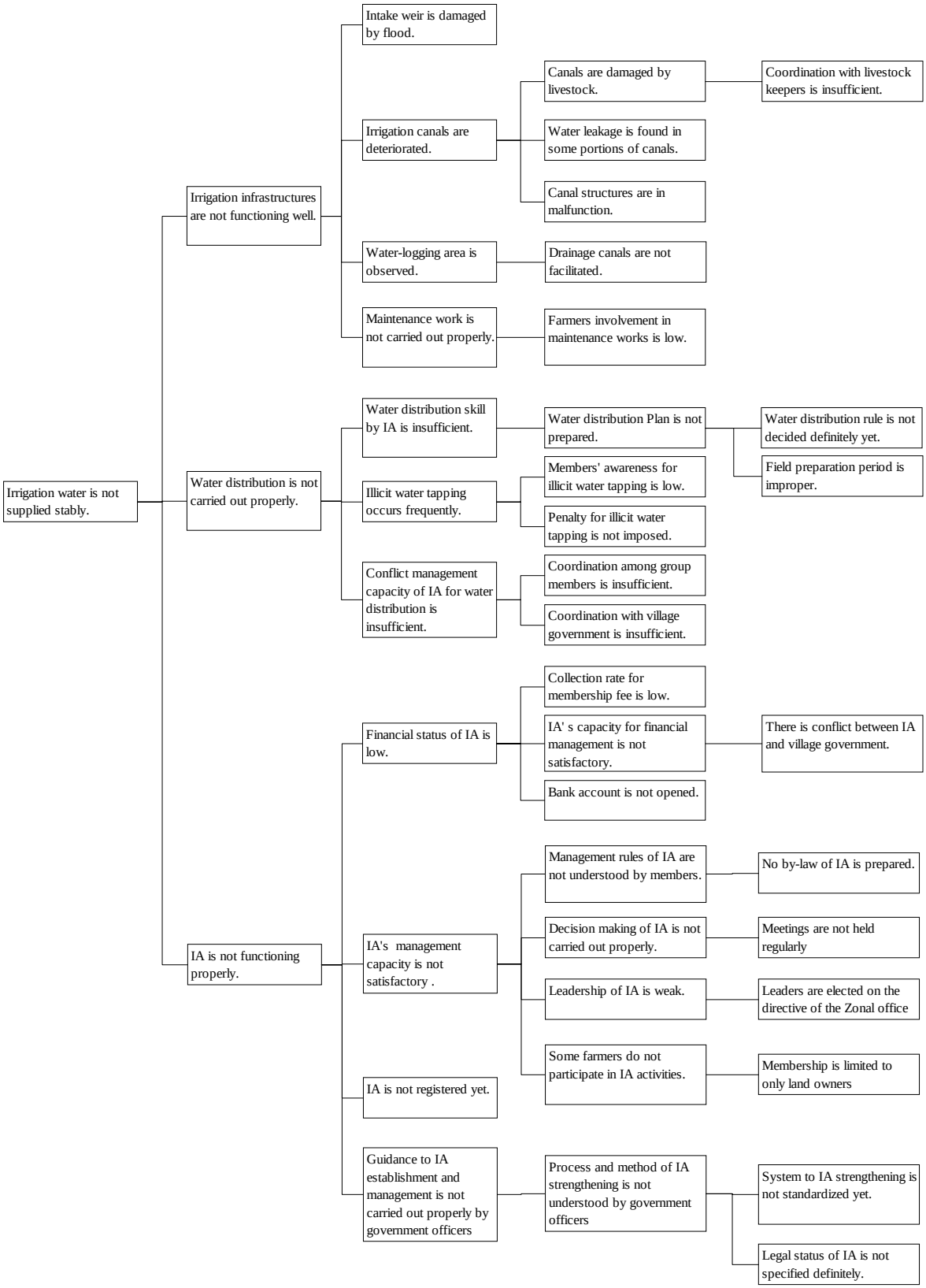
This scheme is adjacent to Lower Moshi scheme and is covered by the services of KATC. Paddy yields are rather stable because of the double cropping with the reasonable inputs such as quality seeds, fertilizers and farm machineries. Vegetable production from home garden also contributes to the farm income significantly. Although there are constraints such as un-affordability to farm inputs and the lack of negotiation power of farmers with middlemen, the most important issue is the rehabilitation of weir and distribution points damaged by the heavy rainfall in 2002.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Organizing an IA is on going under supervision of the district cooperative officer and the zonal office (more or less top down approach).
	The farmers' insufficient skill of managing an IA.
Irrigation and Drainage	Unstable existing intake weir.
	No systematic water management.
	In efficient irrigation system due to no consistency in repair works.
	Improper operation of intake gates on the main canals due to poor design.
	Water stagnant due to poor drainage.

(3) Problem Analysis

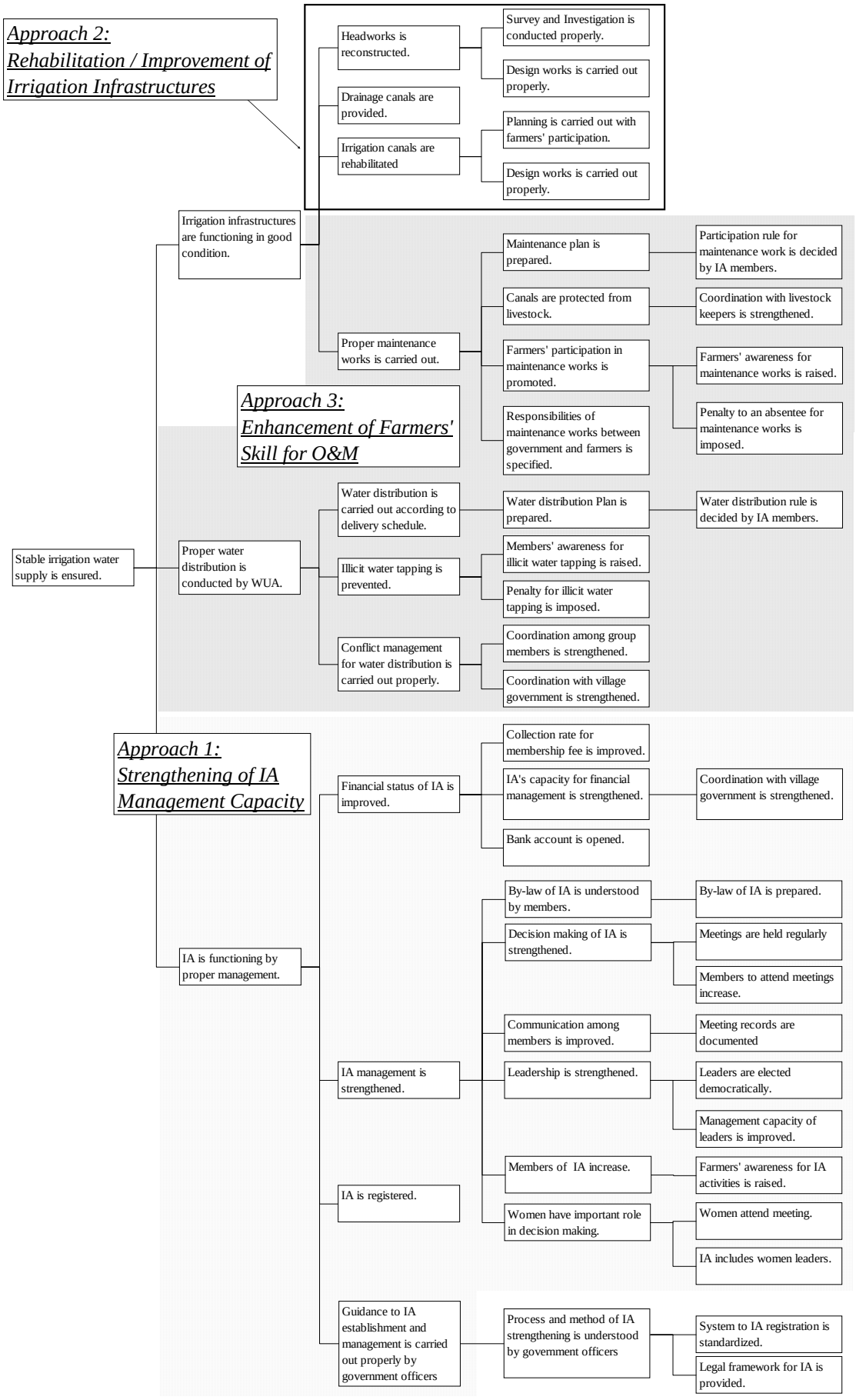
Problem analysis of Musa Mwinjanga Irrigation Scheme is shown below.



Musa Mwinjanga Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

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



Musa Mwinjanga Irrigation Scheme - Objective Tree

5.1.6 Mgongola Irrigation Scheme

(1) Site Description

The scheme area occupies most of Hembeti Ward (Morogoro Rural District) in the eastern part of the Morogoro Region. Administratively, it includes three villages, namely, Mkindo, Dihombo and Hembeti. Access to the scheme area in the Mkindo village is by an unmetaled all-weather road from Dakawa, of which the distance is about 10 km. The scheme area could be easily accessible by any kind of vehicle in every season, because the access roads are well maintained though they are unpaved.

Average annual rainfall of the scheme area is estimated at about 1,310 mm with double threads at the maximum in April. Mkindo River, which is a water source of the scheme, has perennial flow. Average discharge of the river at the existing intake point was estimated at more than 8.0 m^3/sec, and even the lowest discharge in the dry season, say in September, was estimated at above 1.9 m^3/sec.

Fertile alluvial plain extends downstream of the gouge of the Mkindo river. The scheme area is enclosed by the Mkindo River and its tributary, Mgongola River.

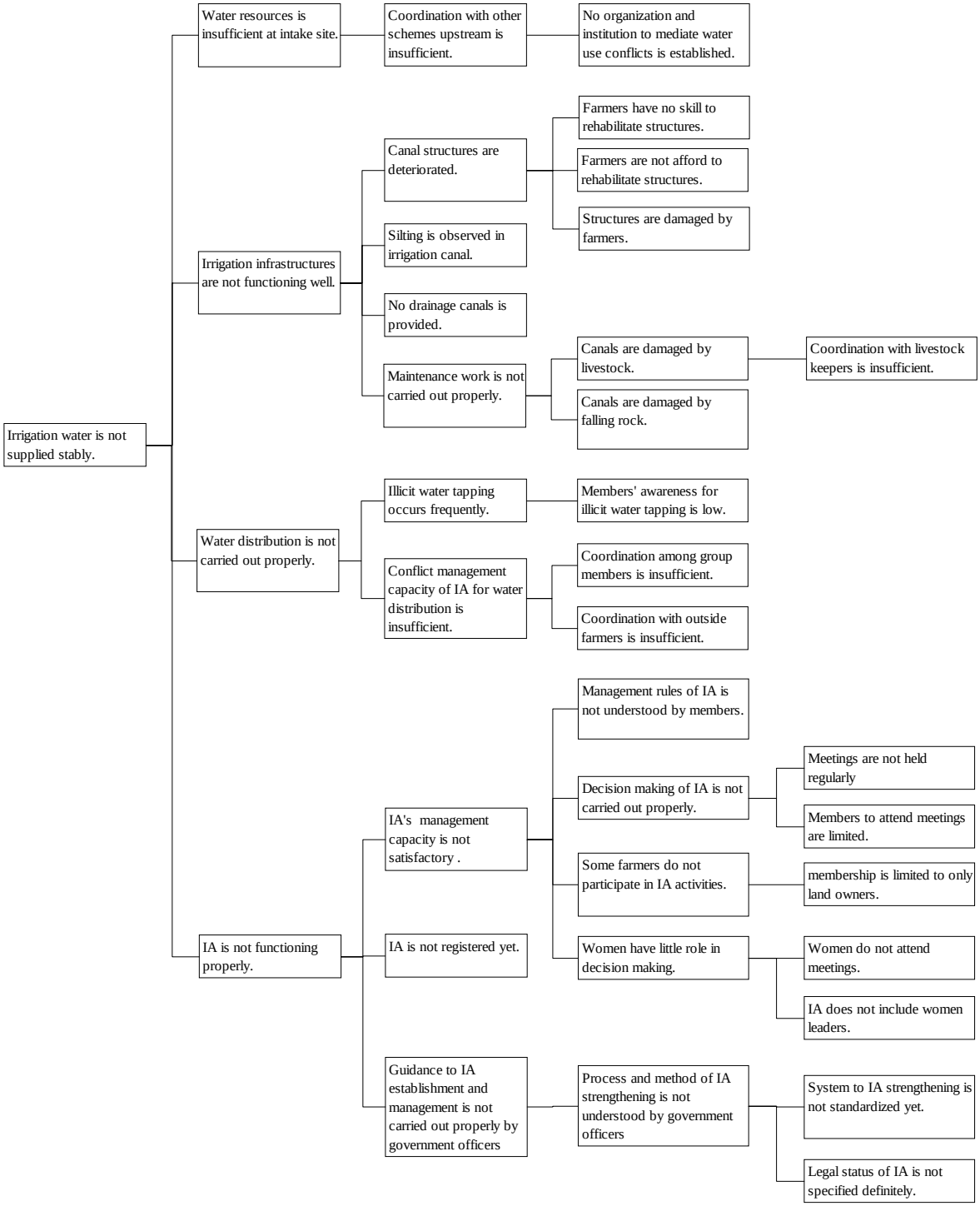
Irrigated paddy production was introduced into this area through the model field of 37 ha and the irrigated area has been expanded by the effort of farmers up to 200 ha. But the majority of the area is still used for the production of rainfed paddy. The average plot size for rainfed paddy is presently 1.6 ha. In case the double cropping system is introduced through irrigation development, an appropriate plot size is considered to be around 0.8 ha per family based on the ordinary workability. Proper land distribution arrangement will thus become an important subject for the future irrigation development.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Non registered IA. In addition, the registered cooperative was established by some members of the IA through top-down intervention of the district cooperative officer. The cooperative doesn't work well, however.
	The bylaw and the regulations are not well understood by the members. Only landowners are eligible for the membership. Poor participation of members in the IA activities such as operation and maintenance activities of irrigation facilities, meetings and etc.
Irrigation and Drainage	Water conflict with outside irrigation water users.
	Water stagnant due to no flood protection facility and poor drainage.

(3) Problem Analysis

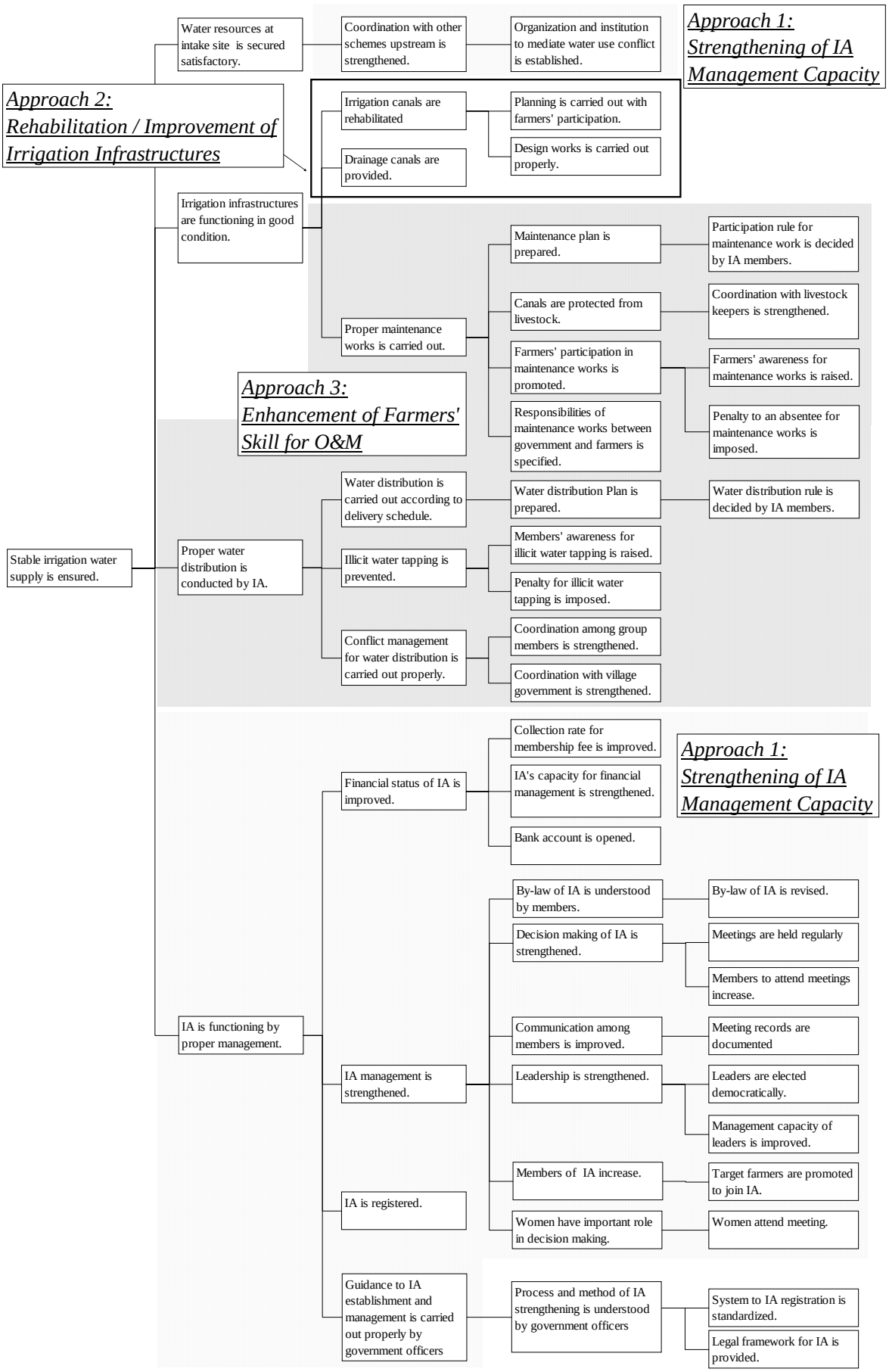
Problem analysis of Mgongola Irrigation Scheme is shown below.



Mgongola Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Results of objective analysis with three development approaches such as (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity, are indicated below.



Mgongola Irrigation Scheme - Objective Tree

5.1.7 Lower Moshi Irrigation Scheme

(1) Site Description

The scheme is located in the Moshi Rural District of the Kilimanjaro Region. The scheme covers six villages of Mabogini, Rau Ya Kati, Chekereni, Oria, Mandaka Mnono and Kaloleni. The scheme area extends on the alluvial low land area, this being composed of gently sloping land with an average gradient of 0.5 %. The elevation of the scheme area ranges from 700m to 760m. Climate in the scheme area is characterized by three seasons: rainy season from March to May, dry season from June to October, and a short rainy season from November to February. The mean temperature varies from 20^{o}C to 25^{o}C throughout the year.

Water sources of the scheme consist of the Rau River and the Njoro River, a tributary of the Rau River. The Rau River originates from Mt. Kilimanjaro and traverses the scheme area until it is joined by the Ruvu river collecting water from springs in the mountain area. The Mwanagurue spring located in Mandaka Mnono is acting as a stable water source of the river. The Njoro River, collecting water from such springs as the Njoro ya Dobi spring and Goa spring, has a relatively stable flow throughout the year. The estimated mean discharge at Mabogini and Rau Ya Kati ranges from 1.23 m^3/sec to 1.59 m^3/sec and from 2.24 m^3/sec to 4.35 m^3/sec, respectively. The soils have no serious limitation for irrigated rice farming. The access to the scheme area is good and possible even during the rainy season.

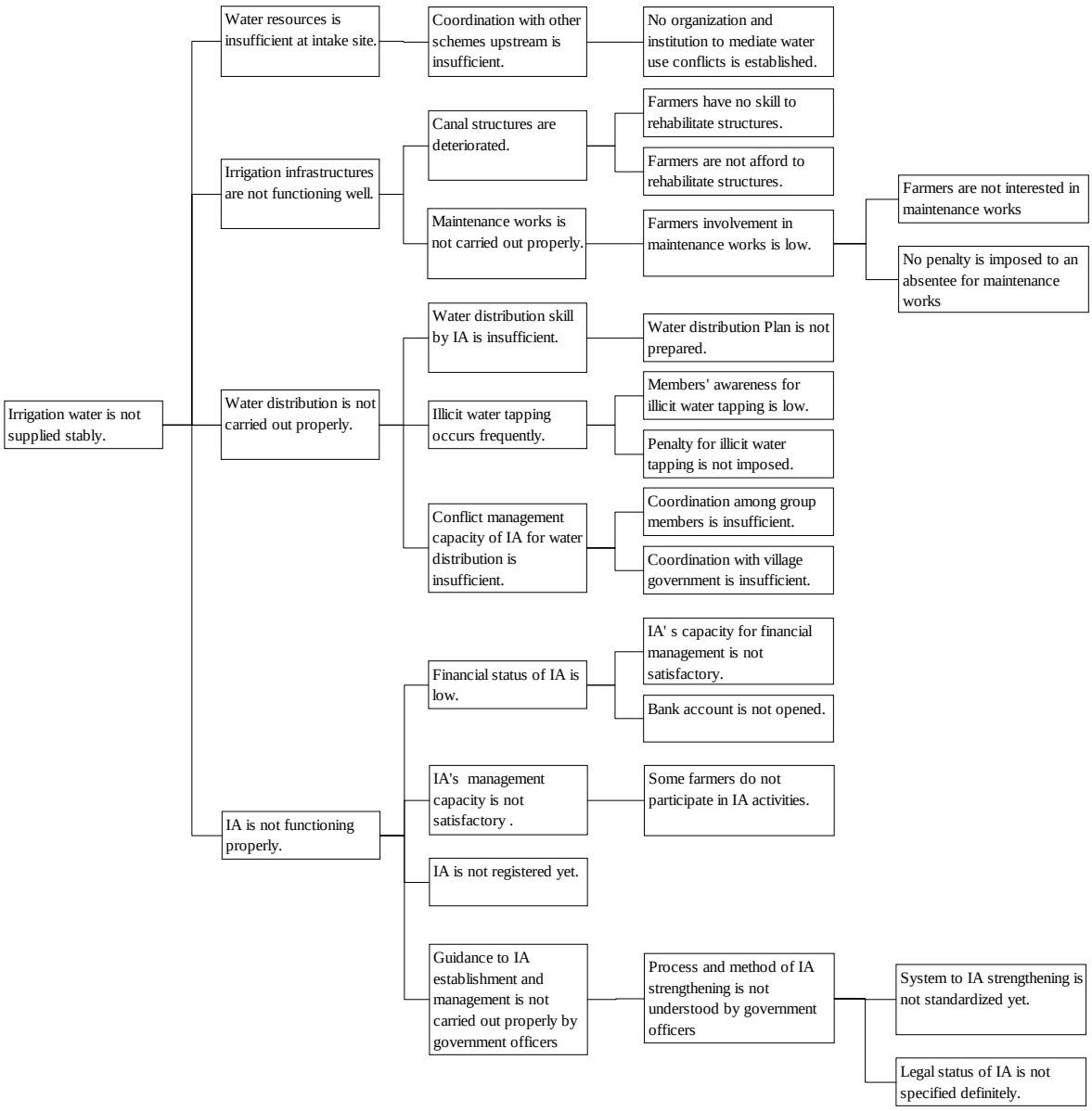
Although the cropping intensity in the original plan was 170 %, the highest annual cropping intensity in the past was 137 % and then decreased substantially. The average cropping intensity in recent three years (2000-2002) was 85.6 %; 113 % in Mabogini system and 65 % in Rau system. According to the current interview survey for the villagers in the upper stream of the existing scheme, on the other hand, the cropping intensity is more than 200 %. It implies that the water resources are not evenly distributed within and also between schemes.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Non registered IAs. No concrete future plans 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.
	Water rights issues need coordination of the responsible stakeholders including relevant governmental organizations
Irrigation and Drainage	Critical water conflict with other outside irrigation water users.
	No protection of water rights obtained.
	Improper rotational irrigation.
	No even water use in the same river basin.

(3) Problem Analysis

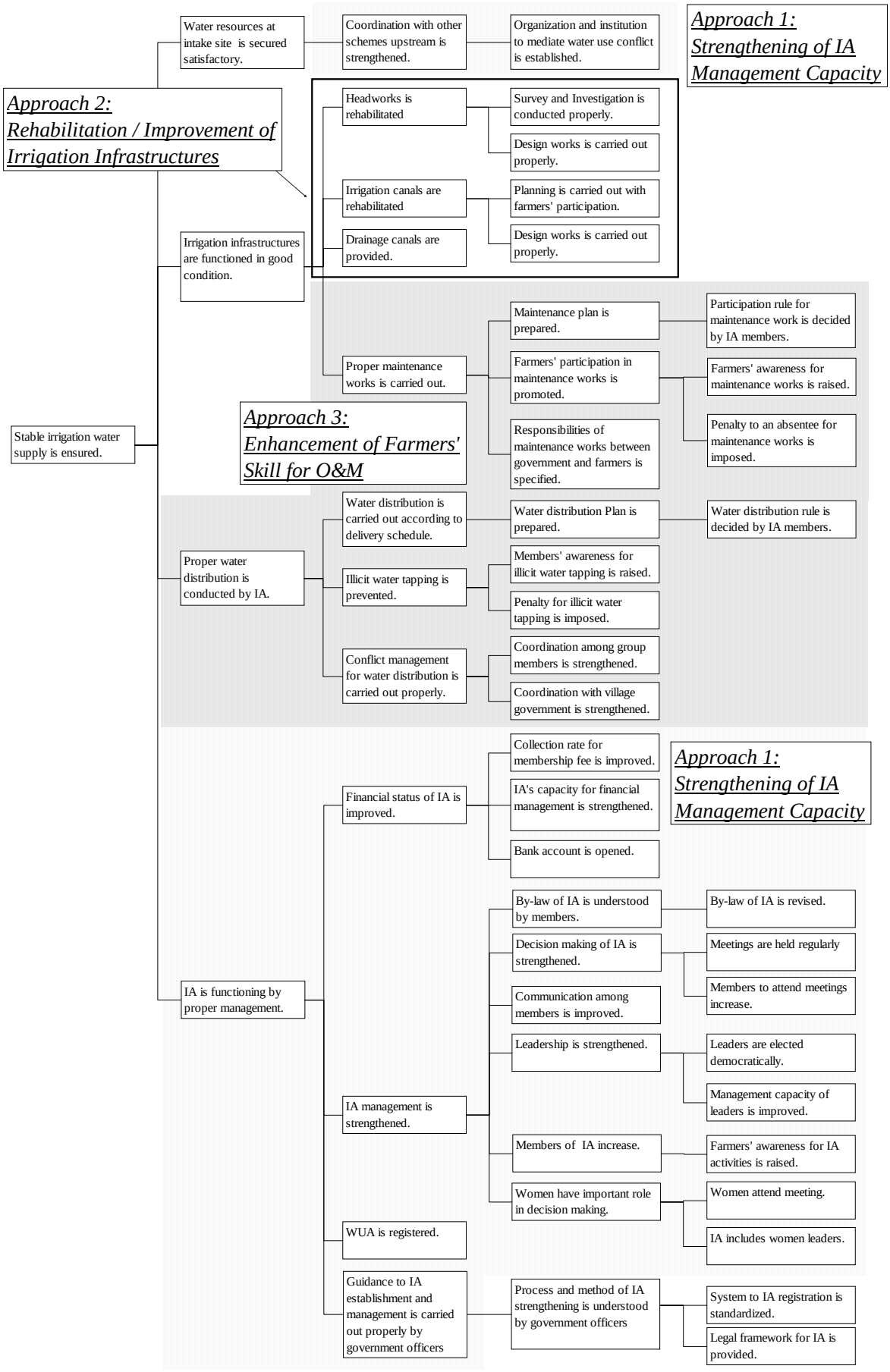
Problem analysis of Lower Moshi Irrigation Scheme is shown below.



Lower Moshi Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Objective analysis with three development approaches such as (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity, presents the following objective tree shown on the next page.



Lower Moshi Irrigation Scheme - Objective Tree

5.1.8 Kisese Irrigation Scheme

(1) Site Description

The scheme area covers most of Kisese Ward (Kondoa District) in the northern part of the Dodoma Region. It administratively includes 4 villages, namely, Kisese-Sauna, Kisese-Disa, Mapinduzi and Madisa. Access to the center of the scheme area in the Kisese-Sauna is by an unmetaled seasonal-weather road from Kondoa, about 71 km long. The scheme area is accessible only by 4WD vehicle even in the dry season because the access roads approaching from west are through a mountain pass with small width and steep slopes, otherwise other access roads approaching from south are erodible at the closings with tributaries. It is sometimes difficult to reach the area during the rainy season by any type automobile.

Annual rainfall of the scheme area ranges from 500 mm to 800 mm having a single peak in April. Kisese River is a major water source of the scheme having about 100 km^2 of catchment area. The river is intermittent or ephemeral in and below its middle reaches. Small streamlets have however been seen in the upstream segment of the river gushing out from several springs during the dry season. The watershed of the river is well vegetated and exposes rocks in layers, which seem to be relatively suitable for feeding springs.

As the downstream portion of the scheme area and the outside area extending downstream are rainfed cultivated during the rainy season, water harvesting measures diverting flood flush are the only means possible for irrigation to these dry area. On the other hand, specified areas in the upstream areas are presently irrigated by abstracting water in a traditional manner.

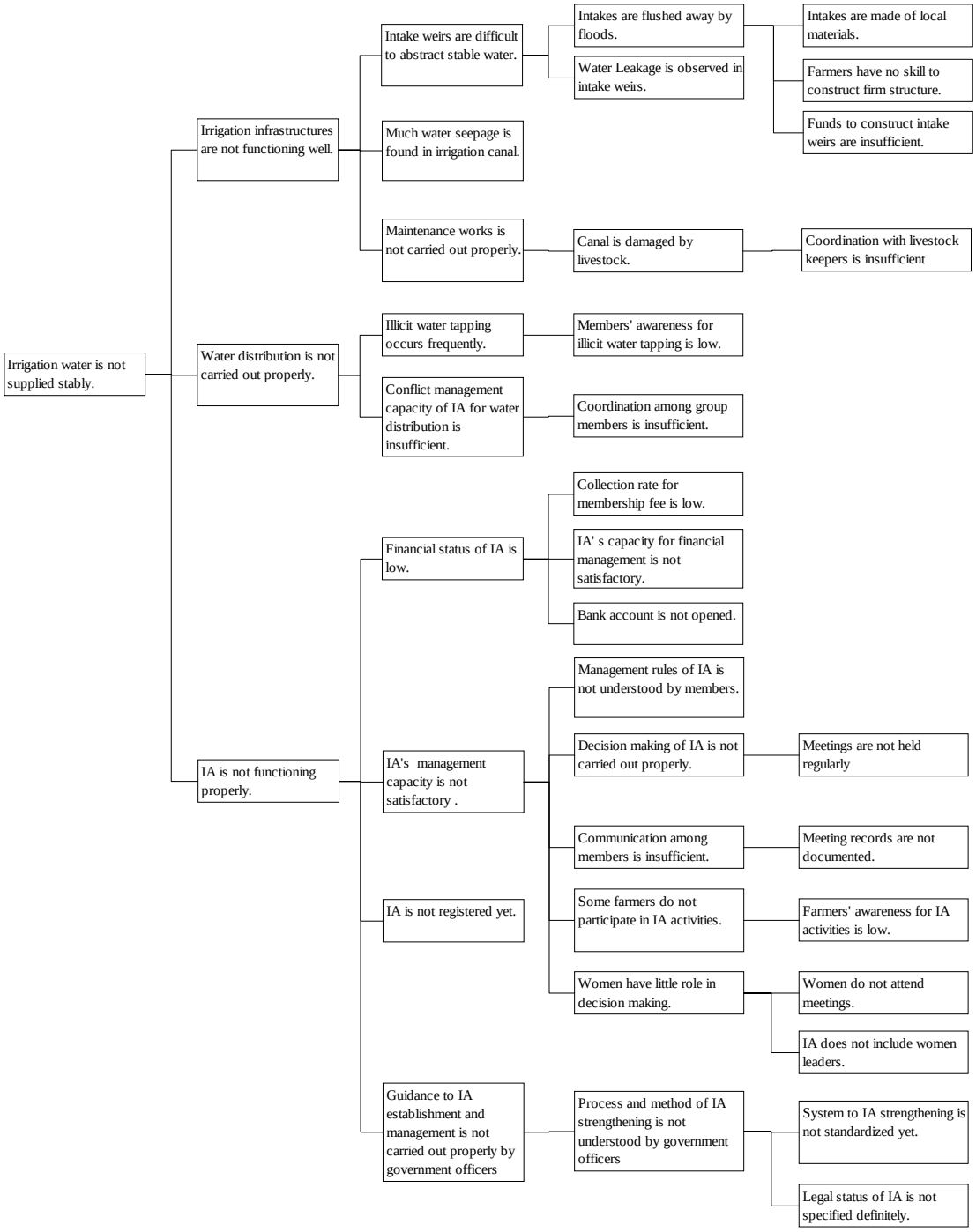
The average holding size is as large as 4 ha and the crops of more than 10 kinds are cultivated. Major crops cultivated are cereals including maize, sorghum and millet. Cash crops such as sunflower and sesame occupies about 20 % of the cultivated area. Sugarcane, paddy and vegetables are presently irrigated. The main intention for irrigation development is to increase the production of vegetables such as onion and tomato because of high demand in the surrounding areas. Contour bands and contour ridges are constructed in some of the field of advanced farmers as countermeasures for soil erosion.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	No IA at present, but a small group of vegetable cultivators exists.
	The management of the small group is still insufficient. There is no general meeting. The bylaws or the regulations are not well understood by the members.
Irrigation and Drainage	Insufficient water source.
	Poor existing intake facility.
	Insufficient knowledge on irrigation.

(3) Problem Analysis

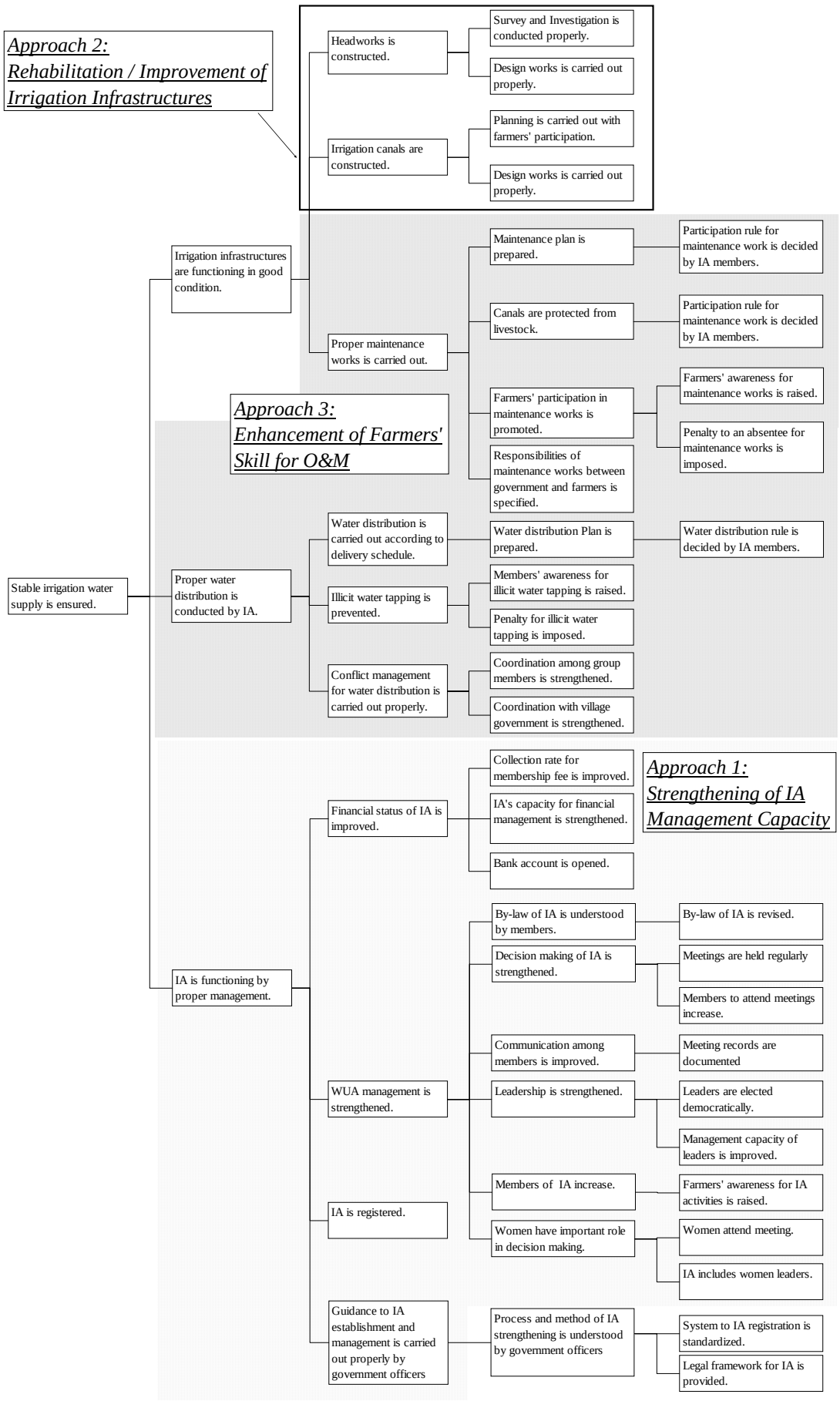
Problem analysis of Kisese Irrigation Scheme is shown below.



Kisese Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

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



Kisese Irrigation Scheme - Objective Tree

5.1.9 Pamila Irrigation Scheme

(1) Site Description

The Pamila Irrigation Scheme is located in the Pamila Valley extending south of Pamila Village situated about 53 km east of Kigoma Town, capital of Kigoma Region. Beneficiaries of the scheme are mostly living in Pamila Village having a total population of 3,469 in 2002. There are 671 households.

The inhabitants of Pamila Village are mostly peasants. Their livelihood mainly depends on agricultural production of food and cash crops. As food crops, they cultivate rice, maize, cassava, sweet potatoes and pulses. Oil palms and sometimes rice are cultivated as cash crops. Fruits such as mangoes, oranges and bananas are grown on a small scale.

The scheme area is comparatively flat topography sloping toward the east. Its elevation ranges from 990 m to 1,000 m. The scheme area extends on alluvial deposits, being fairly fertile, well drained with fine to moderate textured clay loams and sandy clay loams. The soils have no serious limitation for irrigated rice farming.

The scheme area has bimodal type of rainfall. The first rainy season starts in mid October through mid January, and the second rainy season starts in late February and lasts until May. The average annual rainfall is about 1,200 mm. The average minimum temperature is 18^{o}C and the maximum temperature is 30^{o}C.

The access to the scheme area is fair and possible even during the rainy season. However, it is difficult to approach the various intake sites due to high moisture in the soil during the rainy season.

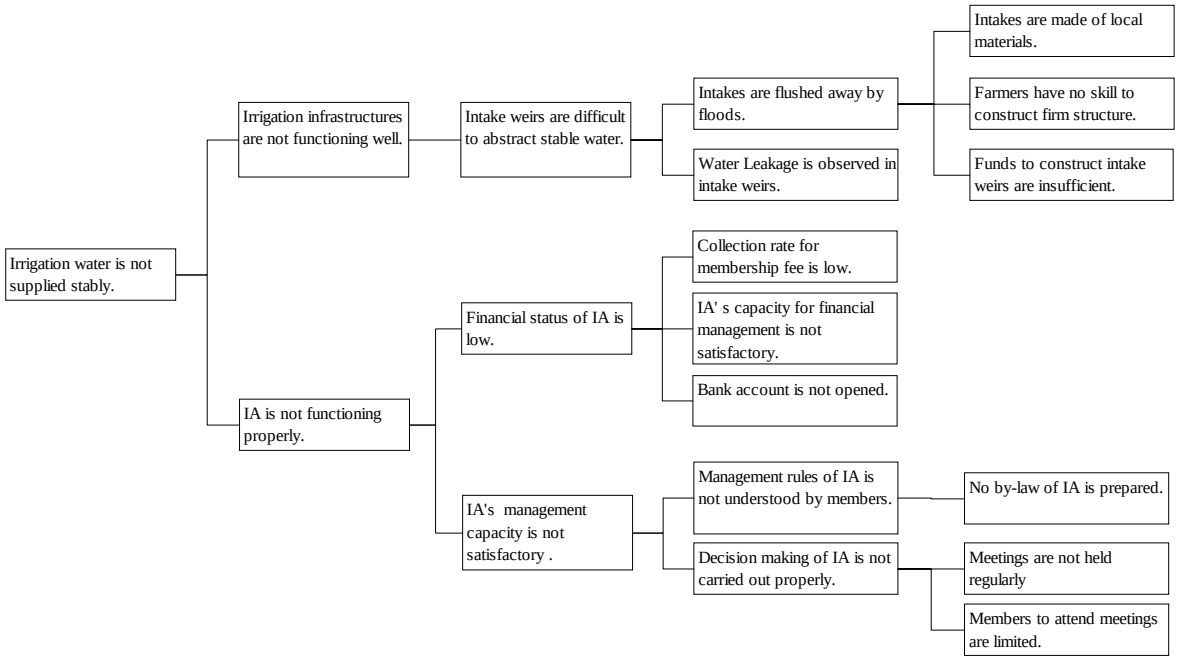
Although this scheme is categorized into water harvesting, the method is almost rainfed just controlling the flooding water by small bunds. The average holding size is about 1.6 ha for upland crops and 0.8 ha in low land. Since a part of the proposed scheme area belongs to Mkuti Forest Reserve, an appropriate procedure might be needed to alter the land use status for irrigation development. Irrigated paddy production is performed only in rainy season and the average yield is 1.8 tons/ha which is almost same level with rainfed paddy. Major constraints in crop production pointed out by farmers were shortage of water, shortage of land, insufficient supply of inputs such as farm machinery and fertilizer.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	No IA, but informal irrigators' sub groups exist. However, the farmers don't have sufficient experiences of managing an IA.
	Insufficient technical training opportunities for the farmers
Irrigation and Drainage	Very fragile existing weirs.
	Superficial farmers' experience in irrigation.
	Ineffective irrigation canal system.
	Water stagnant due to poor drainage system.

(3) Problem Analysis

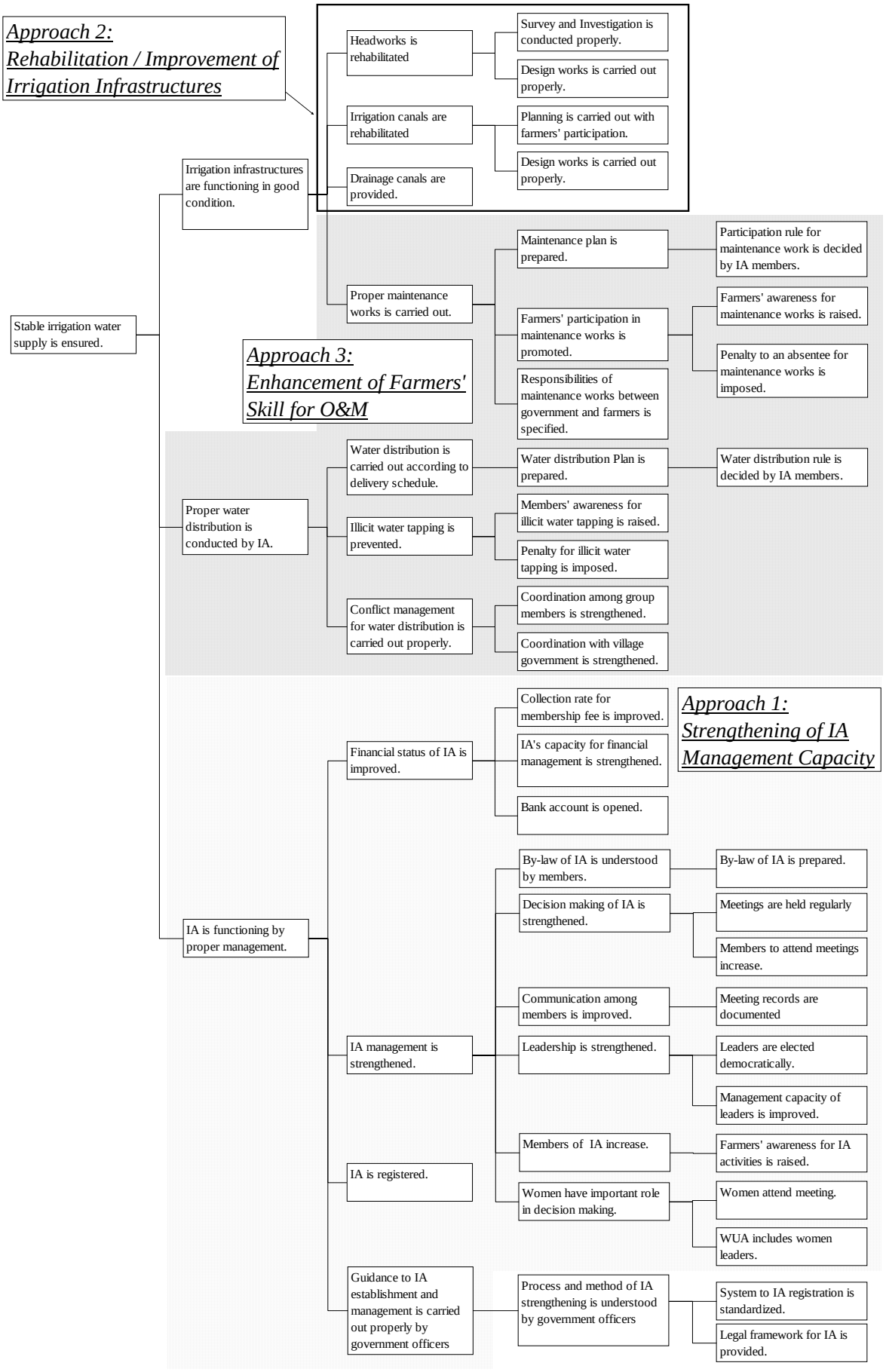
Problem analysis of Pamila Irrigation Scheme is shown below.



Pamila Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Results of objective analysis with three development approaches (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity, are indicated on the next page.



Pamila Irrigation Scheme - Objective Tree

5.1.10 Nkenge Irrigation Scheme

(1) Site Description

The Nkenge Irrigation Scheme is located in Mbale Village, Kitobo Ward, Kiziba Division, Bukoba District, Kagera Region. The scheme area lies about 32 km northwest of Bukoba, capital of Kagera Region. The access to the scheme area is good and possible even in the rainy season.

The scheme area extends in the Ngono river basin which is the most suitable potential area for irrigated farming. The topography of the scheme area is gently sloped toward the northwest. Its elevation ranges from 1,147 m to 1,155 m above mean sea level.

The climate of the scheme area is classified as “Moist-Sub Humid”. The mean annual rainfall is about 1,300 mm. The rainy season is in March to May, and the dry season in June and July. The temperature is characterized by average daily minimum ranging from 13^{o}C to 16^{o}C and daily maximum from 24^{o}C to 25^{o}C.

The scheme area is underlain by alluvial deposits of the Ngono flood plain. These deposits are fine textured to a depth of at least 3 m and have high silt and clay contents which have no serious limitation for irrigated rice farming.

It is easy to approach the pumping site and major structure sites because of existing farm roads.

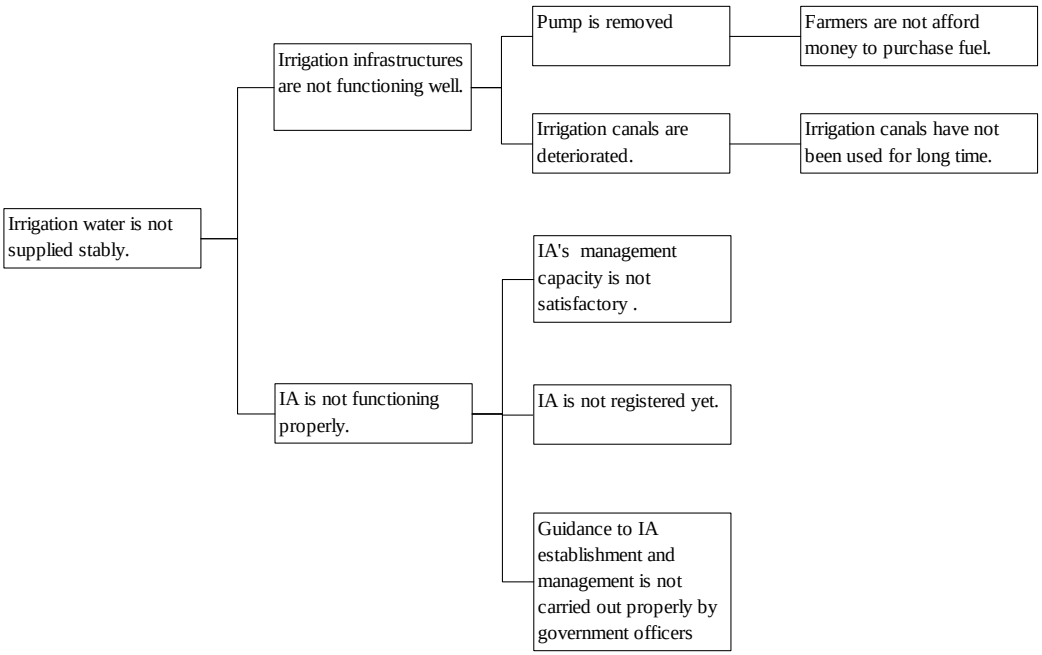
The traditional cultivation method is the mixed culture of banana, coffee, cassava, beans and maize in the slope area with the average holding size of about 0.8 ha. There is a tremendous decline of banana production due mainly to diseases and insects in addition to the sharp decline of coffee price. The diversification to alternative crops has therefore become necessary and irrigated paddy is considered as one of the promising alternatives. The distribution size of holding for irrigated paddy should be considered carefully by taking various conditions into consideration.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	No IA. The farmers don't have any experience managing an IA.
Irrigation and Drainage	Deterioration of existing pump equipment
	High pump operation cost for farmers.
	Lack of ownership on operation and maintenance of irrigation facilities.
	Insufficient support to farmers by LGAs.

(3) Problem Analysis

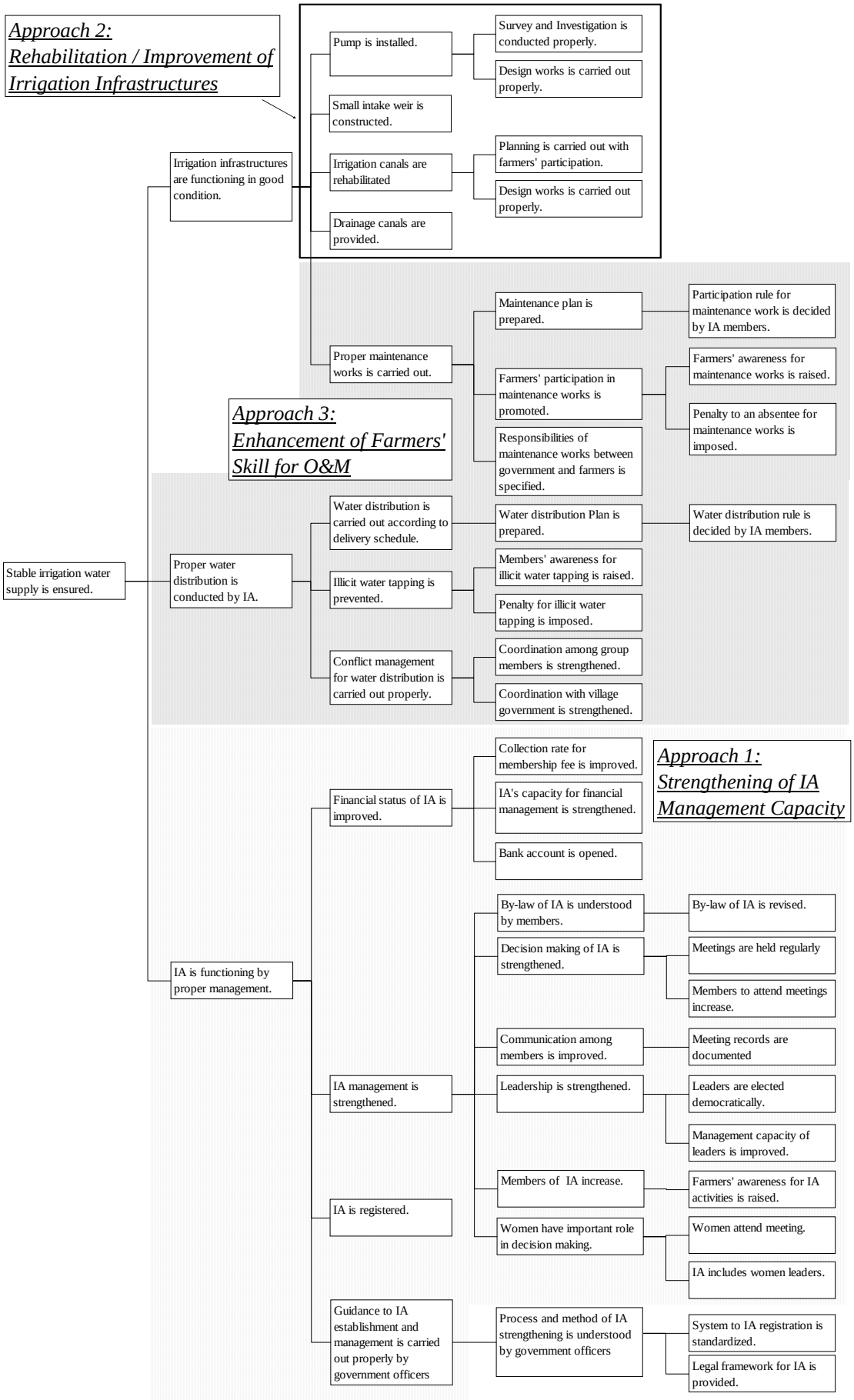
Problem analysis of Nkenge Irrigation Scheme is shown below.



Nkenge Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

Results of objective analysis with three development approaches (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity, are indicated below.



Nkenge Irrigation Scheme - Objective Tree

5.1.11 Luchili-Nyakasungwa Irrigation Scheme

(1) Site Description

The scheme area covers most of Sengerema Ward (Sengerema District) at the shore of the Luchili Bay in the Lake Victoria. It administratively includes two villages, namely, Luchili and Nyakasungwa. Access to the scheme area is by an unmetaled road from Sengerema, of which distance is about 35 km.

Annual rainfall in the scheme area is about 930 mm distributing mainly during two periods of the short rains in October-December and the long rains from March to May. Agriculture, especially during the dry season, is virtually dependent on irrigation.

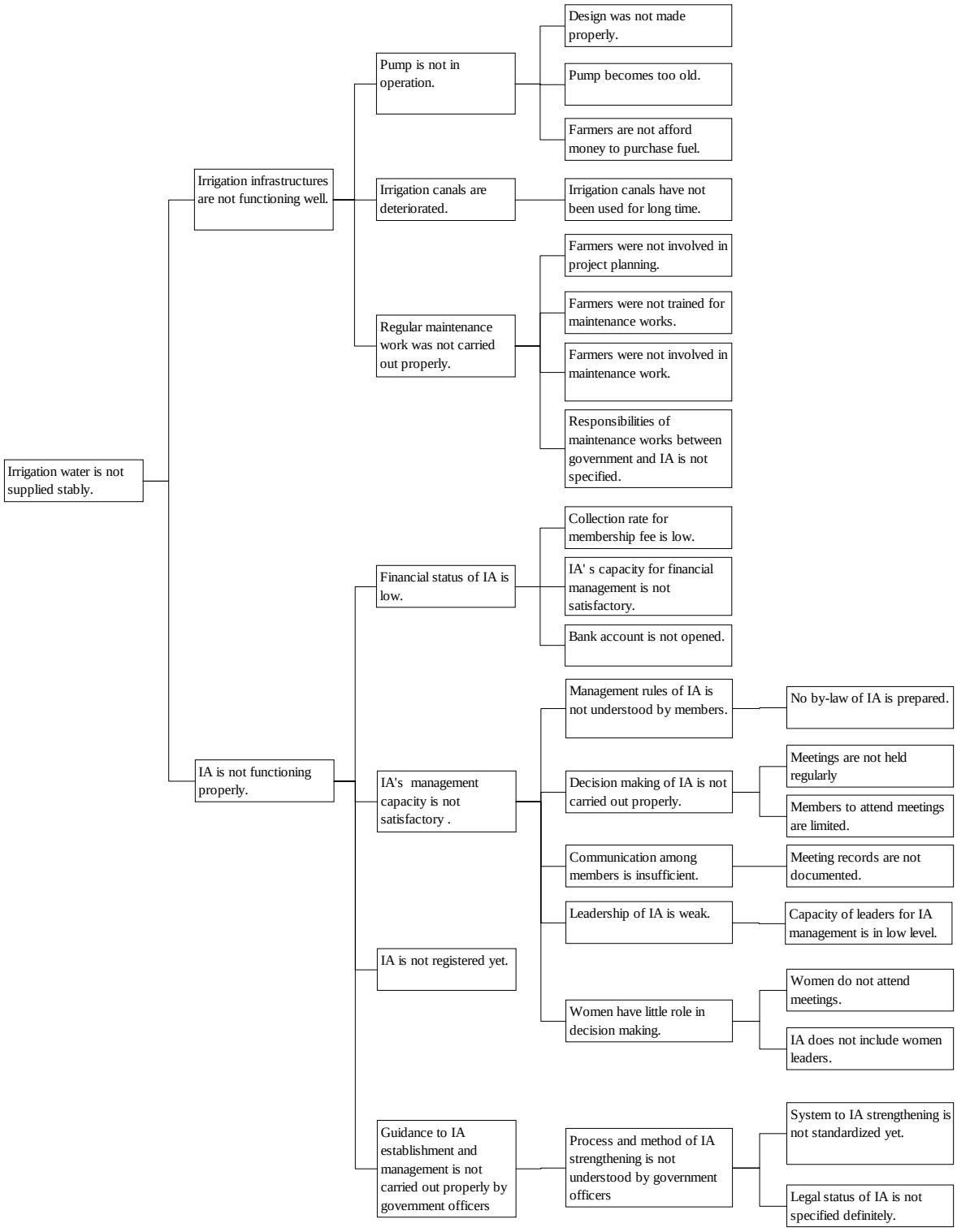
Since the profit through paddy and cotton production is insufficient due to low farm gate prices, the net farm income of average farmer in this scheme can not cover the living expenditure. The distribution size of irrigated plot was only 0.3 ha and the contribution to the farm income will be minimal even if dry season cultivation is performed. Most farmers recognize the main aim of irrigation as a mean for stabilizing rainy season paddy because they are also involved in other upland crop cultivation activities.

(2) Summary of Problems and Issues

Description	Problems and Issues
Institution	Non registered IA and its poor management. Its activities are stagnant because of no irrigation at present.
	Weak ownership and financial base of farmers
Irrigation and Drainage	Deterioration of installed pump equipment and irrigation facilities.
	Improper design on pump station and its related facilities.
	High pump operation cost for farmers.

(3) Problem Analysis

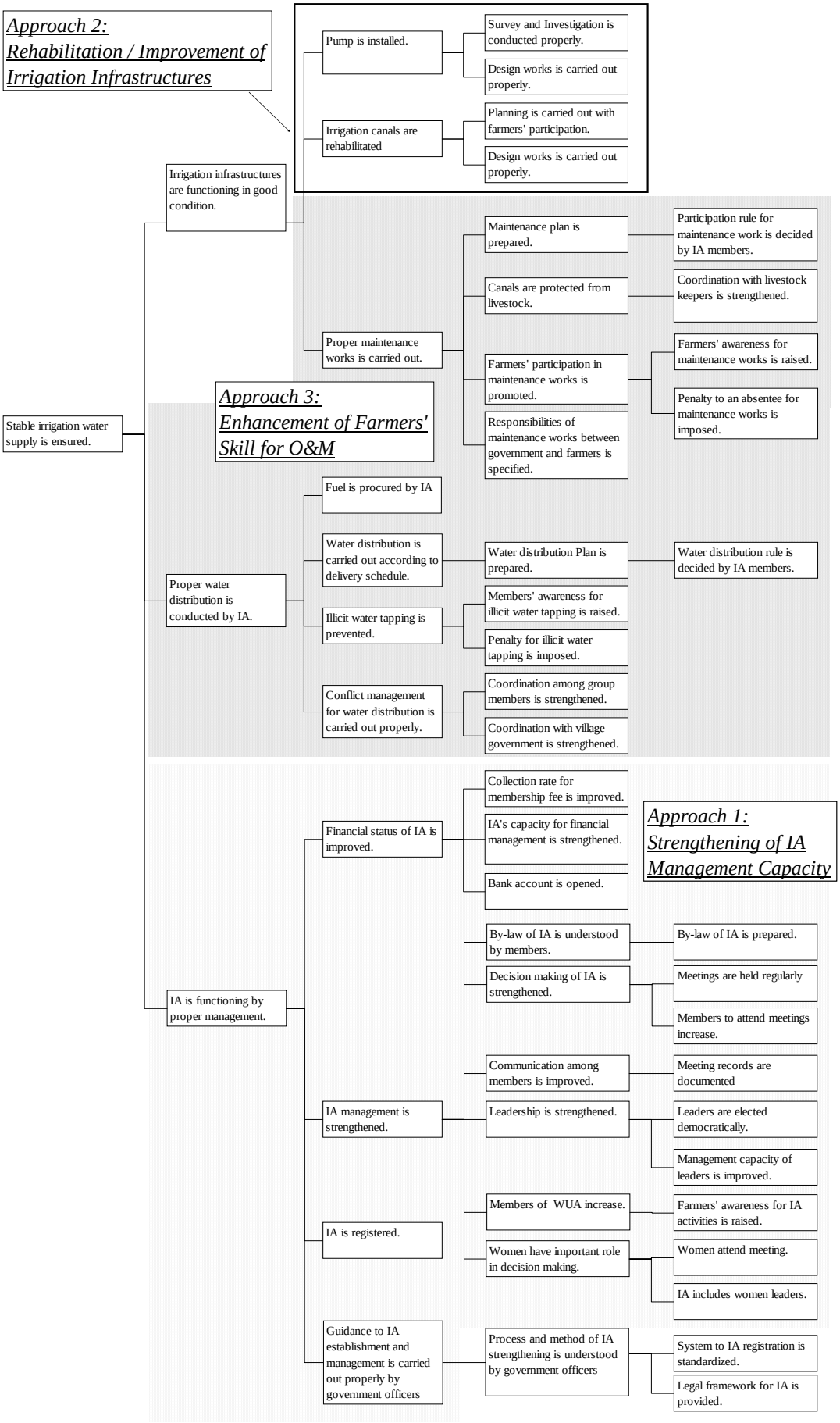
Problem analysis of Luchili - Nyakasungwa Irrigation Scheme is shown below.



Luchili-Nyakasungwa Irrigation Scheme - Problem Tree

(4) Objective Analysis and Development Approach

The objective tree shown on the next page is results of objective analysis with three development approaches such as (i) rehabilitation/improvement of infrastructures, (ii) enhancement of farmers' skill for O & M, and (iii) strengthening of IA management capacity.



Luchili-Nyakasungwa Irrigation Scheme - Objective Tree

5.2 Linkage of Identified Issues from Field Survey and Subject-wise Improvement Programmes

5.2.1 General

As mentioned in Clause 5.1, lots of problems on the selected ten Model Irrigation Schemes were clarified through RRA and site inspection, and then appropriate countermeasures were discussed for respective fields of institution, agriculture and engineering.

On the other hand, 37 Programmes of the Subject-wise Improvement Programmes were provisionally selected as the fundamental and cross-cutting subjects for all irrigation schemes in the Master Plan study. In this Clause, these 37 Programmes were preliminarily examined as to whether or not further Sub-programmes are necessary using the results of appropriate countermeasures discussed in Section 5.1. In addition, a linkage among problems, countermeasures and programmes of the Subject-wise Improvement Programmes were clarified based on the results of analysis and study executed so far.

5.2.2 Institutional Issues

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

- Insufficient legal framework of IA
- Farmers' insufficient ability or lack of experience of IA management
- Weak ownership and financial base of farmers
- Lack of efficient support for the farmers' bottom up movement by the GOT
- Inefficient harmonization of relevant governmental organizations
- Inefficient technical training services for the farmers

The following countermeasures have been derived from the preliminary analysis on the problems identified through the RRA and the site inspection:

Summary of Countermeasures for Each Scheme

Countermeasures	Scheme									
	Kinyope	Magoma	Pawaga	Musa Mwinjamaga	Mgongola	Lower Moshi	Kisese	Pawaga	Nkenge	Luchili-Nyakasungwa
Support for organizing IA		○	○	○				○	○	
Support for IA registration		○	○		○	○	○	○		
Technical Trainig of IA management	○	○	○	○	○		○	○		○
New legal framework for IA	○			○	○	○				○
Introduction of competitive bottom up approach	○						○		○	○
Backstop for bottom up movement by the government		○				○	○		○	○
Harmonization mechanism of the government	○			○	○	○				

Source : JICA Study Team

The table obviously indicates that “Technical Training of IA management” is the most common countermeasure for the schemes. However, “Support for bottom up movement by the government” is the most essential and fundamental countermeasure among the listed countermeasures, in other words, the most important cross-cutting issue for the ten selected Model Irrigation Schemes in institutional aspects. Without the efficient support by the GOT, the other countermeasures wouldn’t work well.

The examination of the content of the Subject-wise Improvement Programmes previously selected in the Mater Plan study, was undertaken based on the identified problems from RRA and site inspection. Consequently, the following Programmes are added, taking into consideration the need of IA strengthening:

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

Linkage of Countermeasures with Components of Subject-wise Improvement Programme

Category	**A: Institutional Aspects**					**B: Systemizing Aspects**
Original Programme	**A-1: DITS Institutional Improvement Programme**	**A-2: - LGA Institutional Strengthening Programme for Irrigation Development**	-			**B-1: DITS Working Mandate Formulation Programme**
Additional Sub-programme	-	-	**A-3: IA Strengthening Programme**			-
Sub-components added / **Countermeasures**	-	-	New Legal Framework for IA Establishment Study	IA Organizing and Registration Support Manual	IA Management Training for Farmers	-
Support for organizing IA	-	-	-	○	-	-
Support for IA registration	-	-	-	○	-	-
Technical Trainig of IA management	-	-	-	-	○	-
New legal framework for IA	-	-	◎	◎	-	-
Introduction of competitive bottom up approach	-	-	-	-	◎	-
Backstop for bottom up movement by the government	◎	◎	-	-	-	◎
Harmonization mechanism of the government	◎	○	-	-	-	◎

Source: JICA Study Team
◎: Priority in execution

5.2.3 Irrigation and Drainage Issues

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

On the preparation of the Project Proposal for the selected Programmes of the Subject-wise Improvement Programmes, the problems and issues identified through the field survey have to be fully considered so as to make the proposal realistic and more useful. Identified problems and necessary measures for solving them are broken down by Model Irrigation Schemes as follows:

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

Summary of Countermeasure for Each Scheme

Countermeasures	Schemes									
	Kinyope	Magoma	Pawaga	Musa Mwinjagama	Mgongola	Lower Moshi	Kisese	Pamila	Nkenge	Luchili-Nyakasungwa
Establishment of proper technical manuals	○	○	○	○	○	○	○	○	○	○
Utilization of contractors in proper manner	-	-	○	-	-	-	-	-	-	-
Establishment of proper O & M Manual	○	-	-	-	-	-	○	-	-	-
Preparation of necessary provisions on IA	○	-	○	○	-	-	○	-	-	-
Achievement of proper river-basin management	-	-	-	-	○	○	-	-		-
Attainment of good participation	-	-	-	-	-	-	-	-	○	-
Strengthening of roles of LGA	○	-	-	-	○	-	-	-	○	-
Confirmation of standard roles of donors and NGO	-	-	-	-	-	-	-	-	○	-
Strengthening of capabilities of LGA and/or DITS	-	-	-	○	-	-	○	-	-	-

Source: JICA Study Team

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

Linkage of Countermeasure with Orginally Selected Programmes

Countermeasure	Programmes of Subject-wise Improvement Programme											
	A1	A2	B1	B2	C1	C2.1	C2.2	C3.1	D3	D4	E1.5	E1.6
Establishment of proper technical manuals	-	-	-	-	○	○	○	○	-	-	-	-
Utilization of contractors in proper manner	-	-	-	○	-	-	-	-	-	○	-	-
Establishment of proper O & M Manual	-	-	-	-	-	-	-	○	-	-	-	-
Preparation of necessary provisions on IA	-	-	-	-	-	○	-	○	-	-	-	-
Achievement of proper river-basin management	-	-	-	-	-	-	-	-	-	-	○	○
Attainment of good participation	-	○	-	-	-	-	-	○	-	-	-	-
Strengthening of roles of LGA	-	○	-	-	-	-	-	-	-	-	-	-
Confirmation of standard roles of donors and NGO	-	○	○	-	-	-	-	-	-	-	-	-
Establishment of information and database system	-	-	-	-	-	-	-	-	○	-	-	-
Strengthening of capabilities of LGA and/or DITS	-	○	○	-	-	-	-	-	-	-	-	-

Source: JICA Study Team

Note: Contents of Programmes

A1 : DITS Institutional Improvement Programme
A2 : LGA Institutional Strengthening Programme for Irrigation Development
B1 : Regularization off Irrigation Administration and DITS Working Mandate Formulation Programme
B2 : Contract Management System Improvement Programme
C1 : Survey and Investigation Guideline Establishment Programme
C2.1 : Planning Guideline Establishment Programme
C2.2 : Design Guideline Establishment Programme
C3.1 : O & M Guideline Establishment Programme
D3 : Information and Database Improvement Progra
D4 : Irrigation Development Contractors and Consu Listing Programme
E1.5 : Environmental Assessment Study for Irrigation Practice in Tanzania
E1.6 : Study of River-Basin Approach in Irrigation Development

5.3 Selection of Priority Programmes

Based on analysis in Sub-clause 5.2.2, the modified number of Subject-wise Improvement Programmes amounts to forty in total, adding three programmes in relation to strengthening IA. The Priority Programmes were selected from 40 programmes in consideration of current progress of ASDP implementation, the cross-cutting issues identified through RRA and the following strategic targets for the Short Term development scenario presented in the Master Plan:

- Reform of the environment for promotion of decentralization and improvement of the private sector,
- Establishment of appropriate technologies on irrigation development in a cost-effective concept,
- Dissemination of the concept of the river basin approach, and
- Establishment of an irrigation development system by participatory approach.

The table below shows the selected Priority Programmes written in bold character.

Selected Priority Programmes among Subject-wise Improvement Programmes

No.	Ref.	Programmes	Current Progress of ASDP	Cross-cutting Countermeasures	Strategic Targets for the Short Term Development			
					Decentrization and Private Sectors	Appropriate Technologies	River-basin Approach	Participatory Approach
1	**A1**	**DITS Institutional Improvement Programme**	◎	◎	◎			
2	**A2**	**LGA Institutional Strengthening Programme for Irrigation Development**	◎	◎	◎			
3	**A3.1**	**New Legal Framework for IA Establishment Study**	◎	◎	◎			
4	**A3.2**	**IA Organizing and Registration Support Manual**		◎	◎			
5	**A3.3**	**IA Management Training for Farmers**		◎	◎			
6	**B1**	**Regularization of Irrigation Administration and DITS Working Mandate Formulation Programme**		◎	◎			
7	**B2**	**Contract Management System Improvement programme**			◎	○		
8	B3	Regulatory Networking System Establishment between LGAs and IS			○			
9	B4	NGOs' Intervention in Irrigation Development Encourage Programme			○			
10	B5	Cooperation Channeling within Irrigation-Sector Establishment Programme			○			
11	B6	Sub-sectors Coordination System Establishment			○			
12	**C1**	**Survey and Investigation Guideline**		◎		◎	○	

		Establishment Programme						
13	**C2.1**	**Planning Guideline Establishment Programme**		◎		◎	○	
14	**C2.2**	**Design Guideline Establishment Programme**		◎		◎		
15	**C3.1**	**O&M Guideline Establishment Programme**		◎		◎		
16	C3.2	Monitoring & Evaluation Guideline Establishment Programme				○		
17	**C4**	**Farmers' Participation in Irrigation Development Programme**			◎	○		◎
18	**C5**	**Village Irrigation Development Guideline Establishment Programme**			◎			◎
19	C6	Farmers' O&M Manual Establishment Programme				○		○
20	**C7**	**Establishment of DADP Formulation Guideline for Irrigated Agriculture Development**	◎		◎		○	○
21	D1	Web-site and Networking Establishment Programme						
22	**D2**	**Technical Manuals Handling Guideline Establishment Programme**				◎		
23	**D3**	**Information and Database Improvement Programme**			◎	○		
24	D4	Irrigation Development Contractors and Consultants' Listing Programme			○			
25	D5	LGAs' Data Organization Programme			○			
26	D6	LGA Networking System Establishment Programme			○			
27	D7	Existing-scheme Monitoring System Establishment Programme				○		
28	E1.1	Irrigation Technology Research Center Establishment Programme				○		
29	E1.2	Perennial Irrigation Method Improvement Programme				○		
30	E1.3	Flood Irrigation Development Programme				○		
31	E1.4	Small Dam Technology for Irrigation Development Establishment Programme				○		
32	**E1.5**	**Environmental Assessment Study for Irrigation Practice in Tanzania**				◎		
33	**E1.6**	**Study of River-Basin Approach in Irrigation Development**					◎	
34	E2	Hydraulic Experimental Center Establishment Programme				○		
35	E3	IS's Equipment Management Programme						
36	E4	Irrigation Development Contractors and Contractors' Training Programme						
37	E5	Farmers' Participation Training Programme					○	
38	E6.1	Irrigated Agriculture Training Programme for Rice Production Increase						
39	E6.2	Irrigated Agriculture Training Programme for Cash Crops Production Increase						
40	E7	Integrated Irrigation Development Model Establishment Programme				○		

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

CHAPTER 6 SPECIAL STUDY ON MAJOR ISSUES IDENTIFIED IN PROBLEM ANALYSIS

6.1 General

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

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

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

6.2 Scheme Implementation Process

6.2.1 General

Recently, special attention has been given to development of small-scale irrigation schemes. Consequently, most schemes implemented in recent years were small-scaled ones rather than large like others in Tanzania. Thus the small-scaled irrigation schemes are implemented under donor-supported programmes such as RBMSIIP and PIDP, which deal with certain specified geographic areas. Those donor-supported programmes are particular in implementing processes for their committed irrigation schemes on the condition that the Central Government is responsible for the whole management of scheme implementation, while the LGAs and even farmers are involved in projects on a demand basis.

Presently, innovative modality of irrigation scheme implementation, unlike the current centralized procedure, is sought so as to further the movement of decentralization as indicated in ASDP implementation. The ASPS, DANIDA supported the agriculture sectoral programme by preparing the Guidelines for "Participatory Improvement to Farmer Initiated and Managed Smallholder Irrigation Schemes" in May 2003. The ASPS guidelines aim to give guidance for the implementing process for the eligible candidate irrigation schemes of wide-range commanding projects like ASPS-IC. It is instructive for seeking new methods of process because it is taking a fundamental stance giving attention to the

LGA and farmers initiatives. The proposal of the ASPS puts a discussion basis on the theme for the implementation process for farmer-managed small scale irrigation schemes.

6.2.2 ASPS Guideline

The ASPS guidelines propose the processes of participatory planning and implementation of smallholder irrigation schemes, so as to conform with the river basin approach in accordance with the new Water Policy. The guidelines are conceived based on conditions that, firstly, specific geographic areas are focused on in the river basin basis. After focusing the areas, "district focus" is taken with a priority attention to the districts located within a specified catchment area. Although any districts must be eligible for official financing as well as the ASDP grants by DADP preparation process, the ASPS guidelines target concerned smallholder irrigation schemes under a geographically focused development programme.

By focusing on specific geographic areas, the ASPS guidelines put a first step to selection of targeted districts in "Step zero". Such process is not needed if all districts are eligible for farmer-managed irrigation development impartially. Meanwhile, the ASPS guidelines deserve to pay attention especially on the person who takes an initiative in the processes. Until now irrigation schemes have been implemented by donors' initiatives, and the donors are very influential in decision making through almost all processes of scheme implementation as shown below:

Donors' Influence on Scheme Implementation

Stakeholders	Scheme implementation process						
	Scheme selection	Site survey and planning	F/S	D/D	Tendering	Implemen-tation	O&M
Donors/NGOs	■	■	■	▒	▒	▒	
IS/ZIU	▒	▒	▒	■	■	■	
District council						▒	▒
District staff		▒				▒	▒
Farmers							■
Legal entity*							■
*Contractor***		▒	▒	▒	▒	▒	

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

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

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

On the contrary, the ASPS guideline intends to give initiative to the LGAs, farmers and legal entities of farmers, and to activate outsourcing for the private sectors as shown below:

Donors' Influence on Scheme Implementation in ASDS Guidelines

Stakeholders	Scheme implementation process						
	Scheme selection	Site survey and planning	F/S	D/D	Tendering	Implemen-tation	O&M
Donors/NGOs							
DITS/ZIU							
District council							
DPDT*							
Farmers							
Legal entity**							
*Contractor****							

Note1: This is not proposed for all types of irrigation projects, but for farmer-manageable irrigation schemes with a scale which Districts are able to handle

Note2: The shaded squares on the above matrix means a degree of importance among relevant stakeholders in each implementation process(Strong shade indicates the more important role.).

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

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

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

This is an epoch-making proposal while there are some points to be reconsidered or examined in detail.

6.2.3 Giving Attention to LGA-Initiative in Planning Process

In order to generalize the guidelines for every eligible irrigation scheme without limitation, some modification should be given for the initial prospective plan. Most crucial need of modification is to make the local people play a more leading role. In this respect, the method of Village Level Planning (VLP) applied in Songea District serves as an advantageous reference. Songea District Council uses a bottom-up and/or participatory approach in planning through the VLP cycle. Every village makes an inventory every year of its main problems and prioritizes these problems themselves. These priorities are presented to the concerned Ward. At Ward level, a further prioritizing is done, and then it is sent back to the Village Government. After checking by the villages, it is sent to the District.

In 2002, the village planning procedure started from hamlet level using the accumulated knowledge of VLP and Village Government integrated hamlet plans and made prioritization of three problems for planning for a three year term. The village plans concerning every sub-sector, including irrigation, were prepared for three years. Each problem plan will be sent to the Ward Council (WDC) for ward prioritization and feedback to the served Village and District. At District level for integration of village plans at district level, the priorities from the Ward Development Committee are incorporated in the plan together with intention of

District Council, policy priorities of Central Government and results from key stakeholders.

The heads of Department/Project sit together, identify these priority areas and set priorities within these areas, based on the planning guidelines and also the experiences and results of past years.

6.2.4 Proposal on New Implementation Process for Small Schemes

The guidelines on the scheme implementation process should be generalized, so that all eligible Districts could apply them to small scale irrigation scheme development. Songea District has developed a noteworthy village-oriented participatory development routine. Such village participatory process should be incorporated into the new irrigation scheme implementation process. Furthermore, current advancement of ASDP implementation should be considered. In the ASDP implementation, DADP is a key format for agriculture development at the local level, which is prepared by LGAs' decision making. Since irrigated agriculture is a highlighted sub-sectoral issue in the DADP, a scheme implementation process must be improved to systemize into the routine of the preparation of the DADP. It is therefore proposed to introduce a periodic planning cycle management at LGA level like VLP into the small irrigation scheme implementation process in connection with the formulation of an irrigated agriculture component of DADP (DADP-IA).

Taking the new attempt in Songea District and the possible mainstream of irrigation scheme implementation into account, a new process based on the ASPS model is proposed. Notable changes in the new process from current methods are enumerated from the following three aspects:

(1) Improvement of Institution and Organization

- LGAs are mainstreamed in the process of planning, designing and construction of the scheme.
- Some procedures of scheme preparation to be done through mutual collaboration with local parties concerned are incorporated in the DADP formulation process.
- Preparation of organization of farmers' legal entity is set out as early as possible after confirming the scheme outline.
- Sound tendering and award system is essential for contractor selection.
- A tender board consisting of experienced staff is established prior to tendering.
- Monitoring efforts are systemized at the O & M stage after construction works.

(2) Strengthening of Farmers Participation

- Farmers participate in any stage of scheme implementation.
- The routines of participatory cycle management like VLP are applied in the implementation process.
- Farmers contribution has to be considered for any scheme implementation.
- Farmers contribution is mostly achieved through engaging in construction works of minor canals and drains under supervision by the District engineer, which are separated from the contractors' works, otherwise participating in contractors' construction works under the proper arrangement of District engineer and consultant

(3) Promotion of Use of Private Sector

- Proper F/S and D/D are carried out by engagement of competent consultants.
- The construction works of the scheme are executed on the contract basis, instead of force account system.

Figure 6.2.1 shows the proposed implementation process, of which the outline is tabulated as follows:

Tentative Plan of Small Irrigation Scheme Implementation Process

Steps	Activities	Leading Stakeholders	Remarks
Step1(1-1)	(Finalization of revised DADP-IA)	District Office, District Councils	Cycling from the Step1-11
Step1(1-2)	Monitoring of DADP-IA	District Office, District Councils	
Step1(1-3)	Evaluation of previous year's plan by specified indicators	District Office, District Councils	
Step1(1-4)	Planning workshop on DADP-IA	District Office	
Step1(1-5)	Strategic planning meeting	District Office, Ward Council and Villages	
Step1(1-6)	Preparation of strategic paper on agricultural development	District Office, Ward Council and Villages	
Step1(1-7)	Modification of DADP-IA	District Office	
Step1(1-8)	Meeting for finalization of the modified DADP-IA	District Office, Ward Council and Villages	
Step1(1-9)	Compiling DADP-IA by District Planning Office	District Office	
Step1(1-10)	Approving the modified DAD-IA by full councils	District Councils	
Step1(1-11)	Preparation of final DADP-IA	District Office, District Councils	Cycling to the Step 1
Step1(1-12)	Preliminary scheme selection by Districts	District Councils	
Step 2	Selection of irrigation schemes to be implemented	District Councils, ZIU, MAFS	Verified by ZIU/IS
Step 3	Participatory action planning	District Office, Ward,	

		Villages	
Step 4	Registration as Legal Entity (LE) and Letter of Understanding	District Councils, Ward, Villages	
Step 5	Participatory diagnostic study	District Office, LE	
Step 6	Participatory design and feasibility study	District Office, LE Supported by ZIU/IS	Consultants are hired
Step 7	Joint investment decision and financing agreement	District Councils, LE, financial sources	Donors and Central Gov. may be involved.
Step 8	Detailed design and tender documents preparation	District Office, LE, ZIU/IS	Consultants are hired
Step 9	Tendering and contract award	District Councils, LE, financial sources	
Step 10	Construction	District Office, LE Supported by ZIU/IS	Contractors are hired
Step 11	Completion certificate	District Councils, LE, financial sources	
Step 12	Operation and maintenance	LE supported by District Offices and ZIU	Starting project cycle management

Taking into consideration the above mentioned scheme implementation process, the modality of small scheme implementation should be regularized within the proposed Subject-wise Improvement Programme on time.

6.2.5 Indictable Issues on the Proposed Implementation Processes

The proposal on the implementation processes still presents some problems to be discussed more and settled. In order to clear up the problems without any delay, the following approaches are recommendable:

Remaining Problems and Recommendable Approaches

Remaining Problems	Recommendable Approaches
In order to apply the VLP cycle for scheme selection, LGA organizations of Village, Ward and District have to mutually work in cooperation with each other. Is it possible to realize the proper combination with each other on schedule?	Some local government renovating programmes have been executed on a national scale. Fruitful results of the programmes could be expected for this purpose. For the time being, it is recommendable to start with LGAs ready for applying the VLP method promptly.
In Songea District, VLP is applied for the purposes of determining villagers' desires on multi-sub-sectoral issues. Could VLP be applied for the preparation on the single sub-sector of irrigation?	It is inefficient to employ the VLP cycle only for irrigation sub-sectoral subjects. The part of VLP proposed in irrigation scheming process might be executed in collaboration with other sub-sectoral courses.
Farmers' legal entity is proposed to be established before execution of feasibility study. Feasibility study may occasionally reject scheme implementation by showing unfeasible result. It may happen that the organized entity remains without scheme implementation.	Time of organization of the farmers legal entity may not be fixed exactly before execution of feasibility study. If scheme selection is done properly, scheme implementation is hardly ever denied even through study in feasibility. Scheme selection process is more important in this sense.
On the proposal, DPDT shall play an important role in scheme implementation. Is it possible for every LGA to organize active DPDT for each candidate of irrigation scheme?	It is not necessary to form DPDT for each scheme. One DPDT may handle some number of schemes. In addition, capacity building and staff recruitment are required according to the situation of the District.
Work outsourcing is encouraged utilizing consultants and contractors effectively. Scheme planning and F/S and so on are proposed to adopt private sector. Who	ASPS's guideline does not mention the financing source for study execution. It could be budgeted in ASDP and also from District financial sources.

can bear the cost?	
Farmers contribution in scheme implementation is essential to feed farmers ownership through participation in implementation works. However, contractors feel it is troublesome because special arrangement is sometimes required for the care of the farmers' works.	It should be required of the contractors in the contracts even though it might be a burden for the contractors. Contract documents shall clearly mention this issue.
As a form of farmers contribution, should farmers participate in construction works as labors?	In case of participating in construction works, who supervises and evaluates farmers' performance is an important issue. To avoid those troubles, farmers may contribute to the scheme by providing some construction materials unless the contractor refuses to use them in their construction works in view of its quantity and quality.
The ASPS Guidelines define the target scheme as not small-scale scheme but smallholder scheme.	Proposing implementation processes herein specify kind of irrigation scheme which could be managed by LGA level with their ownership. Therefore, the schemes should be small-scaled. Smallholder schemes should be given higher attention, but it is not worth emphasizing.

6.3 Irrigators' Association

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

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

Presently the IAs are generally classified into the following three categories, (i) irrigators' association registered under the Cooperative Act (IAC), (ii) irrigators' association registered under the Societies Ordinance (IAS), and (iii) non-registered association (NIA).

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

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

Comparison of Registered Irrigators' Associations

	Irrigators' Association registered under the Cooperative Act	Irrigators' Association registered under the Societies Ordinance
Legal Ground	Registered under the Cooperative Act of 1991, Article No.15, with Ministry of Cooperatives and Marketing -Organization should have a capital shared by the members -Monitored by the District cooperative officer after registration -It must have an executive committee of not less than 5 members and not more than 15 members, including a chairperson, vice chairperson, secretary, treasurer, and members.	Registered under the Societies Ordinance, 1954, with Ministry of Home Affairs - Organization structure depends on the wish of members
Major Necessary Conditions/Requirements for Registration	Members should not be less than 10.	Founder members should not be less than 10.
	The bylaw should be prepared and four copies sent to the registrar.	The constitution should be prepared. Its two copies and the minutes of the meeting approving the constitution should be sent to the registrar.
	The District cooperative officer's recommendation to the Regional cooperative officer/assistant registrar	Supporting Document/letter from the respective authority, e.g. DC, RC or the Ministry
	Registration fee: Tsh. 1,800	Application fee: Tsh. 10,000 Registration fee: Tsh. 100,000, Annual payable fee: Tsh. 40,000
	Economic viability report	
Other Features	The cooperative is primarily a business-oriented organization whose main interest is generally marketing, not operation and maintenance.	The association can be applicable to any type of social activities.
	The cooperative is a legal entity which can get access to formal rights (land, water) and services (bank account, technical advice, business advice and so forth). Generally the social credibility is higher than that of the association. The cooperative may be able to get a credit from financial institutions more easily than the association.	The association is a legal entity which can get access to formal rights (land, water) and services (bank account, technical advice, business advice and so forth). The social credibility is lower than that of the cooperative.
	The organizational structure can not be so flexible as the association.	The organizational structure can be flexible to the needs of the members.
	The registration fee is only necessary for application and registration. No annual payable fee.	The application fee, registration fee and annual payable fee are more expensive those of the cooperative.
	There might be some intervention from the cooperative officers which is not always positive to the members.	There is possibly less intervention from the government officers than in the case of cooperative.

Source: DITS, MAFS and JICA Study Team

6.3.1 Insufficient Legal Framework of Irrigators' Association

Although the DALDO, in some cases with the Zonal Irrigation Office, has been guiding farmers (irrigators) in organizing and registering the IA, the importance and roles of the IA have not been fully understood by farmers yet. Furthermore, neither cooperative nor association is necessarily an optimum organizational form for the IA. The primary role of the IA is to operate and maintain the irrigation facilities by itself. However, the cooperative is primarily a business-oriented organization whose main interest is generally marketing, not operation and maintenance. Besides, farmers still have some negative images of the previous cooperative's activities in the country. The association registered under the Societies Ordinance is applicable to any type of social activity. The rights and duties of the IA members can't be always clearly and uniformly defined under the present legal framework, whichever cooperative or association is chosen. For instance, although a compulsory participation of all irrigators in the IA is quite crucial to the successful management of irrigation, there is presently no legal basis for it. Only the bylaw and the regulations can define and impose the compulsory participation on the irrigators in the irrigation scheme without any legal basis.

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

framework:

- The IA is not a marketing- or business oriented organization. Its main activities are operation and maintenance of the irrigation facilities. In that sense, the IA is a non-profit organization.
- The compulsory participation of all irrigators in the IA is a prerequisite of irrigation development.
- The MAFS must become a competent authority of the IA, that is to say, the registrar of the IA. Otherwise irrigation development can be hardly implemented consistently and smoothly. In that sense, other ministries such as the Ministry of Cooperatives and Marketing and the Ministry of Home Affairs shouldn't become the registrar of the IA.
- The MAFS should hold an appropriate coordination function of the water right for irrigation development with the Ministry of Water and Livestock Development.

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.

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

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

6.3.2 Farmers' Insufficient Ability for IA Management

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

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

As for the countermeasures for the above problems, preparing a management manual of the IA and training program of the leaders (chairperson, secretary and treasurer) is necessary. The manual should include model bylaws and regulations, so that each IA can establish its own bylaws and regulations by modifying the model responding to its local conditions and needs. Besides, the manual should cover financial management subjects such as budget planning, bookkeeping, preparation of financial report, and etc. Public awareness of the IA also should be strengthened through the DALDOs.

6.4 Farmers' Participation and Bottom-up Approach

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

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

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

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

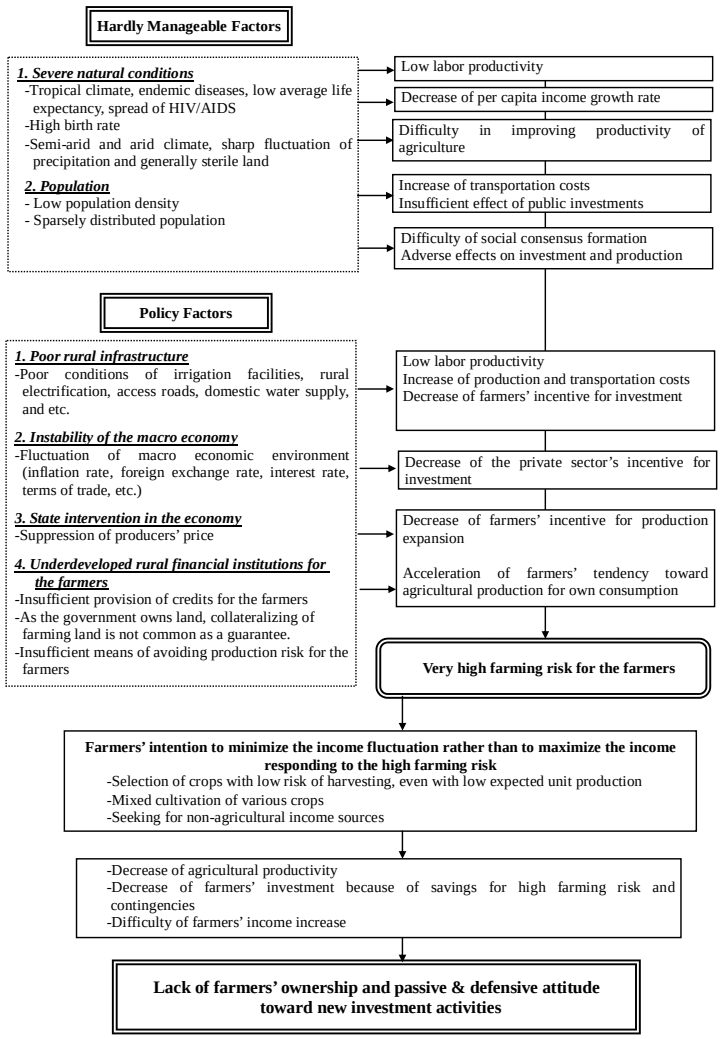
The hardly manageable factors include the followings:

- Natural conditions: severe tropical climate, endemic diseases such as malaria, schistosomiasis, sleeping sickness and etc., relatively low average life expectancy, the spread of HIV/AIDS.
- Population: low population density, sparsely distributed population

The policy factors include the followings:

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

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



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

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

6.4.2 Necessity of Efficient Harmonization of Relevant Governmental Organizations

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

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

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

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

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

A new method of project formation and selection focusing on farmers' initiative and based on competitiveness among candidate projects should be introduced. It means an introduction of new selection criteria and procedures for irrigation project. The project should be appraised and selected on a competitive basis through not only

technical point of view but also strength of farmer's will and intention, in other words, the degree of preparation for self-reliance. Their will and intention to develop the irrigation facilities can be evaluated by readiness for organizing an IA, preparation of own contribution, own operation and maintenance plan, and etc. Without the farmers' strong will and intention any irrigation project cannot be sustainable. The competitive bottom-up approach must be prepared, introduced and established successfully.

6.4.4 Necessity of Farmers' Initiative Strengthening

The rather passive attitudes of farmers toward irrigation development and the possible reasons are already discussed above. Farmers' initiative strengthening is one of the key elements in order to properly adopt the self-reliant and competitive bottom-up approach. Extension services for farmers through the DADLO have an important role. The following components have emphasis in the training programs.

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

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

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

The bottom-up approach on a competitive base for farmers should be strengthened further. However, the farmers themselves cannot be easily adapted the bottom-up approach without the appropriate technical and financial support and guidance of the government. Therefore, the government itself must adapt institutionally and technically to the new bottom-up approach for the successful realization of farmers' self-reliant irrigation development. It is noted that the more the farmers' participatory bottom-up movement is strengthened, the more the government' support is important.

Presently, however, even at the district level the unilateral top-down approach to the farmers can be seen, for instance in some cases of supervision by the district cooperative officer who cannot easily take a neutral position for the registration of IA. He tends to encourage irrigators to register it as cooperative regardless of their needs and intention. The government staffs must understand that such a top down approach doesn't work well anymore and, furthermore, it is even harmful to strengthening the farmer's initiative and realization of the sustainable farmers' self-reliant irrigation development.

The efficient support of the government needs the following three components.

- The institutional improvement of the Division of Irrigation and Technical Services (DITS)
- Local Government Authorities Institutional Strengthening
- The Division of Irrigation and Technical Services (DITS) Working Mandate Formulation

The first step of the DITS institutional improvement has already begun since 2002. The president approved the reform and promotion of the former Irrigation Services Unit (ISU) in November 2002. The old ISU was promoted to the new division consisting of the irrigation services, agricultural machinery and agricultural land use planning. However, it is still not enough. The organization of DITS as a whole must be reformed responding to the new movement of the LGRP and the bottom up approach. Further strengthening is necessary including the following subcomponents:

- Establishment of Efficient Support Mechanism
- Strengthening of Monitoring Function
- Reform of Zonal Irrigation Office conforming to the LGRP

The efficient support mechanism has not yet been well established institutionally and technically for the farmers' self-reliant irrigation development. First of all, the DITS does need a stronger role of inter-ministerial harmonization among the relevant governmental organizations and other major stakeholders, for instance coordination of the water rights with the Ministry of Water and Live Stocks. When a conflict of water for irrigation and other uses arises, there is seemingly no effective mediation mechanism at present.

And also a new scheme selection procedure for the competitive bottom-up approach should be studied and introduced. In addition, upgrading the technical level of existing technical staffs is also necessary. In particular, the training focus must be revised responding to the bottom up approach for the irrigation

The Monitoring and Evaluation Unit and the Environmental Unit are presently really understaffed, even though their expected roles at the national level are quite crucial to provision of effective feedback data to perform their demarcated roles and, moreover, to the socio-economic effectiveness of irrigation development with environmental consideration. As a matter of fact, the DITS does not yet have established a firm monitoring mechanism and has not even selected a list of necessary socio-economic, technical and environmental indicators to monitor and evaluate the irrigation development activities. Strengthening of those two units should be included in the DITS institutional improvement programme.

Reform of the Zonal Irrigation Office should be synchronized with the progress of LGRP. Presently the Zonal Irrigation Office still has a very influential role in irrigation development, in particular, in new development schemes, because the LGAs are presently not yet capable enough to perform their demarcated roles and functions. At least in the first stage of the Master Plan up to 2007 the Zonal Irrigation Office should maintain the present roles and functions. Gradually, however, their roles should focus on the inter-regional coordination in cooperation with the Regional Secretariat and provision of policy and technical guidance to the LGAs (DALDO) toward the end of the third stage up to the year of 2017. Gradual withdrawal from direct supervision of irrigation schemes and transferring it to the LGAs should be undertaken step by step.

6.4.6 Farmers' Roles in Scheme Implementation

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

(1) Planning and Design Stage

In the planning and design stage, the farmers' participation is the most important role toward the construction and operation and maintenance stages. The farmers' participation in the planning and design stage is to positively take part in meetings, workshops and surveys and investigations executed by the government staff, to convey their intention properly. In the planning stage, an important issue is to firmly ensure the farmers' will on contribution to investment costs and on operation and maintenance cost for the irrigation scheme to be implemented.

There is an effective participatory approach in the planning and design stage as discussed in Sub-clause 6.2.3. This is the method of Village Level Planning (VLP) successfully applied in Songea District. The actual application of this method, however, requires a certain amount of time. As one of the effect ways during the transition period, the government will prepare and present several irrigation development plans with different development levels to the farmers, and explain the required farmers' roles in the respective plans. And an important point is to make them select the acceptable development plan for themselves.

The ASPS guidelines also promote farmers' participation in the planning and design stage. The guidelines specify that a "participatory action planning", "participatory diagnostic study", and "participatory design and feasibility study" should be conducted. The participatory design and feasibility study include the following sessions:

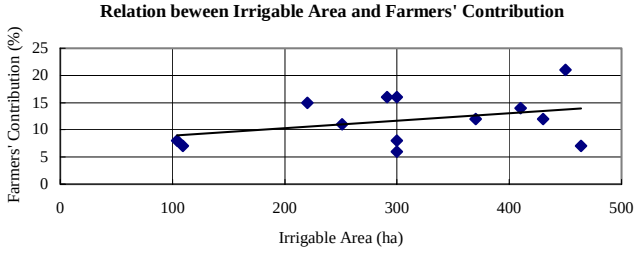
- Guidance on participatory planning for the farmers before commencement of the field investigation
- Survey and Investigation in cooperation with farmers
- Workshop with farmers to formulate rehabilitation and improvement plans
- After design works, workshops with farmers to discuss final development plans with farmers' cost sharing.
- Agreement on implementation of work with farmers and farmers' contribution to construction work

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

The survey and investigation will be conducted by the government staff in co-operation with the farmers as much as possible. The farmers' intention where the facilities are rehabilitated and improved shall be collected throughout the survey and the workshops and they will be incorporated in the plan. Once the basic consent by farmers to the plan is obtained, the design, with cost estimate, will be carried out and discussed in the workshop, where a decision will be made how the total cost will be shared between the government and farmers.

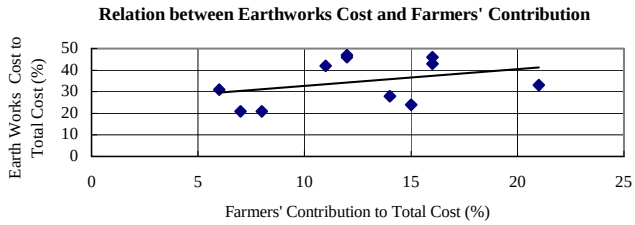
(2) Construction Stage

There are lots of arguments on farmers' contribution to investment costs in irrigation development. The ASPS guidelines present a higher possibility of farmers' contribution in kind than that in cash, mainly considering the shortage of cash resources and surplus of labour. The ASPS guidelines also show the expected minimum contribution from farmers of at least 100% of the unskilled labour and 100% of locally available construction materials. In RBMSIIB, 16 traditional irrigation schemes have been completed so far, in a concept similar to the farmers' contribution mentioned above. The data for 13 schemes out of the 16 indicates that the farmers' contribution ranges from 5 to 20% of total construction cost. The graph shown on the right indicates a rough tendency between the irrigable area and rate of farmers' participation to total construction cost.



As the farmers' contribution

is mostly related to canal earth works, this relationship is also examined. Although the derived graph does not show a distinct tendency, it might be used for the preliminary planning stage to indicate the rough figure of farmers' contribution from ratio of canal earth works cost to total construction cost.



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

The farmers' contribution to the project at the construction stage is crucial toward the next stage of operation and maintenance, which is the most important for project sustainability. The government should monitor and analyze the conditions of farmers' contribution, and establish the rules to be mentioned in the Irrigation Regulation discussed in Clause 6.7 of this report.

(3) Operation and Maintenance Stage

Currently, the government is transferring all duties on operation and maintenance for irrigation and drainage facilities to the beneficiary farmers groups concerned. Most irrigation schemes, however, show a regrettable fact that the operation and maintenance works are not properly conducted by farmers groups, say IAs, in spite of the fact that these are indispensable activities for sustainability of an irrigation scheme. According to the results of problem analysis, the main reason for such unsatisfactory operation and maintenance activities by farmers group is lack of farmers' ownership as discussed in Sub-clause 6.4.1. This would result in weak farmers' groups and low collection rate of water charges, so that fewer funds are

available for operation and maintenance of facilities. In order to avoid or improve such situation, it is necessary to promote farmers' participation in the planning stage, to grow their ownership as discussed previously. And also, the government support is essential for the above.

A preliminary farm budget analysis was conducted for a typical farmer with a land holding size in the ten selected Model Irrigation Schemes. The results are as follows:

O & M Cost Share to Net Reserve -With Project Condition

Scheme	Without Project Condition Net Reserve (Tsh 1000/household)	With Project Condition Net Reserve (Tsh 1000/household)	Annual O&M Cost (Tsh 1000/household)*	O&M Cost Share to Net Reserve "With Project Condition" (%)
(a) Kinyope	218	425	13	3
(b)Magoma	17	366	8	2
(c)Pawaga	26	337	22	7
(d)Musa Mwinjanga	273	571	14	2
(e)Mgongola	134	437	13	3
(f)Lower Moshi	88	234	10	4
(g)Kisese	617	717	2	0.3
(h)Pamila	54	65	2	2
(i)Nkenge	34	116	11	9
(j) Luchili-nyakasungwa	93	695	52	7

Source: JICA Study Team

**: Annual O & M cost/ha for Nkenge and Luchili-Nyakasungwa Schemes (Pump Scheme) are estimated at Tsh.115,000 and Tsh.172,000, respectively.*

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

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

6.5 Agricultural Inputs Supply and Marketing of Farm Products

6.5.1 Background

Based on the survey results of the Model Irrigation Schemes, it was revealed that "Ensuring of Inputs" and "Establishment of Proper Approach to Marketing with Price Controls" are the most cross-cutting issues as conceivable countermeasures to solve the major problems of farmers in agricultural aspects. As for ensuring of inputs, insufficient supply and low affordability should be improved with approaches from the supply side and from the demand side. Farm gate price of some crops such as paddy and maize highly fluctuates between harvest season and a few months after harvest. This fluctuation is strongly affecting the income level of farmers and the situation could be different if the price is stabilized. It is also important for farmers to enhance the bargaining power to middleman in order to sell their products at better prices and this might be performed through organizing farmers' groups. Farmers can thus make better monetary contribution to the irrigation development by increasing their income level through effective inputs supply and better marketing.

It was therefore decided to carry out the special study on the present situation and future direction on inputs supply and marketing in addition to the readily available information described in the Master Plan. Additional information on price control of staple foods, role of the middleman and marketing facilities such as transportation and storage facilities were collected from relevant authorities in order to formulate an appropriate plan for smallholders to obtain reasonable profit. Recommendations and suggestions were then prepared as a part of Action Plan on proper input supply and marketing in relation to irrigation development.

6.5.2 Present Situation on Input Supply and Marketing of Farm Products

(1) Input Supply

The main agricultural inputs employed in Tanzanian agriculture are chemical fertilizers, agro-chemicals, improved seeds and others. Supply of such materials was already studied in the course of the Master Plan. In-depth studies were carried out in this Action Plan study by focusing on chemical fertilizers and improved seeds with approaches from the supply side and from the demand side.

As for the supply of chemical fertilizers, a substantial amount of fertilizer is now imported by private importers and some amount is received on grant from donors and the government distributes these fertilizers to private traders through tender. Furthermore, the Agricultural Inputs Trust Fund (AGITF) provides soft loans to traders for the local distribution of such fertilizers. Since AGITF deals only with

about 10% of all inputs supplied in the country, this should be strengthened in future. The major constraints in the field level are, however, low affordability of producers in fertilizer procurement as a demand side problem. In the case of cash crops such as tobacco, coffee and cotton, the buyers are usually arranging fertilizers for producers. In the case of food crops, on the other hand, provision of credit facilities is the only means to support producers. The AGITF can support groups of farmers at the national level and there are inputs funds arranged by many district councils. Input funds are sometimes available even at the regional level. Farmers can effectively utilize such funds through any type of farmer's group. The government is now recommending that farmers establish SACCOS (Savings and Credit Cooperatives) in order to apply for such funds and also to engage in group buying of inputs and group selling of products. Farmers should therefore urgently organize SACCOS apart from IA.

The production and distribution of improved seeds in Tanzania is in an insecure circumstance as mentioned in Master Plan report. The most promising approach is therefore community based seed production. It means the improved seeds necessary for each scheme will be produced locally under each scheme and will be distributed to farmers in the scheme. Foundation seeds are available in research stations such as Dakawa, Ifakara and Kilimanjaro. Selected farmers can receive training in seed production and are supplied with foundation seeds for multiplication. Each scheme should therefore arrange the seed production system under the activity of farmers group such as associations and cooperatives.

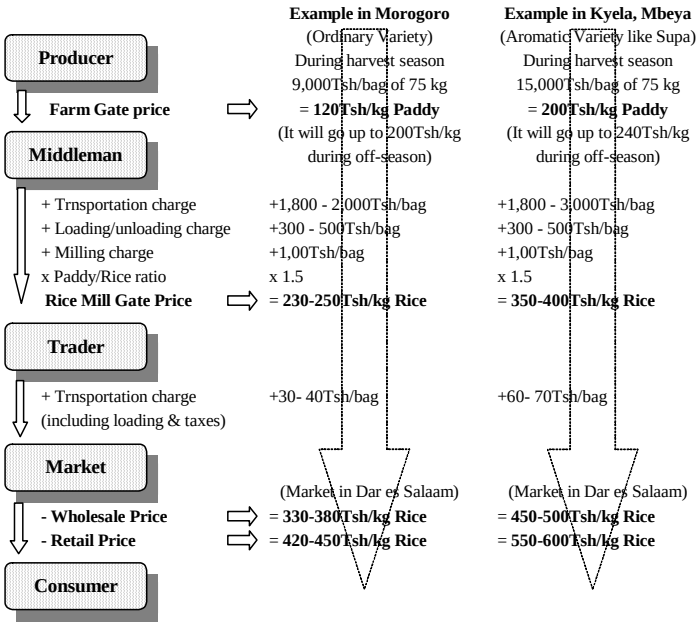
(2) Marketing

Due to increasing significance of agricultural marketing, the government established the Ministry of Cooperatives and Marketing in the year 2000. Since there are no marketing policies in Tanzania so far, the Ministry is now keen to formulate policies that will lead to efficient marketing of farm products, develop marketing facilities, marketing research, and promotion and dissemination of market information. Under this policy, the Ministry is going to start various activities in the field of promotion/regulation and research/information. Various problems in the marketing of farm products will be improved through such activities.

The Ministry is also initiating two projects, the MDC (Market Development Center) and the AMSDP (Agricultural Marketing Systems Development Programme). MDC will be established for information management including market conditions and buying/selling prices. AMSDP will be carried out to improve market infrastructures such as transportation, storage and processing

facilities. Promotion of such projects will also improve the marketing of farm products. The investigation on paddy marketing clarifies the general marketing flow of paddy illustrated on the right.

General Marketing Flow of Paddy



Source:JICA Study Team

At the field level, smallholders operate their farming activities as individuals and as such do not have bargaining power and their linkages with markets are tenuous. Middlemen or sometimes large-scale farmers purchase paddy directly from such smallholders at the village level in different prices according to (i) the quality of paddy, that is in most cases variable and (ii) the seasonality, that is the harvest season and off-season. Since the seasonal farm gate price of paddy fluctuates highly, proper storage facilities would be advantageous to the producers. A middleman then arranges transportation including loading/unloading to the rice mill at district or regional level. The rice miller generally does not purchase paddy but just provides milling service by receiving necessary payment from the middleman. The middleman finally sells the processed rice to the local market or to the traders from large cities. In Iringa, for example, most of the processed rice is distributed to the local market and some is transported to Dar es Salaam and even to Zanzibar. In Kilimanjaro, on the other hand, a considerable amount of rice is exported to Kenya. Farm gate price is thus determined according to the seasonality, the variety of paddy and the marketability.

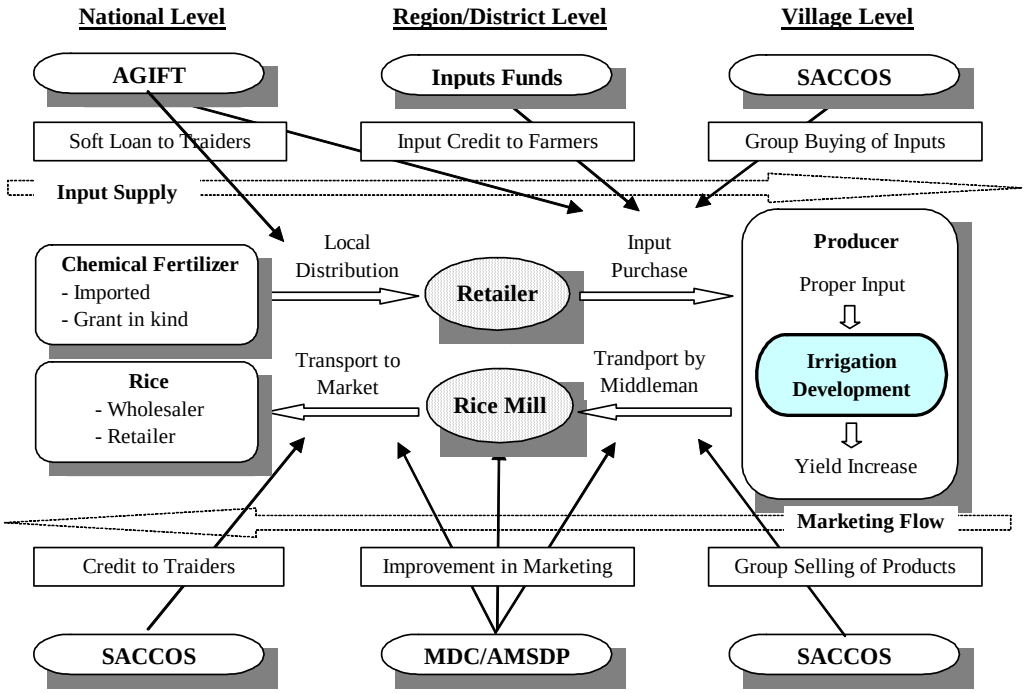
Middlemen thus take an important role in the determination of farm gate prices and also in the marketing flow of paddy. Although fair marketing competition is indispensable between smallholders and middlemen, this is sometimes not performed properly due to various reasons including collusion by some middlemen. Because small and medium scale middlemen, other rural traders and processors are also poorly organized and similarly lack in bargaining power. They need to be well informed about market conditions and to have access to adequate and reliable credit facilities. SACCOS is also recommended to be established for such middleman and traders for proper savings and to get credit services.

In addition to the marketing of paddy, the marketing of perishable products such as fresh vegetables should be carefully considered under irrigation development because irrigation development makes dry season cultivation possible and various types of vegetables are introduced as dry season crops due to better profitability. In the case of pump schemes, vegetable production is indispensable to cover the rather high operation and maintenance cost as it was clarified through the capacity to pay analysis under the current study. When vegetables are intended to be introduced in the irrigation scheme, careful consideration is needed, not only for farming practices, but also for various conditions on proper marketing of products. Those conditions include the perishableness of target vegetables, the accessibility to the market center, the suitable amount and season of production and the competition with other production areas.

6.5.3 Recommendations and Suggestions

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

Present Interrelation between Inputs Supply/Marketing Flow and Related Support



Source: JICA Study Team

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

- Strengthening of AGITF for improving input supply,
- Provision of credit facilities for smallholders,
- Promotion of farmers group formation for effective access to credit, group

buying of inputs and group selling of farm products apart from IA,
- Promotion of improved seed production at scheme level,
- Review of various activities to be decided under the new marketing policy,
- Promotion of MDC to improve market information management,
- Promotion of AMSDP to improve market infrastructures,
- Capacity building of farmers on marketing skills,
- Empowerment of producer and trader groups,
- Strengthening of the linkages between producer groups and markets, and
- Provision of technical, managerial and organizational support for small and medium-scale traders and processors.

6.6 Environmental Consideration

6.6.1 Background

The result of preliminary environmental assessment for 10 Model Irrigation Schemes suggested the focal points that need environmental consideration for the irrigation development as tabulated below:

Environmentally Sensitive Areas in or Vicinity of Model Scheme

Environmentally Sensitive Area	Traditional		Improved Traditional		Modern		Water Harvesting		Pump	
	Kinyope	Magoma	Pawaga	Musa Mwinjanga	Mgongola	Lower Moshi	Kisese	Pamila	Nkenge	Luchili/ Nyakasungwa
a) Areas under specific designation										
- Wetlands of International importance designated in Ramsar Convention										
- Wetlands of national importance										
- Wildlife corridor										
- Habitat of fauna and flora		○								
- Heritage sites, social, cultural, history and archaeological										
- National parks			○							
- Forest reserve	○	○			○		○	○		
b) Areas prone to natural disasters										
- Area susceptible to erosion		○	○			○	○			
- Flood plains			○		○			○		
- Geological hazards										

Environmentally sensitive areas in or near Model Irrigation Schemes are forest reserves, national parks, habitat of fauna and flora, areas susceptible to erosion and flood plains with higher probability in forest reserves. According to the scoping and screening checklists for the schemes, potential environmental impacts were expected in the issues of social, health/sanitary, vegetation, soil erosion/sedimentation and water quality with higher probability on deterioration and degradation of vegetation. The summary of potential environmental impacts in

the schemes also shows that the most common issues are change of ecosystems including the degradation of vegetation and soil and water pollution due to application of fertilizer and agro-chemicals as shown in the following table.

Summary of Potential Environmental Impacts in each Model Scheme

Potential Environmental Impacts	Traditional		Improved Traditional		Modern		Water Harvesting		Pump	
	Kinyope	Magoma	Pawaga	Musa Mwinjanga	Mgongola	Lower Moshi	Kisese	Pamila	Nkenge	Luchili /Nyakasungw
Physical Conditions										
Siltation		○	○			○	○			
Soil Erosion		○	○				○			
Water-logging	○		○	○	○			○		
Loss of fuelwood resources					○					
Change in Ecosystems										
Deterioration and degradation of vegetation	○	○	○	○	○	○	○	○	○	○
Increasing habitat of water borne diseases vectors	○	○	○	○	○	○	○	○	○	
Disruption of faunal communities with the increase of destructive animals and birds	○	○	○	○	○	○	○	○	○	
Propagation of aquatic plant such as water hyacinth										○
Agriculture										
Water use conflict	○		○		○	○		○		
Land use conflict between villagers						○				○
Conflict between crop producers and livestock keepers			○		○	○	○			○
Loss of soil fertility	○	○		○						
Sanitation and Public Health										
Soil and water pollution due to application of fertilizer and agro-chemicals	○	○	○	○	○	○	○	○	○	
Others										
Population increase					○					
Increase of water demand					○					
Vandalism of structures				○		○				○

Source: JICA Study Team

An appropriate conservation of protected areas such as forest reserves together with the prevention of vegetation degradation are thus considered as important issues in environmental consideration for irrigation development. Based on the GIS database prepared during Master Plan study, it was revealed that Pamila Irrigation Scheme is located within Mkuti Forest Reserve. According to the information from District Office, Pamila village was once within the forest reserve and the border of the forest reserve was recently shifted according to the land use of the area. But the proposed irrigation scheme is still within the forest reserve. At present, the District Office is requesting the Ministry of Natural Resources and Tourism to remove this scheme area from the forest reserve. There are many other proposed schemes that are within or adjacent to the protected areas such as forest reserves, game reserves,

national parks and conservation areas according to the above mentioned GIS database. Furthermore, most of the wetlands are considered to be important from the viewpoint of biodiversity and also such areas are ecologically fragile. Some of the proposed irrigation schemes may also be located within the vicinity of such wetlands. Irrigation development should be carried out in harmony with the environmental conservation of such protected areas and wetlands. It was thus decided to carry out a special study on irrigation development and environmental conservation with particular attention on the conservation of protected areas and the prevention of vegetation degradation.

6.6.2 Conservation of Protected Areas

Various articles on forest reserves such as procedures for declaration of forest reserves, powers to alter and de-reserve a forest reserve are stipulated in the Forest Act, 2002. This Act regulates a national forest reserve and a local authority forest reserve. A national forest reserve may consist of a production forest reserve, a protection forest reserve and a nature forest reserve for the purpose of production, protection and a nature forest reserve. A local authority forest reserve shall be an area used principally for purposes of the (i) sustainable production, (ii) protection of watersheds, soil conservation and the protection of wild plants and (iii) area reserved for the local authority.

According to the forest officer in the Division of Forest and Beekeeping, Ministry of Natural Resources and Tourism, all the forest reserves should be preserved in principle. In particular, protection and nature forest reserves are strictly protected in that land use can not be altered. While, production forest can be utilized for other uses, provided that a proper procedure is followed to alter land use status. The detailed information on declaration, variation, revocation and classification (productive/protective) of forest reserves is tabulated in the Natural Forest Handbook for Tanzania, Volume-II. As for Mkuti Forest Reserve in Kigoma, for example, it was declared in 1956 and the total area (47,915ha) is production forest.

The procedure for altering land use of forest reserves suggested by the forest officer of the Ministry of Natural Resources and Tourism is as follows. A request to alter part of the productive forest reserve to other use (e.g. irrigation development) from District/Regional authorities has to be submitted to the Permanent Secretary in the Ministry of Natural Resources and Tourism for careful consideration and has to include the following;

- Information on intended land use for the piece of land requested within the productive forest reserve,
- Total area to be developed and the detailed development plan,

- The number of beneficiaries for the intended land use,
- Results of the Environmental Impact Assessment in order to ascertain possible impacts of the intended project to the environment, and
- A map, or at least a sketch of the location of the intended scheme/project in relation to the forest reserve.

6.6.3 Prevention of Vegetation Degradation

Although the negative impacts of irrigation development on the environment such as drying-up of stream flow, water-logging, water borne diseases and lowering of ground water level are often pointed out, such problems can be controlled through appropriate management of irrigation schemes. On the other hand, various positive impacts of irrigation development can be expected on the prevention of vegetation degradation as already emphasized in the Master Plan report. The effect of the integrated soil and water management such as erosion control, prevention of salt accumulation, flood protection and the augmentation of underground water resources will prevent the vegetation degradation. Stable production and improvement of yield per unit area that will be attained through irrigation development can contribute to reduce the expansion of cultivated area and the access to alternative energy sources that can also prevent the vegetation degradation. The prevention of vegetation degradation can thus be performed through the effective utilization of positive impacts of irrigation development.

6.6.4 Recommendations and Suggestions

Following are recommendations and suggestions so far conceived;

(a) As already mentioned in the Master Plan report, the GIS database should be managed properly by leveling up the accuracy of data and also keeping the data up-to-date. Since various databases on land cover, land units, soil type, protected areas, agro-ecological zones and farming systems are available in digitized form, any proposed scheme can be assessed from such land use categories if proper coordinates are available. The result of the inventory survey on irrigation schemes is a valuable database source to be utilized for many purposes such as planning and evaluation but the data on coordinates are not satisfactorily accurate. It is therefore strongly recommended to increase the accuracy of coordinates data of proposed irrigation schemes using GPS.

(b) Since all the protected area is intentionally established basically to prevent development of the area, the irrigation scheme located within the protected area should be ranked at a lower priority for the future development. It is therefore important to check beforehand whether the proposed scheme is located in the protected area or not. This factor should be considered as one of the selection

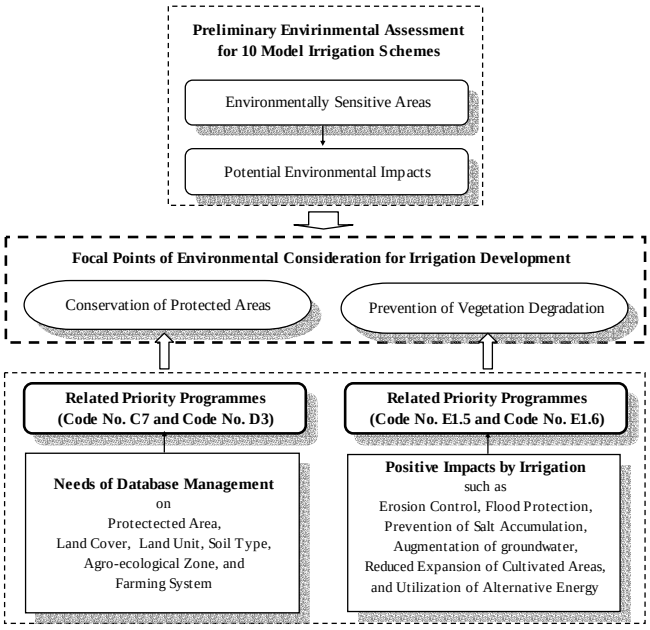
criteria of irrigation schemes within the flow of DADP. In order for the district staff to carry out such evaluation process accurately, the abovementioned GIS data should also be utilized effectively.

(c) If it is finally proved that the irrigation development is still necessary even within the protected area, all the necessary arrangements should be carried out according to the proper procedure mentioned above. More detailed information on the procedure is available in the Forest Act, 2002 and also in the Natural Forest Handbook for Tanzania, Volume-II.

(d) The positive impacts of irrigation development on the prevention of vegetation degradation are to be promoted through appropriate management, operation and maintenance of irrigation schemes.

(e) An interrelationship between the focal points of environmental consideration for irrigation development and priority subjects is summarized in the figure shown on the right.

Interrelation between Focal Points of Environmental Consideration and PriorityProgrammes



Source : JICA STUDY Team

Note
Code No.C7 : Establishment of DADP Formulation Guideline for Irrigated Agriculture Development
Code No.D3 : Information and Database Improvement Programme
Code No.E1.5 : Environmental Assessment Study for IrrigationPractice in Tanzania
Code No.Ei.6 : Study on River-Basin Approach in Irrigation Development

6.7 Irrigation Regulations

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

irrigation development.

(1) Government

The government agencies relevant to irrigation development, are DITS of MAFS, Regional Secretariat, Zonal Irrigation Offices and LGAs. In the Master Plan, the functions and duties of these agencies are studied and proposed as follows:

DITS of MAFS

The DITS will be basically responsible for determining the national minimum standards (NMS) of service, safeguarding professionalism, and determining the qualifications and number of staff required to meet the NMS. In that sense, among the demarcated roles, a top priority for the DITS is given to the role of formulating and reviewing policy, laws, procedures, regulations and guidelines on irrigated agriculture. The proposed specific functions and duties of DITS are as follows:

- Formulate and review policy, laws, procedures, regulations and guidelines on irrigated development including farmers' participation and contribution,
- Investigate and identify areas suitable for irrigation development,
- Set criteria for sound/appropriate irrigation projects,
- Evaluate schemes recommended by LGAs and give advice on their suitability,
- Supervise preparation of irrigated agriculture projects prior to their implementation,
- Coordinate and evaluate irrigation projects, and
- Prepare guidelines for formation of groups that intend to use water for irrigated agriculture.

Zonal Irrigation Office and Regional Secretariat

The Zonal Irrigation Office and the Regional Secretariat have basically inter- and intra-regional coordination and supervision functions through different channels. The main task of the Zonal Irrigation Office is that of technical supervision on one hand. The Regional Secretariat is to coordinate irrigation development with other development activities on the other hand. Below-mentioned are the proposed major roles for the Zonal Irrigation Office and Regional Secretariat:

- Receive, coordinate and prepare reports on irrigation development and give guidance needed,
- Interpret and give advice on policy of irrigation development,
- Coordinate identification of suitable land for irrigation development,
- Give advice on how to evaluate irrigation projects,
- Coordinate use of resources in irrigation areas, and
- Coordinate projects that promote irrigation development through cooperation

with DITS.

LGAs

The LGAs' role is quite critical under the decentralization policy. One of their main roles is based on the guidance from the Central Government to provide technically and financially appropriate and feasible replicable models and/or methods of irrigation development to the irrigators' organizations (farmers) and, in addition, to assist and encourage them to operate and maintain the irrigation scheme by themselves. Major proposed roles of LGAs are given below:

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

Then, in consideration of the above-mentioned functions and roles of each agency, effective supervision formation for implementation of irrigation projects should be considered for the following three cases:

- Irrigation schemes covering more than one region,
- Irrigation schemes covering more than one district within one region, and
- Irrigation schemes located in one district.

As one of the ideas, it is proposed to establish an irrigation committee for smooth implementation. The committee for the first and second cases will be operated mainly by DITS and the Regional Office. However, the committee for the last case will be managed by District Office staff although staff of the Zonal Irrigation Office is required to join as technical advisor for the time being. NGOs and farmers' representatives should also take part in these committees from the viewpoint of a participatory approach.

(2) IAs

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

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

To execute these functions and duties smoothly, the Irrigation Regulations should give clear articles on the needs, objectives, composition, registration, and operation of the IA.

There are lots variations in the size of irrigation schemes. The above mentioned functions and duties of IAs are applicable for small-scaled irrigation schemes. For large-scaled irrigation schemes, though its definition is necessary, a different approach should be considered. Establishment of a federation of IAs is one of the possible countermeasures. Also, the intervention of the government for controlling upstream portions like intake structures and main canals, is another countermeasure. These matters should be clarified in the Irrigation Regulations.

As stated before, the government issued the ASPS guidelines in May 2003. The guidelines cover all procedures of irrigation development. It is expected that the Irrigation Regulations should be elaborated fully using the guidelines.

(3) Private Companies

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

CHAPTER 7 ACTION PLANS FOR PRIORITY PROGRAMMES AND MODEL IRRIGATION SCHEMES

7.1 General

Action Plans for the selected 18 Priority Programmes of the Subject-wise Improvement Programme and ten Model Irrigation Schemes of the Scheme-wise Development Programme were worked out based on the results of PCM, RRA, site inspection, and review of relevant study reports. The results of the special study on major issues, which are discussed in Chapter 6 of this report, were also incorporated into the Action Plans.

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

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

7.2 Action Plans for Priority Programmes

7.2.1 General

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

7.2.2 Basic Concept

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

- Reform of the environment for decentralization;
- Involvement of the private sector;
- Establishment of an irrigation development system by participatory approach;
- Establishment of Appropriate Technologies on irrigation development in a cost effective manner; and
- Dissemination of the concept of the river basin approach.

7.2.3 A1: DITS Institutional Improvement Programme

(1) Title of Programme	DITS Institutional Improvement Programme (Code No.A1)
(2) Location	Mainland
(3) Objectives	This programme aims to diagnose the organizational structure and management of the DITS, in particular, focusing on its appropriateness for implementation of NIMP, namely the realization of sustainable irrigation development, and then, based on the diagnosis, to implement the institutional improvement of the DITS so that it can execute its mandates successfully.
(4) Programme Description	The first step of the DITS institutional improvement began in 2002. The president approved the reform and promotion of the former Irrigation Services Unit (ISU) in November 2002. The old ISU was promoted to the new division consisting of the irrigation services, agricultural machinery and agricultural land use planning. However, this is still not enough. The organization of DITS as a whole must be reformed responding to the new movement of the LGRP and the bottom up approach. Further strengthening is necessary including the following subcomponents: - Establishment of Efficient Support Mechanism - Strengthening of the Monitoring Function - Reform of Zonal Irrigation Office conforming to the LGRP Therefore, the recommendations for DITS improvement mainly focus on the three components. (a) Establishment of an Efficient Support Mechanism The efficient support mechanism hasn't yet been well established institutionally and technically for the farmers' self-reliant irrigation development. First of all, the DITS does need a stronger role of inter-ministerial harmonization among the relevant governmental organizations and other major stakeholders, for instance, coordination of the water rights with the Ministry of Water and Live Stock. When a conflict of water for irrigation and other uses arises, there is seemingly no effective mediation mechanism at present. And also a new project selection procedure of the competitive bottom-up approach should be studied and introduced. In addition, upgrading the technical level of existing technical staff is also necessary. In particular, the training focus must be revised responding to the bottom up approach for the irrigation. (b) Strengthening of Monitoring Function The Monitoring and Evaluation Unit and the Environmental Unit are presently really understaffed, even though their expected roles at the national level are quite crucial to provision of effective feedback data to perform their demarcated roles and, moreover, to the socio-economic effectiveness of irrigation development with environmental consideration. As a matter of fact, the DITS doesn't yet have a firm monitoring mechanism established and hasn't even selected a list of necessary socio-economic, technical and environmental indicators to monitor and evaluate the irrigation development activities. Strengthening of those two units should be included in the DITS institutional improvement programme.

	(c) Reform of Zonal Irrigation Office conforming to the LGRP Reform of Zonal Irrigation Office should be synchronized with the progress of LGRP. Presently the Zonal Irrigation Office still has a very influential role in irrigation development, in particular, in new development schemes, because the LGAs are presently not yet capable enough to perform their demarcated roles and functions. At least in the first stage of the Master Plan up to 2007 the Zonal Office should maintain its present roles and functions. Gradually, however, their roles should focus on the inter-regional coordination in cooperation with the Regional Secretariat and provision of policy and technical guidance to the LGAs (DALDO) toward the end of third stage up to the year of 2017. Gradual withdrawal from direct supervision of irrigation schemes and transferring it to the LGAs should be undertaken step by step.
(5)Contents of Report on Recommendations	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 and the LGAs. 2.1 DITS and MAFS 2.2 Other Ministries (Ministry of Water and Livestock Development, Ministry of Cooperatives and Marketing and PORALG) 2.3 LGAs 3. Diagnosis of the Organizational Structure and Management of the DITS 3.1 Overall Structure 3.2 Each Unit 3.3 Zonal Office 4. Improvement Plan of the DITS Organizational Structure 4.1 Goal and Strategy of 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 Senior Staffs 5. Implementation Plan 5.1 Phasing of Necessary Actions of Organizational Improvement 5.2 Implementation Schedule 5.3 Cost estimation 5.4 Monitoring and Follow-up Mechanism of the Implementation Plan
(6) Required Cost	US$ 660 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for the study and one year for implementation of the Programme (July 2004 - June 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	The division of responsibilities of 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 senior staffs (in particular, organization management skill) must be implemented in parallel. Otherwise, the improved structure won't work smoothly as expected.
(10) Special Arrangements	-

7.2.4 A2: LGA Institutional Strengthening Programme for Irrigation Development

(1) Title of Programme	LGA Institutional Strengthening Programme for Irrigation Development (Code No. A2)
(2) Location	Mainland
(3) Objectives	This programme aims to diagnose the organizational structure and management of the LGAs, mainly focusing on the appropriateness of DALDOs for implementation of NIMP, namely the realization of sustainable irrigation development, and then, based on the diagnosis, to implement the institutional improvement of the DALDOs so that they can execute their mandates successfully.
(4) Programme Description	In the LGAs the District Agriculture and Livestock Development Office (DALDO) is in charge of irrigation development. However, not all DALDOs have irrigation officers. As a matter of fact, some DALDOs are understaffed today. Although their expected roles and functions have expanded more, the LGAs presently face a lot of constraints that limit their capacity including: - Lack of a legal mandate, technical skills and facilities to enforce some roles. - Lack of expertise for strategic and financial planning and management. - Very limited resources for local level institutional building for community participation in the development process. - A shortage of competent personnel and, in some cases, technical equipment to manage and control the development process. The LGAs' role is quite important under the decentralization policy. A lot of constraints stated above must be solved one by one to perform their roles satisfactorily. Some of their main roles are based on the guidance from the Central Government to provide technically and financially appropriate and feasible models and/or methods of irrigation development to the irrigators' organizations (farmers) and, in addition, to assist and encourage the irrigators' organizations to operate and maintain the irrigation scheme by themselves. Therefore, this project consists of the following components: - To diagnose the appropriateness of the DALDOs' present organizational structure for implementation of NIMP - To recommend an improvement plan of the DALDOs' organizational structure. - To prepare the implementation plan of the recommendation. - To implement the institutional improvement plan so that the DALDOs can execute the mandates successfully for better performance of participatory irrigation development responding to the decentralization policy.

	The LGAs are presently being transformed under the decentralization policy, i.e. the LGRP. Therefore, this programme needs to have a close coordination with the progress of the LGRP.
(5) Contents of Report on Recommendations	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 the LGAs and relevant Ministries. 2.1 The LGAs (DALDOs) 2.2 MAFS (DITS) 2.3 Other Ministries (Ministry of Water and Livestock Development, Ministry of Cooperatives and Marketing and PORALG) 3. Diagnosis of the Organizational Structure and Management of the DALDOs for Irrigation Development 3.1 Overall Structure 3.2 Each Unit 3.3 Relationship with Other Relevant Organizations such as Regional Commissioner's Office and the Zonal Office 4. Improvement Plan of the Organizational Structure of the DALDO 4.1 Goal and Strategy of 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 of Senior Staffs 5. Implementation Plan 5.1 Phasing of Necessary Actions of Organizational Improvement 5.2 Implementation Schedule 5.3 Cost estimation 5.4 Monitoring and Follow-up Mechanism of the Implementation Plan
(6) Required Cost	US$ 660 thousand
(7) Executing Agency	The LGAs
(8) Implementation Schedule	Two years for study and implementation of the Programme (January 2005 to December 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	The division of responsibilities of the irrigation development among the relevant governmental organizations needs to be authorized and recognized firmly by the government. This is the prerequisite for the programme. Therefore, 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 senior staffs (in particular, organization management skill) must be implemented in parallel. Otherwise, the improved structure won't work as expected.
(10) Special Arrangements	The A1 programme should precede the A2 programme.

7.2.5 A3-1: New Legal Framework for IA Establishment Study Programme

(1) Title of Programme	New Legal Framework for IA Establishment Study (Code No. A3.1)
(2) Location	Mainland
(3) Objectives	The IA is a basic private organization and a principal actor for irrigation development. A well-organized IA is one of the crucial factors for its 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 liability 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. - MAFS 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. - MAFS should hold an appropriate coordination function of the water right for irrigation development with the Ministry of Water and Livestock Development. 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.) - Recommendations for a new legal framework for the IA - Implementation plan for a new legal framework for the IA A reliable legal framework is a prerequisite for successful farmers-oriented irrigation development. It should provide a secure legal environment for farmers and other private stakeholders to participate and invest in irrigation development. Legal status of the IA, land tenure and water rights, as well as ownership of and responsibility for irrigation facilities should be clearly defined for irrigation development through the new legal framework.
(5) Contents of Report on Recommendations	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 liability for irrigation development 4.1 Overview of Roles and Liability 4.2 Registration 4.3 Organizational Structure 4.4 Membership 4.5 Water rights, Water charges, Land tenure 4.6 Ownership of the Facilities 4.7 Bylaws and Regulations 4.8 Operation and Maintenance of the Facilities 4.9 Management of Organization 4.10 Dissolution 4.11 Others 5. Recommendation for a New Legal Framework for the IA 6. Implementation Plan for a New Legal Framework 5.1 Phasing of Necessary Actions for a New Legal Framework 5.2 Implementation Schedule 5.3 Cost estimation 5.4 Monitoring and Follow-up Mechanism of the Implementation Plan
(6) Required Cost	US$ 525 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for the study and one year for implementation of the Programme (July 2004 - June 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	A good coordination of the relevant ministries is crucial to the success of the study, such as PO-RALG, the Ministry of Cooperatives and Marketing, Ministry of Home affairs, Ministry of Water and Livestock Development, and so forth.
(10) Special Arrangements	The Preparation of a Legal Framework for the Development of Irrigation in Tanzania under the Agricultural Sector Programme Support (ASPS) – Irrigation Component has been implemented. The result of the study should be utilized for this programme A3.1.

7.2.6 A3-2: IA Organizing and Registration Support Manual

(1) Title of Programme	IA Organizing and Registration Support Manual (Code No. A3.2)
(2) Location	Mainland
(3) Objectives	For the time being, registration of IA as cooperative or association should be promoted, until the new legal framework has been established. A registered IA is essentially much preferable to a non-registered one even in the present situation, because a legal status as a cooperative or association may bestow social credibility to the IA filled with the prerequisites for the registration and may make the management of IA more smooth and easy for the farmers. Registration of an 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 LGAs can provide the farmers with necessary information on organizing and registration of IA and guide them properly. The programme also includes a training programme of 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 organizational chart for an IA, model bylaws and regulations and etc., so that the farmers can properly select an appropriate organizational form from cooperative and association based on their needs. Therefore, the central government, namely DITS, needs to prepare the standard guidelines and manual for the Local Governments 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 LGA extension service officers - To train the LGA extension service officers The preparation of the manual includes the following activities: - To review the existing organizing and registration procedure of the IA - To create the supp ort manual of organizing and registr ation of the IA under the present legal framework. Training of the LGA extension service officers includes the following activities: - To hold seminars for explanation of the support manual to the LGAs' staffs and other stakeholders. - To train staffs of governmental offices concerned with the procedures of organizing and registration of the IA.
(5) Contents of Manual	The proposed contents of the Manual are as follows: **Table of Contents** 1. Introduction: Project Purpose and 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 Bylaw 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
(6) Required Cost	US$ 780 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for preparation of the manual and one year for training the extension officers (January 2005 - December 2006)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	The manual should be applied to the all concerned IAs without biased intervention of the government officials, such as the district co-operative officer. The LGA staffs must be neutral to the farmers' selection of their appropriate legal entity. Unnecessary intervention is surely harmful to promoting the farmers' ownership for irrigation development. Also, efforts are required to popularize the manual especially to LGAs' staff concerned with irrigation development.
(10) Special Arrangements	The manual must be modified after the enactment of the new legal framework. Besides, the programmes A3.2 and A3.3 can share and utilize the study results together. Therefore, unnecessary overlap of the study should be removed.

7.2.7 A3-3: IA Management Training for Farmers

(1) Title of Programme	IA Management Training for Farmers (Code No. A3.3)
(2) Location	Mainland
(3) Objectives	Judging from the RRA done by the NIMP study team, the management of existing IAs should be improved. The following problems have been identified: - Poor participation of members in the IA activities such as operation and maintenance activities of irrigation facilities, meetings and etc. - Lack of leadership of the IA executive committee and necessity of leadership training - Poor awareness of the IA's importance and roles by farmers for self-reliant irrigation development and necessity of enlightenment of farmers for better understanding of the IA - Insufficient financial management ability The objectives are to prepare a training programme for 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 defines the compulsory participation of the members and other necessary items. - To prepare the training manual and programme for the IA management for IA leaders. - To design an organizational setup for implementation of the training program. - To provide IA leaders with the training services through the setup
(5) Contents of Training Programme	The proposed contents of the training for the IA leaders are as follows: (a) Overview of Roles and Liabilities of the IA (b) Registration (c) Organizational Structure (Executive Committee, Sub-Committee, Field Canal Group) (d) Bylaw and Regulations - Necessity of Compulsory Participation of Irrigators (e) Selection of Leaders (Chairperson, Secretary, Treasurer) (f) Membership (g) Water rights, Water charges, Land tenure

	(h) Operation of General Meetings and Other Meetings (i) Financial Management (Registration Fees, Membership Fees, Budget (j) Plan, Financial Report, Bank Account, Audit, and etc.) (k) Dissolution (l) Enlightenment of Members' Active Participation in the IA Activities (m) Leadership Training (n) Others
(6) Required Cost	US$ 765 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for preparation of the manual and the program and one year and a half for training the IA leaders (January 2005 - June 2007)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Good cooperation of DITS and the LGAs (DALDOs) is a necessary condition for successful implementation of the programme. DITS is mainly responsible for preparing the manual and the training programme. The LGAs are mainly responsible for implementing the training programme for the IA leaders.
(10) Special Arrangements	The programmes A3.2 and A3.3 can share and utilize the study results together. Therefore, unnecessary overlap of the study should be removed.

7.2.8 B1: Regularization of Irrigation Administration and DITS Working Mandate Formulation Programme

(1) Title of Programme	Regularization of Irrigation Administration and DITS Working Mandate Formulation Programme (Code No.B1)
(2) Location	Mainland and Zanzibar
(3) Objectives	The programme aims to regularize irrigation administration of Tanzania, and to standardize the mandate of DITS in accordance with the irrigation regulations. The DITS's mandate should clarify scheme selection procedures and scheme implementation processes in collaboration with LGAs. Through properly executing the programme, DITS will properly initiate works in the new governing of irrigation development. It is expected to attain the overall objectives of NIMP.
(4) Programme Description	Circumstances of irrigation administration have drastically changed in Tanzania. Progress of the agricultural sector development represented by ASDP is a most influential movement in the irrigation sector. Corresponding to such movement, decentralization and privatization have been brought into irrigation administration. The GOT has promoted the competent authorities of irrigation administration from the Irrigation Section (IS) to the DITS following a recommendation made in the Master Plan. In accordance with the promotion of the

<table>
<tr><td></td><td colspan="2">former IS, the new position of the irrigation authority as the DITS, has to be clarified immediately.
The ASDP is underpinned by national policies which are strongly supporting, in particular, the decentralization of many public sector responsibilities to LGAs. Irrigation administration is positioned in the turmoil of the decentralization. New formation of the irrigation administration with the collaboration of the LGAs needs to be established. Fulfillment of this programme is to answer those urgent needs.</td></tr>
<tr><td>(5) Contents of Programme</td><td colspan="2">Major activities and expected outputs are as follows:</td></tr>
<tr><td></td><td>Activities</td><td>Outpcomes</td></tr>
<tr><td></td><td>1-1 To review previous laws and rules.</td><td>Review note</td></tr>
<tr><td></td><td>1-2 To prepare a draft of regulations of irrigation administration.</td><td>Several series of regulations concerning irrigation development (Draft)</td></tr>
<tr><td></td><td>1-3 To adjust inconsistencies of the draft regulations with other related regulations and irrigation development policy.</td><td>Study report (implied)</td></tr>
<tr><td></td><td>1-4 To finalize the draft regulations of irrigation administration.</td><td>Several series of regulations concerning irrigation development (Final)</td></tr>
<tr><td></td><td>2-1 To review the previous mission for the DITS.</td><td>Review note</td></tr>
<tr><td></td><td>2-2 To prepare a plan for a new mission statement of DITS.</td><td>Mission Statement (Draft)</td></tr>
<tr><td></td><td>2-3 To finalize the plan for the mission statement of DITS.</td><td>Mission Statement (Final)</td></tr>
<tr><td></td><td>3-1 To study demands to be included into the new duties standard of DITS.</td><td>Study report (implied)</td></tr>
<tr><td></td><td>3-2 To review previous duties of DITS.</td><td>Review note</td></tr>
<tr><td></td><td>3-3 To finalize a plan of task duty standards of DITS.</td><td>Plan of task Duties Standard of DITS</td></tr>
<tr><td></td><td>4-1 To conceptualize official procedures of schemes selection and implementation.</td><td>Concept note</td></tr>
<tr><td></td><td>4-2 To formalize each process of the scheme implementation in consideration of the finalized features of DITS and other related organizations and regulations.</td><td>Regular Forms for Scheme Implementation</td></tr>
<tr><td></td><td>4-3 To prepare written rules on the formalities on scheme implementation.</td><td>Rules on the formalities on scheme implementation</td></tr>
</table>

(6) Required Cost	US$ 540 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	At this moment special attention should be given to farmer-managed small-scale irrigation schemes. Those small-scale irrigation schemes are intended to be managed on the basis of farmers' participation and initiatives. LGAs are expected to play an important role in promotion of the small-scale irrigation developments. Irrigation administration of DITS of MAFS, is essential for irrigation development, but has undergone a complete change in consideration of the decentralization. All personnel concerned in irrigation administration should recognize such needs and embody ideal management of irrigation development in their duties.
(10) Special Arrangements	A Subject-wise Development Programme for institutional improvement of government authorities concerning irrigation development is proposed in Programme A1 together with implementation of this programme. Both programmes have close connections with each other. The two programmes should be implemented together.

7.2.9 B2: Contract Management System Improvement Programme

(1) Title of Programme	Contract Management System Improvement Programme (Code No.B2)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish or improve the management system for contracts, which covers contract works and sub-contract tasks on irrigation development. Fulfillment of improvement of the contract management system would ultimately further improve the private sector through stimulating contractors' motivation for business. Through effective utilization of established contract management systems for irrigation development, it is expected to attain the overall objectives of NIMP.
(4) Programme Description	Outsourcing and entrusting public tasks to the private sector has been encouraged in terms of privatization in Tanzania, especially in the agriculture sector of the country. LGAs as well as central government become important players in contract order and management. Privatization and decentralization are important trends in irrigation development in Tanzania. Current contract management systems for irrigation development in the MAFS are still of the old order, and applicable for specified contract tasks. The contract management system particularly relating to farmer-managed irrigation scheme implementation needs to be improved so as to meet the recent trend of outsourcing. The programme consists of three major significant tasks. The first important task is to review the present contract system and to identify shortcomings and insufficiencies of the old system. The second imperative task is to design new modalities for the contract system,

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<tr><td></td><td>which meet the actual demands of the contracts. The third important task is to build up certain management system operations, maintaining and updating the established contract modalities, so that they can be maintained appropriately. The programme should fulfill these important tasks successfully through assigning staffs, pursuing specified activities, testing and other required activities.</td></tr>
<tr><td>(6) Contents of Programme</td><td>Major activities and expected outputs are as follows:
<table>
<tr><th>Activities</th><th>Outputs</th></tr>
<tr><td>1-1 To review the existing contract system</td><td>Reviewed note</td></tr>
<tr><td>1-2 To plan proper contract procedures for irrigation scheme implementation not only for the central government but also LGAs.</td><td>Plan of Contract Procedures</td></tr>
<tr><td>1-3 To prepare necessary documents on the new contract method</td><td>Forms of Contract Document</td></tr>
<tr><td>2-1 To arrange the circumstances of governmental offices concerning contracts so as to introduce the new contract system.</td><td>New Contract System</td></tr>
<tr><td>2-2 To train staffs of governmental offices on procedures of the new contract method.</td><td>Trained Staffs for New Contract Method</td></tr>
<tr><td>3-1 To prepare an explanatory paper on the new contract method.</td><td>Explanatory Paper on the New Contract Method</td></tr>
<tr><td>3-2 To deliver the explanatory paper on the new contract method to contractors.</td><td>Delivery of the Explanatory Paper</td></tr>
<tr><td>3-3 To hold several seminars for explanation of applying the new contract method to contractors .</td><td>An adequate number of Trained Contractors</td></tr>
</table></td></tr>
<tr><td>(6) Required Cost</td><td>US$ 420 thousand</td></tr>
<tr><td>(7) Executing Agency</td><td>Division of Irrigation and Technical Services, MAFS</td></tr>
<tr><td>(8) Implementation Schedule</td><td>One year for study and implementation of the Programme (July 2005 – June 2006)</td></tr>
<tr><td>(9) Assessment of Possible Problems and Bottlenecks in Implementation</td><td>The need for improvement of the contract system is very high in Tanzania. Once the contract system is established for small irrigation scheme implementation, the contract system could not always direct other irrigation scheme developments. The contract system should be designed assuming various conditions and situations focusable in the whole of Tanzania.

In implementation of small-scaled irrigation schemes, farmer's participation is possibly involved. Consideration for good coordination between contract tasks and participants should be given properly.

Also, efforts are required to popularize the outcomes of the programme, especially for LGAs' local staffs concerned with irrigation development.</td></tr>
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(10) Special Arrangements	Farmers contributions in the physical works of the irrigation scheme are still in the mid course of arguments, as to when and how farmers participating are to be managed, although a special study was executed in this Action Plan. And it is also unclear what is the relation between such farmers contribution and the contract works. Before discussing methods of contract, clear allotment of works in scheme implementation for the contractors should be studied in detail. The contract system and its developed modalities in outsourcing are prepared for the situation of the Mainland. However, it is useful even in Zanzibar. The outputs should be contrived to be convenient for both users in the Mainland and Zanzibar.

7.2.10 C1: Survey and Investigation Guideline Establishment Programme

(1) Title of Programme	Survey and Investigation Guideline Establishment Programme (Code No.C1)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish practical Survey and Investigation Guidelines which are convenient for conducting necessary site survey and investigation 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 Guidelines should be kept by each District Office and Agency related to irrigation development, to provide them with adequate instruction of the required survey and investigation and those operations. Besides, it could provide the improvement of the planning capability of relevant staff in irrigation development. Through the establishment of the guidelines, it is expected to attain the overall objectives of NIMP.
(4) Programme Description	In irrigation development, planning and designing are generally fundamental factors for successful projects. Planning and designing should be based upon reliable information and data, which are collected through proper surveys and investigations. There are many projects which 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 guidelines are essential. In Tanzania, irrigation development should be promoted in various manners corresponding to the variations of scheme sites. Sometimes it might be implemented by LGAs' staffs. Pursuing of optimum irrigation development for each target area with its own constraints and locality, requires an overall guideline of survey and investigation for irrigation development, in which proper alternatives could be also provided in the case of LGA initiative schemes.

(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Topography 2.1 Topo-map and topo-equipment 2.2 Topographic survey 2.3 GIS mapping 3. Geology 3.1 Geologic survey 3.2 Borings and soundings 3.3 Physical prospecting 3.4 Geophysical analysis 3.5 Survey for erosion and land slide 4. Soil and Land 4.1 Needs for soil and land suitability studies 4.2 Exploratory surveys 4.3 Reconnaissance surveys 4.4 Semi-detailed surveys 4.5 Soil sampling 4.6 Field laboratories 4.7 Classification and soil mapping 4.8 Land evaluation 4.9 Present land use surveys 5. Water resources 5.1 River water 5.2 Ground water 5.3 Lakes 5.4 Other water sources 5.5 Water quality tests 5.6 Surveys for water uses 5.7 Water rights 5.8 Drainage 6. Socio-economy 6.1 Demography 6.2 Sociology 6.3 Rural economy 6.4 Rural appraisal 6.5 Marketing 6.6 RRA and other rural society surveys 6.7 PRA 7. Environment 7.1 Environmental hazards in irrigated agriculture 7.2 Regulations on environmental safeguards 7.3 IEE 7.4 EIA 7.5 Countermeasures for environmental problems 8. Execution of field investigations and surveys 8.1 Executing organizations 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
(6) Required Cost	US$ 450 thousand

(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	After preparation of these survey and investigation guidelines, it is proposed that they be applied to all concerned irrigation projects/programs with attentive training, and updating the guidelines periodically. Also, efforts are required to popularize the general guidelines, especially for LGAs' local staffs concerned with irrigation development.
(10) Special Arrangements	The survey and investigation guidelines for irrigation development are prepared for irrigation planning in collaboration with the Mainland and Zanzibar. The guidelines should be contrived to be convenient for both users in the Mainland and Zanzibar.

7.2.11 C2.1: Planning Guideline Establishment Programme

(1) Title of Programme	Planning Guideline Establishment Programme (Code No.C2.1)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish a set of comprehensive and practical Planning Guidelines that are convenient for planning of both new irrigation schemes and rehabilitation irrigation schemes. One set of the Planning Guidelines 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 guidelines, is expected to attain the overall objectives of NIMP
(4) Programme Description	In irrigation development, a planning is the fundamental activity controlling the fate of the 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 set of planning guidelines is essential accordingly. In Tanzania, irrigation development should be promoted in various manners corresponding to the variations of the project sites. And from now on, irrigation development should be implemented by LGAs' staffs under the decentralization policy. Optimum irrigation development for each target area having its own constraints and locality, requires an overall irrigation planning guideline, in which proper alternatives could be provided for all schemes including LGA initiative schemes. For the preparation of planning guidelines, it is required to consider conceptual soundness and logical correctness as well as technical reliability.
(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation Purpose 3. Irrigation Area 3.1 Land Potential 3.2 Climate 3.3 Farmers Potential

	3.4 Social Capital related to Irrigation 4. Irrigated Agriculture 4.1 Applicable Crops for Irrigation 4.2 Cultivation in Irrigated Agriculture 4.3 Post-harvesting 4.4 Marketing 4.5 Other Related Issues 5. Crop Water Requirements 6. Water Resources 6.1 Variation of Water Sources for Irrigation 6.2 Characteristics by water Sources 6.3 Water Resources Development for Irrigation 6.4 Legislation System of Water Use 6.5 Obtaining and Maintaining of Water Rights for Irrigation 7. Irrigation Methods and Irrigation Systems 7.1 Introduction on Irrigation Type 7.2 Irrigation Methods 7.3 Irrigation Categories 7.4 Classification of Irrigation Schemes 7.5 Irrigation Systems 8. Irrigation Development Levels 8.1 Definition of Irrigation Development Levels 8.2 Classification of Irrigation 8.3 Indicators of Irrigation Development Levels 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 Harmoniousness 10. Operation and Maintenance of Irrigation Systems 10.1 Importance of O&M 10.2 Necessary Activities for O&M 10.3 Irrigators Association (IA) 10.4 Establishment and Maintaining of IA 10.5 Relating Organizations 10.6 Arbitration of Conflicts within IA and with Outsiders 11. Participation in Irrigation 11.1 Target 11.2 Method 11.3 Relating Partners 11.4 Monitoring and Support 11.5 Related Issues 12. Project Cycle Management 13. Considerations in the Environment 14. River-basin Management in Irrigation 15. Additional Information and Data for Irrigation Planning ANNEX
(6) Required Cost	US$ 680 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)

(9) Assessment of Possible Problems and Bottlenecks in Implementation	Programmes aim to prepare their own criteria and guidelines. The planning guidelines should be applied to all concerned irrigation projects/programmes. Thereby, discord in the contents between these general guidelines and the individual guidelines belonging to the specified project should be excluded. Also, efforts are required to popularize the general guidelines especially to LGAs' staff concerned with irrigation development.
(10) Special Arrangements	The planning guidelines for irrigation development are prepared for irrigation planning in collaboration with the Mainland and Zanzibar. The guidelines should be contrived to be convenient for both users in Mainland and Zanzibar.

7.2.12 C2.2: Design Guideline Establishment Programme

(1) Title of Programme	Design Guideline Establishment Programme (Code No. C2.2)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish practical Design Guidelines which are convenient for creating designs appropriate to the site conditions for new irrigation schemes and rehabilitation irrigation schemes. One set of the Design Guidelines should be distributed to and kept by each District Office related irrigation development, to provide them with adequate instructions on how to make successful designs. Besides, it could provide the improvement of design capability of relevant staff in irrigation development. Through the establishment of the guidelines, it is expected to attain the overall objectives of NIMP.
(4) Programme Description	In irrigation development, designing as well as planning are the fundamental activities controlling the fate of projects. There are many projects that were executed with great difficulty or sometimes failed due to low skills in designing. Proper designing to meet the actual conditions of the project site is an urgent requirement for successful irrigation development. In order to reinforce designing skills, preparation and full utilization of proper design guidelines is essential. In Tanzania, irrigation development should be promoted in various manners corresponding to the variations of project sites. From now, it might be mostly implemented by LGAs' staffs. To pursue optimum irrigation development for each target area that has its own constraints and locality, requires overall irrigation design guidelines, in which proper alternatives in designing could also be provided in the case of LGA initiative schemes. For the preparation of Design Guidelines, conceptual soundness and logical correctness are to be held in addition to technical reliability.
(5) Contents of Guidelines	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation systems 2.1 Water source systems 2.2 Irrigation system layout 2.3 On-farm facilities and equipment 2.4 Drainage systems

	3. Canal structures 3.1 Irrigation channels 3.2 Canal lining 3.3 Conveyance structures 3.4 Protective structures 3.5 Regulating structures 3.6 Water measurement structures 3.7 Other related structures 4. Diversion weirs 4.1 Type of weirs and layout of a diversion weir 4.2 Hydraulic design 4.3 Design of weir structures 4.4 Gate structures 4.5 Other related structures 5. Dams and Reservoirs 5.1 Dam types and layouts 5.2 Gravity dams 5.3 Fill dams 5.4 Water impounding 6. Boreholes and Wells 7. Pump stations 7.1 Design of pump equipment 7.2 Design of suction and delivery basins 7.3 Designing of pump houses 7.4 Design of pump operation systems 8. Farm irrigation structures 9. Drainage facilities 9.1 Measures for reclamation of waterlogged and inundated soils 9.2 Designs for sub-surface drainage 9.3 Designs for surface drainage 9.4 By force drainage 10. Water harvesting 10.1 Selection of methods for rain water harvesting 10.2 Implicate water harvesting methods 10.3 Explicate water harvesting methods 10.4 Dynamic water harvesting methods 10.5 Related information on water harvesting 11. Land consolidation 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 13. Other references ANNEX
(6) Required Cost	US$ 620 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)

(9) Assessment of Possible Problems and Bottlenecks in Implementation	After preparation of these Design Guidelines, it is recommended that they be applied to all concerned irrigation projects/programs, thereby, 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 guidelines especially to LGAs' local staffs concerned with irrigation development.
(10) Special Arrangements	The design guidelines for irrigation development are prepared for irrigation planning in collaboration with the Mainland and Zanzibar. The guidelines should be contrived to be convenient for users both in the Mainland and Zanzibar.

7.2.13 C3.1: Operation and Maintenance Guideline Establishment Programme

(1) Title of Programme	Operation and Maintenance Guideline Establishment Programme (Code No.C3.1)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish practical Operation and Maintenance Guidelines which are convenient for conducting proper operation and maintenance of existing irrigation systems for sustainable achievement of effective irrigation in new irrigation schemes and rehabilitation irrigation schemes. One copy of the established Operation and Maintenance Guidelines is openly kept in each District Office and Agency related to irrigation development and also in a working place of the farmers' organization, to provide them with adequate instruction on how to conduct activities in O&M. Furthermore it improves the capability in irrigation practice of concerned members under proper maintenance. Through the preparation of the guidelines, it is expected to attain the overall objectives of NIMP.
(4) Programme Description	In irrigation practice, operation and maintenance activities affect the chances of success of schemes. There are many irrigation schemes that were 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, preparation and full utilization of proper Operation and Maintenance Guidelines is essential. For the preparation of Operation and Maintenance Guidelines, consideration should be given to ease of application and familiarity for beneficiaries in addition to technical reliability.
(5) Contents of Guidelines **(showing major items only)**	The proposed contents of the Guidelines are as follows: **Table of Contents** 1. Introduction 2. Irrigation water management 2.1 Irrigation practices in Tanzania 2.2 Government policy and strategies in irrigation development 2.3 Participants in irrigation 2.4 Water rights 2.5 Role of water management

	3. Water users organizations 3.1 Playing the role of water users organization 3.2 Juristical system of irrigation organization 3.3 Typical model of irrigation organizations 3.4 Formation of irrigation organizations 3.5 Performance of irrigation organizations 3.6 Monitoring of IA's activities 4. Source of water 4.1 Preservation of water sources 4.2 Preservation of River Basins 4.3 Preservation of aquifers 5. Irrigation water delivery 5.1 Basic soil-water plant relationships 5.2 Crop water requirements 5.3 Irrigation systems and water application methods 5.4 Measurement of irrigation water 6. Operation of irrigation facilities and structures 6.1 Dams and reservoirs 6.2 Intake structures 6.3 Irrigation channels 6.4 Water delivering structures 6.5 Watering and water spreading facilities 6.6 Pump facilities 6.7 Boreholes 6.8 Water harvesting facilities 7. Maintenance, repair and rehabilitation of irrigation and structures 7.1 Dams and reservoirs 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 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 on 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
(6) Required Cost	US$ 820 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2005 – June 2006)

(9) Assessment of Possible Problems and Bottlenecks in Implementation	Since experience in adequate execution of Operation and Maintenance are superficial in Tanzania, it is hardly expected to deal with the completed guidelines with a practiced hand in the early stage. After preparation of these Operation and Maintenance Guidelines, it is proposed to apply the guidelines to all concerned irrigation projects/programs, and if necessary properly giving attentive training. Also, efforts are required to popularize the general guidelines especially to LGAs' local staffs concerned with irrigation development.
(10) Special Arrangements	The Operation and Maintenance Guidelines for irrigation systems are prepared in collaboration with the Mainland and Zanzibar. The guidelines should be contrived to be convenient for both users in the Mainland and Zanzibar.

7.2.14 C4: Farmers' Participation in Irrigation Development Programme

(1) Title of Programme	Farmers' Participation in Irrigation Development Programme (Code No.C4)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to enhance farmers' participation in irrigation, so that irrigation schemes are properly and continuously managed 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 set of proper guidelines for farmers' participation will be prepared based on the review results. The guidelines are intended to be fully applicable and manageable for the LGAs' staff and leaders of farmers. The farmers' participation should be discussed for the planning, designing, construction and operation and maintenance stages. In particular, farmers' contribution for construction work and operation and maintenance activities should be clearly mentioned in the guidelines. Furthermore, a few pilot model irrigation schemes for farmers' participation will be established, in which replicable effects of the pilot models for farmers' participation are 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 distributed to relevant offices/IAs. Through properly utilization of result of the programme, it is expected to attain the overall objectives of NIMP.

<table>
<tr><td>(4) Programme Description</td><td>Due to periodic food insecurity in Tanzania, there is a keen need to develop farming under irrigation in order to exploit the existing irrigation potential so as to complement weak rainfed farming. However, some of the implemented irrigation schemes are disappointedly deteriorated in operation due to poor farmers' participation. Food security is attainable through irrigation development with adequate farmers' participation.
On the examination and evaluation of current irrigation initiatives carried out under the ASDP preparation, special attention is giving to small-scale farmer-managed irrigation development. Such small-scale irrigation activities generally form a small-scale irrigation scheme which requires intensified farmers' participation.
Furthermore, putting forward the decentralization in agriculture including irrigated agriculture, LGAs and irrigating farmers' themselves are about to play an important role for small-scale farmer-managed irrigation strengthening of the irrigation development under enthusiastic farmers' participation at the center of the movement.
In these respects, it should be said that farmers' participation is essential in irrigation development.</td></tr>
<tr><td>(5) Contents of Programme</td><td>The proposed contents of the Programme are as follows:
<table>
<tr><th>Activities</th><th>Outputs</th></tr>
<tr><td>1-1 To review previous similar references on farmers' participation.</td><td>Review note</td></tr>
<tr><td>1-2 To study the contents of the guidelines for farmers' participation.</td><td>Plan of Contents of Guidelines</td></tr>
<tr><td>1-3 To prepare the Farmers' Participation Guidelines reflecting identified requirements for the guidelines.</td><td>Farmer's Participation Guidelines</td></tr>
<tr><td>2-2 To prepare an inventory of irrigation schemes for farmers' participation in consideration of the irrigation scheme inventory prepared in NIMP Study.</td><td>Inventory of Irrigation Scheme for Farmers' Participation</td></tr>
<tr><td>2-3 To make a criteria of scheme selection for the pilot model for strengthening farmers' participation.</td><td>Criteria of Scheme Selection</td></tr>
<tr><td>2-4 To select pilot model schemes from among possible schemes listed in the inventory.</td><td>List of Selected Schemes</td></tr>
<tr><td>3-1 To prepare the Strengthening Plan for farmers participation in the selected pilot schemes.</td><td>Strengthening Plan for Farmers' Participation</td></tr>
<tr><td>3-2 To arrange necessary resources for implementation of the Strengthening Plan.</td><td>-</td></tr>
<tr><td>3-3 To implement the Strengthening Plan as planned.</td><td>Execution report of the Strengthening Plan</td></tr>
<tr><td>4-1 To monitor the performance of farmers' participation in the pilot schemes.</td><td>Monitoring report</td></tr>
<tr><td>4-2 To support O&M of the pilot schemes as required.</td><td>-</td></tr>
<tr><td>4-3 To arrange necessary resources for implementation of villagers tours to the pilot scheme.</td><td>-</td></tr>
<tr><td>5-1 To plan tours for visiting pilot schemes.</td><td>Tour Plan</td></tr>
<tr><td>5-2 To conduct the tours as scheduled.</td><td>Tour report</td></tr>
<tr><td>6-1 To draft leaflet for the effects of strengthening farmers' participation.</td><td>Leaflet of Farmers' Participation (Draft)</td></tr>
<tr><td>6-2 To finalize the draft of leaflet.</td><td>Leaflet of Farmers' Participation (Final)</td></tr>
<tr><td>6-3 To print leaflets at required sheets</td><td>Copies of Leaflet of Farmers' Participation</td></tr>
</table></td></tr>
</table>

(6) Required Cost	US$ 720 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	At this moment special attention should be given to farmers-managing irrigation schemes which are duly dependent on proper farmers' participation. Farmers' participation should be led under proper support of the LGAs. However, strengthening of LGAs' organization and capacity building of LGAs' personnel in charge might be done in parallel with or slightly behind the schedule of implementation of this programme. Taking the importance of village farmers managed irrigation development into consideration, mutual linkage between this programme and other related programmes should be kept.
(10) Special Arrangements	As discussed in Chapter 6 of this report, farmers' participation should be discussed from the viewpoint of farmers' contribution to implant their ownership to the irrigation schemes. This programme should be implemented in collaboration with the Mainland and Zanzibar. The results of the programme should be contrived to be convenient for both users in the Mainland and Zanzibar.

7.2.15 C5: Village Irrigation Development Guideline Establishment Programme

(1) Title of Programme	Village Irrigation Development Guidelines Establishment Programme (Code No.C5)
(2) Location	Mainland
(3) Objectives	This programme aims to establish proper guidelines for village irrigation development like small-scale farmer-managed irrigation development so as to be easier for LGAs to use. The programme is to conduct investigation studies to clarify problems in farmers managed village irrigation schemes, and to focus on the needs of irrigation development at village the farmers level. The results of the investigations will conceive proper modalities of village irrigation scheme implementation. Also imperative remedial measures against immediate draught crisis will be developed through necessary investigation. The results will be compiled in the form of guidelines for village irrigation development. The compiled guidelines are intended to be fully applicable and manageable for the LGAs' staff too. Proper application methods for the guidelines and establishment of a proper handling system for the guidelines will be also discussed in the programme. Through proper use of results of the programme to the village-level irrigation development, it is expected to attain the overall objectives of NIMP.

(4) Programme Description	Due to periodic food insecurity in Tanzania, there is keen need to develop irrigated farming by exploiting the existing irrigation potential so as to complement weak rainfed farming. The ASDP, which currently struggles notwithstanding the full support of the GOT , is a part of the operational response to a set of policies, strategies and initiatives designed to re-orientate and re-invigorate the national economy. On the examination and evaluation of current irrigation initiatives carried out under the ASDP implementation, a special attention is given to small-scale farmer-managed irrigation development. Such small-scale irrigation activities generally form a small-scale irrigation scheme which involves facility construction. However, unlike scheme implementation, irrigation improvement without involvement of facility construction gives immediate effect to village farmers' irrigation development. Sometimes farmers require immediate technical guidance and information for remedial action against the immediate crisis. Village irrigation development includes such technical support activities without facility construction.
(5) Contents of Programme **(showing major items only)**	The proposed contents of the Programme are as follows: **Table of Contents** 1. Introduction 2. Definition of Village Irrigation Development 3. Cultivation and Water 4. Improvement of Rain-water Use for Agriculture 4.1 Easy Estimation of Crop Water Requirements 4.2 Effect of Rainfall Fluctuation on Crop Cultivation 4.3 Allowable Limit of Water Shortage 4.4 Easy Rain-water Management 5. Measures against Draughts 5.1 Frequency of Draught Occurrences in Tanzania 5.2 Damages by Draught in Tanzania 5.3 Forecasting of Draught Occurrences 5.4 Village Communication for Draught Crisis 5.5 Preventive Measures for Draught Damages 5.6 Remedial Measures against Draught Crisis 5.7 Monitoring of Draught Occurrences 6. Improvement of Watering Practices 7. Village Irrigation Scheme 7.1 Purpose of Village Irrigation Scheme 7.2 Area of Village Irrigation Scheme 7.3 Irrigated Agriculture in Village Irrigation Scheme 7.4 Crop Water Requirements for Village Irrigation Scheme 7.5 Water Source for Village Irrigation Scheme 7.6 Irrigation Method and Irrigation System 7.7 Irrigation Category 7.8 Construction of Village Irrigation System 8. Operation and Maintenance of Village Irrigation System 8.1 Importance of O&M 8.2 Necessary Activities for O&M 8.3 Water Users Group 8.4 Establishment and Maintaining of Legal Entity for O&M 8.5 Relating Organizations 8.6 Arbitration of Conflicts within Water Users Group and with Outsiders 9. Participation in Village Irrigation 10. Consideration in Environment

	11. Access to and continued involvement with Supporting Organizations 12. Additional Information and Data for Village Irrigation ANNEX
(6) Required Cost	US$ 760 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Role of LGAs in irrigated agriculture development has been more and more vital in line with the decentralization policy. It should be made under proper support of the MAFS. Taking the importance of village farmers managed irrigation development into consideration, a comprehensive support programme for promoting village irrigation development including achievement of tasks proposed in this programme could launch independent implementation.
(10) Special Arrangements	This programme implementation aims at reliable preparation of the guidelines that is a first attempt at perfection of the guidelines. Taking into consideration a great variety of village situations over the country, the outcomes of the programme should be examined and revised over and over even after phasing out of the programme. In this respect, it is more favorable to implement a special project to verify the guidelines and improve them based on the results.

7.2.16 C7: Establishment of DADP Formulation Guideline for Irrigated Agriculture Development Programme

(1) Title of Programme	Establishment of DADP Formulation Guidelines for Irrigated Agriculture Development Programme (Code No.C7)
(2) Location	Mainland
(3) Objectives	This programme aims to prepare proper guidelines for DADP formulation for irrigated agriculture in terms of technical aspects. This programme is to conduct an investigation study to clarify problems confronted by District Offices on irrigation development, to select appropriate irrigation schemes, and to focus on the needs of irrigation development at the district level. Proper planning methods and procedures of district manageable small-scale irrigation schemes will be conceived based on the results of the investigations. The results will be compiled into guidelines for village and district irrigation development. The compiled guidelines are intended to be fully applicable and manageable for the LGAs' staff. Deployment of the guidelines in good order and establishment of a proper handling system for the guidelines will also be mentioned in the programme. If necessary, proper training of districts staff could be optionally inclusive within the programme. Through properly utilizing of results of the programme, it is expected to attain the overall objectives of NIMP.

<table>
<tr><td>(4) Programme Description</td><td>The ASDS, which currently struggles notwithstanding the full support of the GOT, is a part of the operational response to a set of policies, strategies and initiatives designed to re-orientate and re-invigorate the national economy. The programme is underpinned by national policies supporting, in particular, the decentralization of many public sector responsibilities to LGAs. The LGAs will increasingly be involved through the participatory formulation of District Agricultural Development Plan (DADP). Presently, formulating modalities of the DADP are mostly highlighted. Putting forward the decentralization in agriculture including irrigated agriculture, the guideline of DADP formulation has to be prepared urgently. This programme is to establish proper guidelines for DADP formulation concerning irrigated agriculture.
As the DADP Guidelines on its clerical procedures are going to be prepared in another channel, guidelines (tentatively called as DADP-IA) prepared by this programme implementation are regarded as a part of DADP's guidelines for irrigated agriculture development.</td></tr>
<tr><td>(5) Contents of Programme</td><td>Major activities and expected outcomes are as follows:
<table>
<tr><th>Activities</th><th>Outcomes</th></tr>
<tr><td>1-1 To study z problems and constraints faced by districts when planning irrigation development independently.</td><td>Study report (implied)</td></tr>
<tr><td>1-2 To study previous failures in irrigation schemes planned by districts due to lack of technical and socio-economical considerations.</td><td>Study report (implied)</td></tr>
<tr><td>1-3 To identify requirements for districts in planning of irrigation scheme developments.</td><td>Review note</td></tr>
<tr><td>2. To prepare the DADP-IA Guidelines reflecting identified requirements for the guidelines.</td><td>DADP-IA Guidelines</td></tr>
<tr><td>3-1 To plan a management and utilization system for the guidelines.</td><td>Plan of management and utilization system</td></tr>
<tr><td>3-2 To prepare the handling manual in line with the management plan.</td><td>Handling rules</td></tr>
<tr><td>4. To transport copies of the DADP-IA Guidelines to the organizations designated in the management plan.</td><td>Placement of DADP-IA Guidelines</td></tr>
</table></td></tr>
<tr><td>(6) Required Cost</td><td>US$ 830 thousand</td></tr>
<tr><td>(7) Executing Agency</td><td>Division of Irrigation and Technical Services, MAFS</td></tr>
<tr><td>(8) Implementation Schedule</td><td>One year for study and implementation of the Programme (July 2004 – June 2005)</td></tr>
</table>

(9) Assessment of Possible Problems and Bottlenecks in Implementation	At this moment special attention should be given to small-scale irrigation schemes with a view to introduce a variety of simple technologies. However, in some cases, simple and low-cost irrigation may not be always sustainable, therefore it should make sure of the applicability and sustainability of introduced irrigation technology under the qualified technical support from the DITS of MAFS. Farmers sometimes do not require implementation of an irrigation scheme, but ask for technical support for their irrigation practices without any facility construction. Also farmers do not desire to make their
	irrigation development as merely a single small-scale irrigation scheme, but desire to fulfill the integrated irrigation development involving other sub-sector works. Upon preparing DADP in irrigation development, LGA's staff should consider these farmers' desires, not being biased toward creation of solely a district manageable small-scale irrigation scheme.
(10) Special Arrangements	Working Group 2 under TF-1 of DADP preparation has worked to formulate proper modality of irrigation development, especially concerning DADP formulation. The programme should be made in the light of the progress of their work.

7.2.17 D2: Technical Manuals Handling Guidelines Establishment Programme

(1) Title of Programme	Technical Manuals Handling Guidelines Establishment Programme (Code No.D2)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish a teaching source for properly handling all technical references and information that are definitely important for improving and heightening irrigation technology. Formerly, technical manuals for engineering in irrigation had been prepared by the MAFS. However, it was not satisfactorily used due to improper handling and managing. Technical information and knowledge are essential for making capacity building for persons relevant to irrigation development. In order to provide necessary technical information and knowledge, establishment of practical 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 guidelines to be prepared in this programme are to provide important skills for proper management and handling of technical manuals and guidelines. Through appropriate application of the guidelines, it is expected to attain the overall objectives of NIMP.

(4) Programme Description	In accordance with the findings 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 these findings. However, after the completion of those guidelines, it should be avoided to leave the guidelines unused or to be lost without purpose or to leave them un-revised when needing updating. It can be said that the manner of handling the technical guidelines directly results in success or failure of improving and heightening irrigation technology, which is essential for irrigation development. Technical Manuals Handling Guidelines to be prepared under this programme are to instruct how to utilize the technical manuals concerned, how to keep them, how to maintain them, and how to revise when the current version is revised.
(5) Contents of Programme	The proposed contents of the Guidelines are as follows: **Table of Contents** 1 Introduction 2 Technical information and manuals 2.1 Technical references 2.2 Technical reports 2.3 News on irrigation 2.4 Survey and investigation guidelines 2.5 Planning guidelines 2.6 Designing guidelines 2.7 O&M guidelines 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 for distribution 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 for technical manuals 6.1 Need of monitoring of technical manuals 6.2 Monitoring system 6.3 Reflection of monitored results to updating 6.4 Maintenance of monitoring system ANNEX
(6) Required Cost	US$ 180 thousand
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS

(8) Implementation Schedule	Six months for study and implementation of the Programme (January 2005 – June 2005)
(9) Assessment of Possible Problems and Bottlenecks in Implementation	Preparation of technical manual handling guidelines 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 kept and used properly. After preparation of these guidelines, it is proposed to give all concerned irrigation projects/programmes proper training on application of the guidelines. Also, efforts are required to popularize the general guidelines especially to LGAs' staffs concerned with irrigation development.
(10) Special Arrangements	The technical manual handling guidelines on irrigation are prepared targeting the Mainland and Zanzibar. The guidelines should be contrived to be convenient for both users in the Mainland and Zanzibar.

7.2.18 D3: Information and Database Improvement Programme

(1) Title of Programme	Information and Database Improvement Programme (Code No. D3)
(2) Location	Mainland and Zanzibar
(3) Objectives	This programme aims to establish or improve information systems and databases related to irrigation development. These are definitely necessary for monitoring the progress of irrigation development. Even now, useful and important information concerning irrigation development exists separately and is unknown to other persons. In order to make successful irrigation development, interdisciplinary information and data are required for many related fields. Irrigation potential maps prepared under the Master Plan study are a good example for indicating clear success of high-qualified utilization of existing data and information. Furthermore, it could be said that leaving useful data and information unused is a great loss of national assets. Through effective use of established databases concerning irrigation development, it is expected to attain the objectives of NIMP.
(4) Programme Description	The GOT has promoted the competent authorities of irrigation administration from the Irrigation Section to the Division of Irrigation and Technical Services (DITS). This fact provides clear proof that the GOT attaches great importance to irrigation development while LGAs' initiatives are to be encouraged more. One major mission of the DITS is 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. The programme is to contribute to this important DITS mission directly. The programme consists of three major significant tasks. The first important task is to properly design an information system and database that meet actual needs now and in the near future. The second important task is to establish a real information system and database as it is designed. Moreover, the third important task is to build up a reliable operation system, and update the established database on time, so that it

<table>
<tr><td></td><td colspan="2">is maintained appropriately. The programme should fulfill these important tasks successfully through procuring necessary equipment and assigning staffs, pursuing specified activities, and testing.

The requisites of the programme are to start the collection of data and information, and to compile them using the computer system. The data on progress of irrigation development in each District, shall be collected from the District Offices.</td></tr>
<tr><td>(5) Contents of Programme</td><td colspan="2">The proposed contents of the Programme are as follows:</td></tr>
<tr><td></td><td>Activities</td><td>Outcomes</td></tr>
<tr><td></td><td>1-1 To identify necessary kinds and modalities of databases to be required for the purpose of irrigation development and management.</td><td>Review note</td></tr>
<tr><td></td><td>1-2 To prepare all required kinds of databases so as to utilize necessary data or GIS information.</td><td>Several series of databases (e.g. scheme inventories, O&M condition of schemes, GIS data concerning irrigation development, personnel data of irrigation engineers and technicians, etc.)</td></tr>
<tr><td></td><td>2-1 To identify types of computer systems by which constructed databases are accessed.</td><td>Specification of computer systems</td></tr>
<tr><td></td><td>2-2 To prepare an operation manual for the databases so as to be operational for the identified computer systems.</td><td>Operation manual</td></tr>
<tr><td></td><td>3-1 To investigate possible resources to be mobilized for database up-dating under the present institutional conditions.</td><td>Investigation report</td></tr>
<tr><td></td><td>3-2 To make a cycle plan for updating databases by utilizing possible resources in MAFS.</td><td>Plan report</td></tr>
<tr><td>(6) Required Cost</td><td colspan="2">US$ 720 thousand</td></tr>
<tr><td>(7) Executing Agency</td><td colspan="2">Division of Irrigation and Technical Services, MAFS</td></tr>
<tr><td>(8) Implementation Schedule</td><td colspan="2">One and half years for study and implementation of the Programme (July 2004 – December 2005)</td></tr>
<tr><td>(9) Assessment of Possible Problems and Bottlenecks in Implementation</td><td colspan="2">New establishment of information systems and databases is required. Even though some databases have already been provided in some manner in implementation of previous projects/programmes, those are not related to each other and unknown to the public. After preparation of the proposed databases, 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 LGAs' staffs concerned with irrigation development.</td></tr>
<tr><td>(10) Special Arrangements</td><td colspan="2">The information systems and databases are established for the situation of the Mainland. However, it is useful even in Zanzibar. The databases should be contrived to be convenient for both the Mainland and Zanzibar.</td></tr>
</table>

7.2.19 E1.5: Environmental Assessment Study for Irrigation Practice in Tanzania

<table>
<tr><td>(1) Title of Programme</td><td colspan="2">Environmental Assessment Study for Irrigation Practice in Tanzania (Code No. E1.5)</td></tr>
<tr><td>(2) Location</td><td colspan="2">Mainland and Zanzibar</td></tr>
<tr><td>(3) Objectives</td><td colspan="2">This programme is to conduct an environmental assessment study to correctly justify causal relations between irrigation water use and environmental issues on water and land. Proper methods of irrigation management friendly to the natural environment are to be conceived. Through implementation of this programme, the possibilities and limitations of irrigation development could be delineated in the scope of the environment.

Appropriate application of the outcomes of the programme to the familiar schemes and enhancement of awareness of the importance of environmental conservation management in irrigation, are expected to contribute to attainment of the overall objectives of NIMP.</td></tr>
<tr><td>(4) Programme Description</td><td colspan="2">Irrigation water use may effect the natural environment in the vicinity of the irrigated site, because no irrigated area can be separated from surrounding environment in connection with a global hydrologic chain. Though some may cause obvious degradation in the environment, others do not lead to serious problems and are sometimes manageable without significant difficulties.

Recently, there has been 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. However those entertained doubts about environmental degradation, have been not justified scientifically in the right manner. Causal relation between irrigation water use and environmental issues are not yet confirmed.

An irrigation development that causes serious environmental degradation should be brought to a close. If environmental effects related to irrigation water use is conspicuous despite being manageable, such irrigation should be controlled in an adequate manner so as to suppress environmental hazards. In order to correctly justify causal relationships between irrigation water use and environmental issues, and to develop proper irrigation management technology affecting small environmental impacts, a comprehensive environmental assessment study for irrigation practice is to be implemented.

Implementation of the programme requires a number of specialists in various scientific fields related to the study scope, proper assignment of required specialists is important to the success of the programme.</td></tr>
<tr><td rowspan="2">(5) Contents of Programme</td><td colspan="2">The proposed contents of the Programme are as follows:</td></tr>
<tr><td>Activities</td><td>Outcomes</td></tr>
<tr><td colspan="2">1-1 To select study areas where substantial environmental issues related to the irrigated agriculture occur.</td><td>Study report (implied)</td></tr>
</table>

	1-2 To investigate the actual environmental situation of the study areas.	Study report (implied)
	1-3 To investigate the effects of irrigation practice in the environment.	Study report (implied)
	1-4 To clarify causes and mechanisms of the environmental issues	Study report (implied)
	2-1 To conceive countermeasures so as to avoid or lighten the environmental hazards.	Study report (implied)
	2-2 To devise procedures for the countermeasures to ensure that they are feasible.	Study report (implied)
	3. To formulate improvement measures to reverse the environmental deterioration that irrigators can deal with.	Study report (implied) Executive document
(6) Required Cost	US$ 900 thousand	
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS	
(8) Implementation Schedule	Two years for study and implementation of the Programme (July 2004 – June 2006)	
(9) 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 the real causal relation between irrigation and environmental phenomena. Proper specialists are to be assigned for the programme implementation, to provide any available data related to the study. Conservation of the environment is occasionally contradictory to development intention. However, concealment and distortion of facts identified in a development intention are strictly forbidden. To discover real causes is indispensable to establish sustainable irrigated agriculture systems.	
(10) Special Arrangements	This environmental programme is to be conducted in the Mainland. However outcomes of the programme which are in common with the natural conditions of Zanzibar should be contrived for Zanzibar.	

7.2.20 E1.6: Study of River-Basin Approach in Irrigation Development

<table>
<tr><td>(1) Title of Programme</td><td>Study of River-Basin Approach in Irrigation Development
(Code No. E1.6)</td></tr>
<tr><td>(2) Location</td><td>Mainland and Zanzibar</td></tr>
<tr><td>(3) Objectives</td><td>This programme is to conduct a planning study to correctly justify how to introduce river-basin approach for irrigation water users. And proper methods of irrigation development and management are to be conceived.

Water rights for irrigation are the roots of water management to be collaborated with other users in a river basin. The study will clarify routines 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 on the importance of river-basin management in irrigation, it is expected to attain the overall objectives of NIMP.</td></tr>
<tr><td>(4) Programme Description</td><td>No irrigated area could be separated from the surrounding environment in connection with a grave hydrologic chain. Generally such water environment could be delineated 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 consider such water balance in the unit of a river basin.

In Tanzania, a river-basin approach has been soundly endorsed since 1990’. A new water resources management system has been launched in accordance with the newly established National Water Policy on the assumption of applying a river-basin approach. On the course of new policy, every water user, needless to say, irrigation water users have to work to accommodate each other within the same river basin. Participation into water management and authorization obtaining water rights is essential for irrigation water users for their survival. This programme is to find a proper water management programme as a water user of irrigation under the condition of river-basin management.</td></tr>
<tr><td>(5) Contents of Programme</td><td>The proposed contents of the Programme are as follows:

<table>
<tr><th>Activities</th><th>Outcomes</th></tr>
<tr><td>1-1 To investigate the present situation of obtaining water rights for irrigators</td><td>Study report (implied)</td></tr>
<tr><td>1-2 To clarify difficulties and problems for obtaining water rights for irrigators</td><td>Study report (implied)</td></tr>
<tr><td>1-3 To devise systematic procedures to handle water rights easily for irrigators</td><td>Study report (implied)</td></tr>
</table>
</td></tr>
</table>

	2-1 To study technical skills to increase the amount of allowable water for irrigation	Study report (implied)
	3-1 To study technical skills to reduce irrigation water demand.	Study report (implied)
	4-1 To study proper organizational arrangement towards negotiation between water users.	Study report (implied)
	5-1 To prepare a guideline for the river basin approach for the irrigation sector.	Study report (implied) Guidelines for the river-basin management for the irrigation sector
(6) Required Cost	US$ 360 thousand	
(7) Executing Agency	Division of Irrigation and Technical Services, MAFS	
(8) Implementation Schedule	One year for study and implementation of the Programme (July 2004 – June 2005)	
(9) Assessment of Possible Problems and Bottlenecks in Implementation	River-basin management requires basin-wide data including data for other water users and diverse information on natural conditions for the corresponding river basin. In order to make this required data available, it is essential to establish a satisfactory cooperative relation among river-basin management offices and other water users. Efforts to build reliable cooperative relations with other relevant parties is need. Furthermore, self-awareness of irrigators on a sense of river-basin management is a starting point toward success of introduction of the river-basin management concept into the irrigation sector. Wide enlightenment of irrigators and farmers is also important. A legal entity composed of beneficiary farmers is very desirable as a proprietor of irrigation water rights rather than individual farmers. Therefore, proper organization of a legal entity of irrigators and the proper functioning of them are important preconditions for the successful management of water rights. Establishment of a legal entity of irrigators is indispensable even in this sense.	
(10) Special Arrangements	This programme intended for the introduction of river-basin management is to be conducted in the Mainland. Though scale of the river basins is rather small in Zanzibar, the manner of water management on a river-basin basis is applicable for Zanzibar.	

7.3 Action Plan for Model Irrigation Schemes

7.3.1 General

The Action Plan for the Model Irrigation Schemes is based on the site inspection and RRA, and is summarized in the Project Design Matrix (PDM) and the Project Proposal, which are shown in Appendix B.

7.3.2 Development Concept

The Action Plan for the Model Irrigation Schemes is prepared under the following concepts, which lead to technical self-reliance, financial self-reliance, and institutional/organizational strengthening, and finally to self-reliance of irrigation schemes.

Development Concept for 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.

7.3.3 Project Design Matrix (PDM)

(1) Overall Goal

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

(2) Project Purpose

The 'project purpose' is to ensure a stable irrigation water supply 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

Based on the results of the field investigation, the following three main 'outputs' were established:

(a) Capacity of IA management is strengthened.
(b) Irrigation infrastructures are rehabilitated or improved.
(c) Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced.

The 'objectively verifiable indicators' will be: (i) 80% or more farmers participate

in the maintenance work by the end of the project, (ii) rehabilitation is completed by the specified year, and (iii) 100% of committee members are trained for O&M by the end of the project. The scheme monitoring reports will be the 'means of verification'.

(4) Activities

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

Objectives and Activities

Objectives	Activities
(a) Capacity of IA management is strengthened.	- Raise farmers' awareness of the project implementation.
	- Re-organize the structure of the IA.
	- Enhance leadership of committee members.
	- Strengthen decision making of IA.
	- Prepare by-laws and regulations.
	- Enhance financial management capacity of the IA.
	- Promote registration of the IA.
(b) Irrigation infrastructures are rehabilitated or improved	- Conduct surveys and investigations with farmers' participation.
	- Carry out design works.
	- Make agreements on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works
	- Proceed with 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 of the project implementation.
(c) Skill of farmers for operation and maintenance of irrigation infrastructures is enhanced	- Prepare irrigation schedules and maintenance plans.
	- 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 GOT 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 as discussed in Sub-clause 6.4.6.

7.3.4 Kinyope Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Three villages, namely, Kinyope, Ruhoma and Myangara, Rutamba Ward, Lindi Rural District, Lindi Region</td></tr>
<tr><td>Scheme Area</td><td>480 ha</td><td>Nos. of Households</td><td>540</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure a stable water supply to the fields through strengthening of the capacity of IA management, rehabilitation / improvement of Irrigation infrastructures, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Intake weirs (13 ea.)
(b) Main irrigation canal (unlined, length of 20,000 m)</td><td colspan="2">(c) Secondary irrigation canal (unlined, length of 22,000 m)
(d) Turnouts (50 ea.)
(e) Farm ditches (length of 48,000 m)
(f) Drainage canal (length of 10,000 m)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 824 Million (US$ 775,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Lindi Rural District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.5 Magoma Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Two villages, namely, Makangara and Mkuajuni, Magoma Ward, Magoma Division, Korogwe District, Tanga Region</td></tr>
<tr><td>Scheme Area</td><td>250 ha</td><td>Nos. of Households</td><td>720 (Village population)</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure a stable water supply to the fields through the improvement of the existing traditional irrigation system, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Intake weir (1 site)
(b) Main irrigation canal (unlined, length of 10,000 m)
(c) Secondary irrigation canal (unlined, length of 11,000 m)</td><td colspan="2">(d) Drainage canal (length of 10,000 m)
(e) Turnout with intake ponds for treadle pump use (20 nos.)
(f) Partial flood dike (length of 2,000 m)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 767 Million (US$ 721,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Korogwe District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.6 Pawaga Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Six villages, namely, Itunundu, Kimande, Kisanga, Isele, Ndolea and Kisoloka, Itunundu Ward, Iringa Rural District, Iringa Region</td></tr>
<tr><td>Scheme Area</td><td>2,000 ha</td><td>Nos. of Households</td><td>1,477</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure a stable water supply to the fields through further rehabilitation of the existing traditional irrigation scheme and once improved, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Remodeling of gabion weir (1 site)
(b) Silt extractor installation in the diversion canal (1 site)
(c) Remodeling of irrigation channels (unlined, length of 10,400 m)</td><td colspan="2">(d) Construction of division structures (6 ea.)
(e) Construction of drainage canals (length of 10,000 m)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 3,104 Million (US$ 2,921,000)</td><td>Project Period</td><td>Four and half years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Iringa Rural District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.7 Musa Mwinjanga Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Mijongweni village, Machame South Ward, Hai District, Kilimanjaro Region</td></tr>
<tr><td>Scheme Area</td><td>676 ha</td><td>Nos. of Households</td><td>600</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure a stable water supply to the fields through further rehabilitation of the existing traditional irrigation scheme and once improved, strengthening of the capacity of the IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of the Capacity of the IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulations.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Reconstruction of intake weir (1 site)
(b) Partly remodeling of canal alignment (length of 8,000 m)</td><td colspan="2">(c) Improvement of division structures (12 nos.)
(d) Construction of drainage canal (length of 6,000 m)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 795 Million (US$ 748,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Hai District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.8 Mgongola Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Three villages, namely, Mkindo, Dihombo and Hembeti, Hembeti Ward, Morogoro Rural District, Morogoro Region.</td></tr>
<tr><td>Scheme Area</td><td>620 ha</td><td>Nos. of Households</td><td>578</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure a stable water supply to the existing pilot model project (Mkindo Pilot Project) and the surrounding areas through improvement of existing irrigation facilities and provision of an irrigation and drainage system, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Remodeling of intake weir (1 site)
(b) Remodeling of diversion canal (unlined, 1,200 m)
(c) Construction of main irrigation canal (unlined, 2,400 m)</td><td colspan="2">(d) Construction of secondary irrigation canal (unlined, 19,100 m)
(e) Construction of drainage canal (13,100 m)
(f) Construction of flood dike (9,800 m)
(g) Construction of related structures (Lump Sum)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 1,913 Million (US$ 1,799,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Morogoro Rural District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.9 Lower Moshi Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Six villages, namely, Mabogini, Rau Ya Kati, Chekereni, Oria, Mandaka Mnono and Kaloleni, Moshi Rural District, Kilimanjaro Region</td></tr>
<tr><td>Scheme Area</td><td>1,560 ha</td><td>Nos. of Households</td><td>3,500 (Village population)</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to achieve equitable water use in the upstream area (Expanded Area) and the downstream area (Existing Lower Moshi Area) through strengthening water management.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Existing Lower Moshi Project (1,100 ha paddy field only)
- Rehabilitation of two intake weirs (intake/scouring sluice gates): 4 ea.
- Repairing of canal lining : Lump Sum
- Repairing of drains: Lump Sum
- Repairing of related structures: Lump Sum</td><td colspan="2">(b) Expanded Area (460 ha in total)
- Construction of intake facilities: 8 ea.
- Improvement of existing canals: 26 km
- Construction of drains: 21 km
- Rehabilitation/construction of farm roads: 30 km
- Construction of related structures: 244 ea.
- Construction of flood dike: 16 km</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 2,999 Million (US$ 2,821,000)</td><td>Project Period</td><td>Three and a half years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Moshi Rural District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.10 Kisese Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Four villages, namely, Kisese-Sauna, Kisese-Disa, Mapinduzi and Madisa, Kisese Ward, Kondoa District, Dodoma Region.</td></tr>
<tr><td>Scheme Area</td><td>50 ha</td><td>Nos. of Households</td><td>1,585 (Village population)</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water by a river basin wide water harvesting development scheme, strengthening of capacity of IA Management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Intake weirs (3 sites)
(b) Irrigation canal (unlined, length of 17,900 m)</td><td colspan="2">(c) Storage reservoir (1 site with capacity of 2,60 m3)
(d) Drainage canal (length of 8,000 m)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 325 Million (US$ 306,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Kondoa District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.11 Pamila Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Pamila Village, Kigoma Rural District, Kigoma Region</td></tr>
<tr><td>Scheme Area</td><td>30 ha</td><td>Nos. of Households</td><td>671 (Village population)</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure necessary irrigation water by applying new water harvesting methods using flood water, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Construction of farm-bunds (totally 30 ha)
(b) Construction of drainage canal (length of 1,300 m)</td><td colspan="2">(c) Construction of farm-passes (length of 2,500 m)
(d) Procuring of equipment for verifying the new water harvesting method (L.S.)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 40 Million (US$ 38,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Kigoma Rural District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.12 Nkenge Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Mbale Village, Kitobo Ward, Kiziba Division, Bukoba District, Kagera Region.</td></tr>
<tr><td>Scheme Area</td><td>32 ha</td><td>Nos. of Households</td><td>1,616 (Village Population)</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water through rehabilitation of the existing failed pump irrigation scheme, strengthening of capacity of IA management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Remodeling pump house and related intake facilities (1 site)
(b) Installation of pump and its accessories (1 set)
(c) Reconstruction of irrigation canal (unlined, length of 2,100 m)</td><td colspan="2">(d) Reconstruction of drainage canal (length of 1,600 m)
(e) Construction of small dam (1 site)
(f) Diversion canal related to the small dam reservoir (length of 1,500 m)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 133 Million (US$125,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Bukoba District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

7.3.13 Luchili-Nyakasungwa Irrigation Scheme

<table>
<tr><td>Location</td><td colspan="3">Two villages, namely, Luchili and Nyakasungwa, Sengerema Ward, Sengerema District, Mwanza Region</td></tr>
<tr><td>Scheme Area</td><td>21 ha</td><td>Nos. of Households</td><td>62</td></tr>
<tr><td colspan="4">Objectives :
The object of the scheme is to ensure irrigation water through rehabilitation of the existing pump irrigation scheme, strengthening of capacity of IA Management, and enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.</td></tr>
<tr><td colspan="2">Activities :
1. Strengthening of Capacity of IA Management
1-1 Farmers' awareness of the project implementation.
1-2 Re-organization of IA structure
1-3 Enhancement of leadership of committee members.
1-4 Strengthening of decision making of IA.
1-5 Preparation of by-laws and regulation.
1-6 Enhancement of financial management capacity of IA.
1-7 Promotion of IA registration.
2. Rehabilitation / improvement of Irrigation infrastructures
2-1 Survey and investigation with farmers' participation.
2-2 Design works.
2-3 Agreement on the project implementation including components of rehabilitation / improvement works and farmers' contribution to the works.</td><td colspan="2">2-4 Pre-implementation activities including tendering and its evaluation.
2-5 Construction of irrigation infrastructures with farmers' participation.
2-6 Turn-over process for O&M of completed irrigation facilities to IA.
3. Enhancement of farmers' skill for operation and maintenance of irrigation infrastructures.
3-1 Preparation of irrigation schedule and maintenance plan.
3-2 Water distribution.
3-3 Maintenance works.
3-4 Enhancements of skills to mediate and resolve water disputes among members and with outside people.
3-5 Monitoring of irrigation performance of the scheme.</td></tr>
<tr><td colspan="2">Irrigation Development Plan:
(a) Remodeling of pump system (1 site)
(b) Re-installation of pump facilities (1 set)</td><td colspan="2">(c) Replacement of delivery pipe (length of 1,890 m)
(d) Repair of existing canal system (L.S.)</td></tr>
<tr><td colspan="2">Input : Donor
1 Training Cost
2 Rehabilitation / Improvement cost
3 Vehicle & Equipment Cost
4 Engineering Service Cost</td><td colspan="2">Input : Tanzanian side
1 Manpower (District Office, Zonal Irrigation Office)
2 Recurrent cost for scheme implementation
3 Farmers' contribution to planning and scheme rehabilitation / improvement.</td></tr>
<tr><td>Required Cost</td><td>Tsh. 210 Million (US$ 198,000)</td><td>Project Period</td><td>Three years for survey, plan, construction, training and follow-up.</td></tr>
<tr><td>Executing Agencies</td><td colspan="3">Sengerama District Office</td></tr>
<tr><td colspan="4">Project Benefits :
1 Capacity of district staff for survey, investigation, planning, and design for irrigation development projects should be strengthened.
2 Project implementation procedure promoting farmers' participation under decentralization should be established.
3 Process to strengthen IA including capacity building programme for farmers should be standardized.</td></tr>
</table>

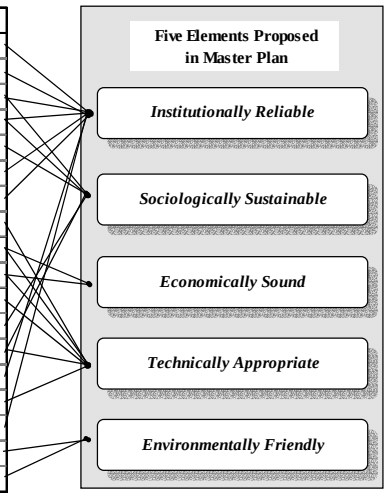
7.4 Implementation Plan

7.4.1 Priority Programmes of the Subject-wise Improvement Programme

As mentioned above, 18 Priority Programmes were selected from 40 Programmes of the Subject-wise Improvement Programme taking into consideration the strategies for the Short Term of Development Programme and current progress of ASDP implementation. The programmes of these selected 18 Priority Programmes are conceived from *Economically Sound, Technically Appropriate, Sociologically Sustainable*, *Environmentally Friendly* and *Institutionally Reliable* viewpoints.

Relation between Prority Components and Five Elements

Code	Subject-wise Improvement Programme in Action Plan
A1	DITS Institutional Improvement Prigramme
A2	LGA Institutional Strengthening Programme for Irrigation Development
A3-1	New Legal Framework for WUA Establishment Study Programme
A3-2	IA Organizing and Registration Support Manual
A3-3	IA Management Training for Farmers
B1	Regularzation of Irrigation Administration and DITS Working Mandate Formulation Programme
B2	Contract Management System Improvement Programme
C1	Survey and Investigation Guideline Establishment Programme
C2.1	Planning Guideline Establishment Programme
C2.2	Designing Guideline Establishment Programme
C3.1	O & M Guideline Establishment Programme
C4	Farmers' Participation in Irrigation Development Programme
C5	Village Irrigation Development Guideline Establishment Programme
C7	Establishment of DADP Formulation Guideline for Irrigated Agriculture Development
D2	Technical Manuals Handling Guideline Establishment Programme
D3	Information and Database Improvement Programme
E1.5	Environmental Assessment Study for Irrigation Practice in Tanzania
E1.6	Study of River-Basin Approach in Irrigation Development



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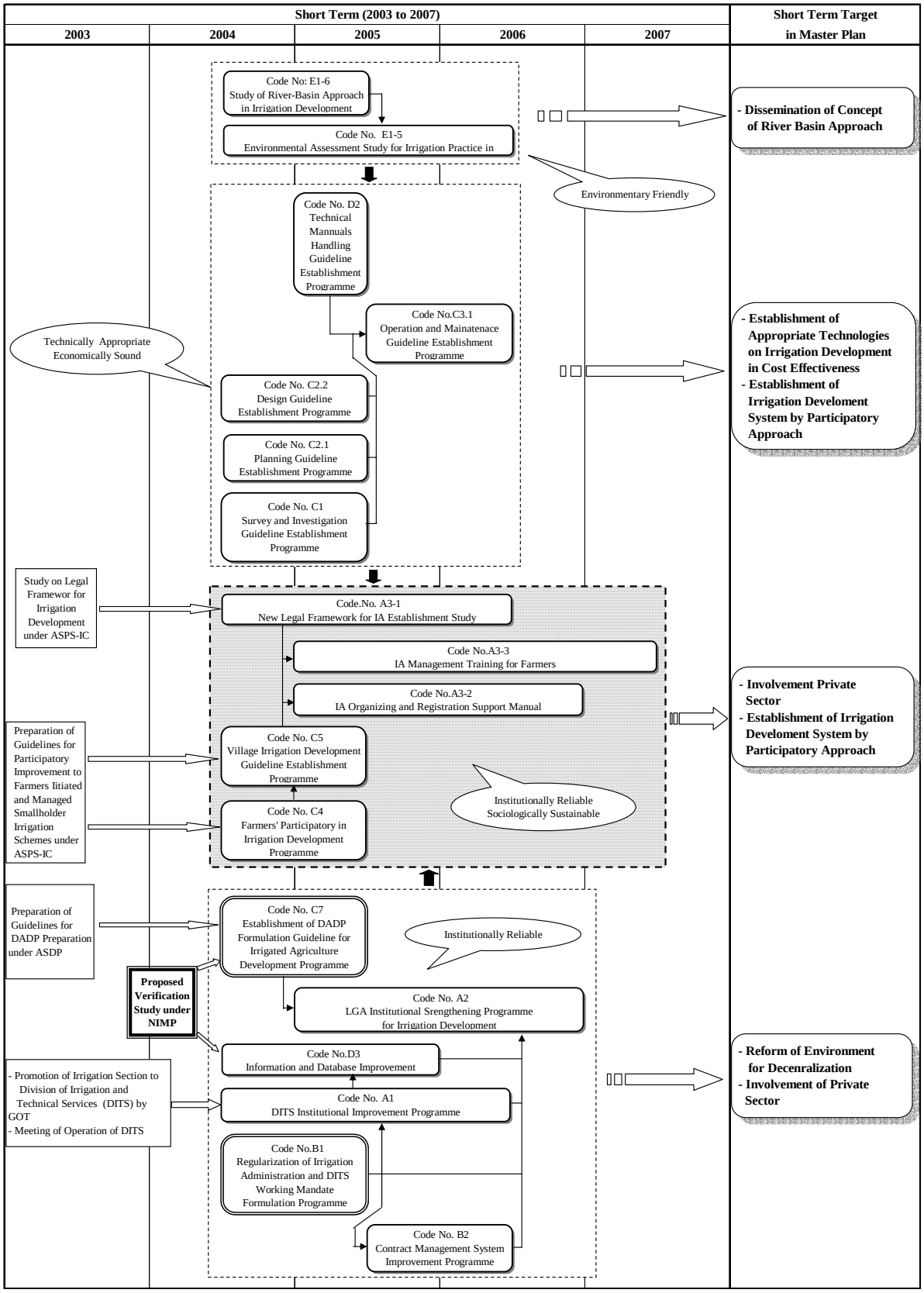
The implementation plan for them was worked out focusing on (i) commencement of the fiscal year when new budget is available, (ii) relation of on-going and completed programmes closely related to them, and (iii) IA as the main actor for irrigation development. The plan also shows the relation between the components and the proposed Verification Study to be conducted later. The plan is illustrated on the next page, and shown in Figure 7.4.1.

Illustrated Implementation Plan of Prioriry Programmes of Subject-wise Improvement Programme



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

The implementation plan for the Scheme-wise Improvement Plan in the Short Term was prepared on the regional area basis. The plan also shows the development area for the three irrigation types (i) rehabilitation of traditional irrigation schemes, (ii) water harvesting schemes, and (iii) new smallholder irrigation schemes.

Accumulated Irrigation Development Area on Regional Area Basis

Unit: ha

Region	by 2002*	Short Term (2003 - 2007)					
		2003	2004	2005	2006	2007	
Arusha	51,186	51,374	51,383	51,541	51,625	53,825	
Coast	1,133	3,085	3,380	3,380	3,380	5,380	*300,000 ha*
Dar es Salaam	4	4	4	4	4	4	
Dodoma	4,313	4,313	4,313	4,313	4,313	4,313	*290,000 ha*
Iringa	6,306	6,424	6,424	6,424	6,424	6,424	
Kagera	15	15	15	15	15	15	*280,000 ha*
Kigoma	4,800	4,800	4,800	4,800	4,800	5,800	
Kilimanjaro	45,738	46,548	46,738	47,428	49,038	49,448	*270,000 ha*
Lindi	1,406	1,406	4,206	4,206	4,206	8,264	
Mara	611	661	661	661	661	2,351	*260,000 ha*
Mbeya	35,249	35,249	35,249	36,189	39,289	39,289	
Morogoro	25,144	28,921	30,806	32,496	34,856	35,546	*250,000 ha*
Mtwara	2,690	2,690	2,690	2,690	2,690	3,690	
Mwanza	1,108	6,865	9,365	10,152	11,702	11,922	*240,000 ha*
Rukuwa	5,236	6,436	7,936	8,306	8,606	8,606	
Ruvuma	198	198	198	198	433	433	*230,000 ha*
Shinyanga	2,500	4,000	6,100	6,500	8,500	10,100	
Singida	2,055	2,655	3,155	5,195	5,195	5,195	*220,000 ha*
Tabora	3,121	3,121	3,121	3,121	3,121	3,121	
Tanga	8,626	8,876	8,876	11,476	11,500	11,500	*200,000 ha*
Total	201,439	217,641	229,420	239,095	250,358	265,226	
Development Area to be Increased		16,202	11,779	9,675	11,263	14,868	
For Irrigatition Tyepe							
Rehabilitation of Traditional Schemes	152,103	155,703	161,682	167,717	173,610	179,778	
Development Area to be Increased		3,600	5,979	6,035	5,893	6,168	
Water harvesting Schemes	13,489	21,389	27,189	30,829	36,199	41,619	
Development Area to be Increased		7,900	5,800	3,640	5,370	5,420	
New Smallholder Schemes	35,847	40,549	40,549	40,549	40,549	43,829	
Development Area to be Increased		4,702	0	0	0	3,280	

Source: Master Plan Report prepared by JICA Study Team in 2002.

Note:

** : Developed Area (191,900 ha by 2001) + Developed Area under On- going Project in 2002*

CHAPTER 8 RECOMMENDATIONS

8.1 General

As the results of the Action Plan study and the Master Plan study, 18 Priority Programmes and ten Model Irrigation Schemes were selected from 40 programmes of the Subject-wise Improvement Programme and 626 irrigation schemes of the Scheme-wise Development Programme. Then the Action Plan for them was worked out based on the results of analysis on problems and constraints obtained through PCM, RRA, site inspection and review on reference reports. From the Action Plan proposed, especially the implementation plan attached, urgent commencement of the following issues is recommendable:

8.2 Support on the Irrigation Scheme Formation Process in DADP

The support on the irrigation scheme formation process in DADP is urgently required for the successful irrigation development from the following reasons:

(1) In line with the decentralization policy, many duties and rights are gradually transferred from the Central Government to the LGAs. In the ASDP implementation, a focus was thus put on the DADP, and the first one was prepared by each District Office and submitted to the ICC in March 2003. Many irrigation schemes are included in the DADPs, and the irrigation development will be duly started based on the DADPs. The appropriate irrigation development plan should be proposed in DADPs.

(2) The success of an irrigation development largely depends upon good performances in the project cycle, such as good planning, good designing, good construction, and good O & M. In these consecutive performances, the planning of irrigation schemes including selection of appropriate irrigation schemes is the most fundamental activity as a starting point toward successful implementation of them. The good planning of irrigation schemes should be therefore made in DADP.

(3) The site inspection for many irrigation schemes with existing development plans in hand and the discussions with district staff on DADPs, indicated that the development plans of irrigation schemes were not clear, especially from technical and economical viewpoints, and also there was no definite criteria on selection of appropriate irrigation schemes. To improve this situation, it is recommended that the practical guidelines on the proper process of scheme formation should be prepared and also capacity building should be provided for district staff concerned.

(4) Presently, the Central Government keeps basic data and information such as

results of inventory surveys, topographic maps and current conditions of irrigation development that are very useful for proper planning of irrigation schemes for District Offices. To further this end, it is recommended that a simple data base system should be established at the Monitoring Unit of DITS of MAFS, to support the District Offices for irrigation scheme formation.

8.3 Strengthening of IA

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

In this connection, the ASPS has started the study on improvement of legal framework for irrigation development, aiming to provide an appropriate, comprehensive and coherent legal framework for irrigation development based on the results of an in-depth review of the existing legal framework. It is expected that a final report will be available early in August 2003.

Taking into consideration the above, it is recommended that the MAFS should launch the IA Strengthening Programme as well as improvement of legal framework based on the ASPS report, to establish viable IAs, which are indispensable for sustainable irrigation development.

8.4 Promotion of Farmers' Managed Irrigation Scheme Development

The Master Plan delineates the development scenario by 2017, with a target of accumulated irrigation development areas of 405,000 ha by 2017. In order to fulfill this target, irrigation development should be carried out steadily, putting a priority on rehabilitation schemes, water harvesting schemes and smallholder irrigation schemes. As for the size of irrigation schemes, the Master Plan does not give any limitation from the viewpoint of effective use of national resources and considering the food shortage due to the rapid increase of population. In general, however, the large-scale irrigation scheme, which is more than about 500 ha as discussed with the MAFS staff, requires more complicated activities on operation, maintenance and management, and needs a certain amount of time for creating the proper environment for its successful implementation. While, the small-scale irrigation schemes, especially farmers' managed irrigation schemes could be easily managed by farmers themselves under less support by the GOT. It is therefore recommended

that the farmers' managed irrigation schemes should be given a priority of urgent implementation, to approach the said target as closely as possible.

As discussed in the Master Plan, irrigation is an essential tool for stabilization of agricultural production and a catalyst to create suitable circumstances for enhancing the agricultural production. It is thus proposed to apply the comprehensive approach to implementation of the farmers' managed irrigation schemes with cooperation from other sub-sectors such as agricultural inputs, extension services, marketing and micro-finance, to enhance the respective effects on agricultural production and finally to ensure a dependable financial source for operation and maintenance activities.

Tables

Table 4.4.1 Salient Features of Each Scheme (1/2)

Item	Kinyope	Magoma	Pawaga	Musa Mwinjanga	Mgongola
Project Title	Kinyope Irrigation Scheme	Magoma Irrigation Scheme	Pawaga Irrigation Scheme	Musa Mwinjanga Irrigation Scheme	Mgongola Irrigation Scheme
Scheme Category	Traditional Irrigation	Traditional Irrigation	Improved Traditional Irrigation	Improved Traditional Scheme	Modern Irrigation
Project Area	480 ha. ; Kimyope, Ruhoma and Myangara villages	300 ha : Makangara and Mkuajuni villages	2,000 ha : Itunundu, Kimande, Kisanga, Isele, Ndolea and Kisoloka villages	676 ha : Mijongweni villages	620 ha. : Mkindo, Dihombo and Hembeti villages
Water Source	Milola river	Lwengera river	Little Ruaha river	Weruweru river	Mkindo river
Available Discharge	Maximum discharge : 35 m3/sec Minimum discharge : 1 m3/sec	Average discharge : 3.6 m^3/sec	Average (intake discharge) : 4 m^3/sec	Maximum: 3.58 m^3/sec Minimum: 0.57 m3/sec	Approximate 0.6 m^3/sec
Applied Crop	Rice (4.5 ton/ha.)	Rice (5.5 ton/ha.)	Rice (4.5 ton/ha.)	Rice (5.0 ton/ha.)	Rice (5.5 ton/ha.)
Cropping Intensity	175%	100%	100%	200%	150%
Remarks	Total number of farmers related to the project is estimated at at 1,434 for 186 households. While presently about 400 ha is irrigated, about 480 ha is supposed to be potential irrigable. Besides irrigated 400 ha for paddy, about 5 ha is used for tomato	Total number of farmers households related to the scheme is approximated at 300 lived within the both villages. Presently about 100 ha of lowlands cultivate paddy supplying irrigation water from the Lwengera river during dry season, avoiding periodic flo	The Project was formulated to phase in three stages. First phase of the Project is to regain the existing irrigation system relating to the old river course of Little Ruaha by means of construction of intake weir (Mlenge Diversion Weir) and diversion can	Total number of farmers related to the project is approximated at 600. Though the preliminary design of the main drain in the scheme area was carried out in 1990 by FAO, no construction of any drainage system has ever being implemented.	Total number of farmers for the project is estimated at about 1,700, some of whom are belonging in the present water users association of Mkindo Pilot Scheme. Project area of 620 ha was demarcated by the limitation of availability of river water in dry se
Existing Development Plan prepared by Government	Remodeling of existing weirs Integration of several existing weirs Rehabilitation/construction of main and lateral canals with inspection roads Construction of farm ditches Training of IAs	Construction of the main diversion weir Construction of canal system Construction of drainage system Construction of flood protection dike Improvement of existing extension advisory services	Remodeling of Wlenge Diversion Weir Improvement of diversion canal including installation of 6 silt excluder Remodeling irrigation canal Construction of drainage canal Reforming of existing IAs Training of IAs	Rehabilitation/remodeling of damaged facilities Establishment of water management rule Strengthening of exiting IA	Construction of main canal :3.8 km Construction of secondary canal : 6.8 km Construction of tertiary canal : 12.3 km Construction of drainage canal : 13.1 km Construction of flood protection dike : 10.2 km Construction of farm road : 9.5 km

Source: JICA Study Team

Table 4.4.1 Salient Features of Each Scheme (2/2)

Item	Lower Moshi	Kisese	Pamila	Nkenge	Luchili-Nyakasungwa
Project Title	Water Management Strengthening Scheme	Kisese Irrigation Scheme	Pamila Irrigation Scheme	Nkenge Irrigation Scheme	Linyuni Irrigation Scheme
Scheme Category	Modern Irrigation	Water Harvesting	Water Harvesting	Pump Irrigation	Pump Irrigation
Project Area	1,560ha. ; Kaloleni, Mandaka Mnono, Mabogini, Rau Ya Kati, Chekereni	2,000 ha. : Kisese-Sauna, Kisese-Disa, Mapinduzi and Madisa villages	30 ha : Pamila village	32 ha : Mbale village	20.5 ha. :Luchili and Nyakasungwa villages
Water Source	Njoro and Rau rivers, and springs	Kisese river (3 springs in upstream)	Nyankara stream	Ngono river	Lake Victoria
Available Discharge	Mwanagnguruwe: 300 lit./sec, Njoro river : 1.41m3/sec. Rau river : 2.82 m3/sec	Average intake discharge : 0.07 – 0.12 m3/sec (dry season)	Maximum: 1.0 m^3/sec Minimum: 0 m3/sec	Minimum discharge : 2 m^3/sec	-
Applied Crop	Rice (6.0 - 6.5 ton/ha.)	Vegetables	Rice (4.5 ton/ha.)	Rice (4.5 ton/ha.)	Rice (4.5 ton/ha.)
Cropping Intensity	100%	200%	100%	200%	200%
Remarks	The Project aims to strengthen the water management for the Existing Lower Moshi Area and Expanded Area, to realize effective use of limited water sources, say public property. For this, the Expanded Area should be provided with the irrigation and draina	In the upstream of the river, about 20 ha has been irrigated taking water from the river by traditional dikes. The proposal is to cover possible maximum area within the project area. However, 2,000 ha is far big against possible discharge of springs.	The discharge of Nyankara stream much depends on rainfall, and generally can supply irrigation water to fields in rainy season although being far from appropriate quantity in irrigation. Farmers organized an irrigators' group by themselves, and constructe	The Scheme was constructed as pilot project in the Ngono river basin under support by CEBEMO (Dutch Catholic Organization) in 1979. The Scheme was operated by the government intervention by 1989. In 1990, however, the government/CEBEMO withdrew the financ	Total number of farmers for the project is estimated at 62 households. Presently the area is not irrigated because of damages of the irrigation facilities. Therefore, the IA is suspended in its operation practically.
Existing Development Plan prepared by Government	Existing Lower Moshi Area (1,100 ha) Rehabilitation of two intake weirs Repairing of canal lining Repairing of drains Repairing of related structures Expanded Area (560ha) Construction f intake facilities : 8 nos. Improvement of existing canals: 26 km Construction of drains : 21 km Rehabilitation/construction of roads : 30 km Construction of related structures : 244 nos. Construction of flood dike : 16 km	Construction of intake structures at springs Night storage reservoir: 2,160 m3 Main canal : 17.9 km	Construction of intake weirs Improvement of existing canals Construction of lateral canals Construction of drains Construction of farm roads Organization of IA Training of farmers	Short-term Plan Installation of pump Rehabilitation of irrigation and drainage system and farm roads covering 32ha. Rehabilitation of buildings Rehabilitation of meteorological station Capacity building of farmers Long-term Plan Expansion of irrigable area to 1,300ha Training of farmers from other areas Maximization of crop production (paddy, maize, and vegetables)	Construction of dam Construction of irrigation canal system Construction of drainage canal system Construction of farm roads Organization of IA Training of IA

Source: JICA Study Team

Figures

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

Japan International Cooperation Agency

Figure 6.2.1
Provisional Implementation Process of Small-Irrigation Scheme

Code No.		Programme Title	Required Period (Years)	Short Term Reform					Medium Term Decentralization					Long Term Self-reliance					Remarks
				2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	
A1		**DITS Institutional Improvement Programme**	**2.0**																Promotion of IS to DITS
A2		**LGA Institutional Strengthening Programme for Irrigation Development**	**2.0**																
	A3-1	**New Legal Framework for IA Establishment Study**	**2.0**																Refer to ASPS-IC
A3	**A3-2**	**IA Organizing and Registration Support Manual**	**2.0**																
	A3-3	**IA Management Training for Farmers**	**2.5**																
B1		**Regularization of Irrigation Administration and DITS Woking Mandate Formulation Pro**	**1.0**																
B2		**Contract Management System Improvement Programme**	**1.0**																
B3		Regulatory Networking System Establishment between LGAs and IS	1.0																
B4		NGOs' Intervention in Irrigation Development Encourage Programme	1.0																
B5		Cooperation Channeling within Irrigation-Sector Establishment Programme	1.0																
B6		Sub-sectors Coordination System Establishment	1.0																
C1		**Survey and Investigation Guideline Establishment Programme**	**1.0**																
C2	**C2-1**	**Planning Guideline Establishment Programme**	**1.0**																
	C2-2	**Design Guideline Establishment Programme**	**1.0**																
C3	**C3-1**	**O&M Guideline Establishment Programme**	**1.0**																
	C3-2	Monitoring & Evaluation Guideline Establishment Programme	1.0																
C4		**Farmers' Participation in Irrigation Development Programme**	**1.0**																Refer to ASPS-IC
C5		**Village Irrigation Development Guideline Establishment Programme**	**1.0**																Refer to ASPS-IC
C6		Farmers' O&M Manual Establishment Programme	1.0																
C7		**Establishment of DADP Formulation Guideline for Irrigated Agriculture Development**	**1.0**																Refer to DADP Guidelines
D1		Web-site and Networking Establishment Programme	1.0																
D2		**Technical Manuals Handling Guideline Establishment Programme**	**0.5**																
D3		**Information and Database Improvement Programme**	**1.5**																
D4		Irrigation Development Contractors and Consultants' Listing Programme	1.0																
D5		LGAs' Data Organization Programme	1.5																
D6		LGA Networking System Establishment Programme	1.0																
D7		Existing-scheme Monitoring System Establishment Programme	3.0																
E1	E1-1	Irrigation Technology Research Center Establishment Programme	2.0																
	E1-2	Perennial Irrigation Method Improvement Programme	1.5																
	E1-3	Flood Irrigation Development Programme	2.0																
	E1-4	Small Dam Technology for Irrigation Development Establishment Programme	2.0																
	E1-5	**Environmental Assessment Study for Irrigation Practice in Tanzania**	**2.0**																
	E1-6	**Study of River-Basin Approach in Irrigation Development**	**1.0**																
E2		Hydraulic Experimental Center Establishment Programme	2.5																
E3		IS's Equipment Management Programme	1.5																
E4		Irrigation Development Contractors and Contractors' Training Programme	1.5																
E5		Farmers' Participation Training Programme	1.0																
E6	E6-1	Irrigated Agriculture Training Programme for Rice Production Increase	5.0																Started by JICA-KATC
	E6-2	Irrigated Agriculture Training Programme for Cash Crops Production Increase	3.0																
E7		Integrated Irrigation Development Model establishment Programme	3.0																

Note: ■ *: Priority Programmes* □ *: Other Programmes*

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

Japan International Cooperation Agency

Figure 7.4.1
Implementation Plan for Subject-wise Improvement Programme

Attachment 1

Minutes of Meeting for the Study

MINUTES OF MEETINGS

FOR

THE STUDY

ON

THE NATIONAL IRRIGATION MASTER PLAN

IN

THE UNITED REPUBLIC OF TANZANIA

AGREED UPON BETWEEN

THE MINISTRY OF AGRICULTURE AND FOOD SECURITY

THE UNITED REPUBLIC OF TANZANIA

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Dar Es Salaam, 10, April, 2001

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

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

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

1. Title of the Study

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

2. Undertakings

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

3. Counterpart Agency

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

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

4. Target Year

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

5. Steering Committee

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

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

6. Counterpart Personnel

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

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

7. Counterpart Training in Japan

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

8. Workshop/Stakeholder Meeting

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

9. Data Base

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

ANNEX 1

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

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

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

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

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

(C) List of the Preparatory Study Team, JICA

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

LIST OF PROPOSED COUNTERPART PERSONNEL

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

Attachment 2

Scope of Work and

Minutes of Meetings for the Study

SCOPE OF WORK

FOR

THE STUDY

ON

THE NATIONAL IRRIGATION MASTER PLAN

IN

THE UNITED REPUBLIC OF TANZANIA

AGREED UPON BETWEEN

THE MINISTRY OF AGRICULTURE AND FOOD SECURITY

THE UNITED REPUBLIC OF TANZANIA

AND

THE JAPAN INTERNATIONAL COOPERATION AGENCY

Dar Es Salaam, 10, April, 2001

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

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

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

I. INTRODUCTION

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

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

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

II. OBJECTIVES OF THE STUDY

The objectives of the Study are as follows:

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

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

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

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

III. STUDY AREA

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

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

IV. SCOPE OF THE STUDY

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

4.1 Phase 1

4.1.1 Data collection

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

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

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

4.1.2 Formulation of the Master Plan

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

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

4.2 Phase 2

4.2.1 Formulation of the Implementation Plan.

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

4.3 Phase 3

4.3.1 Implementation of Verification Study.

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

V. STUDY SCHEDULE

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

VI. REPORTS

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

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

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

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

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

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

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

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

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

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

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

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

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

Tanzanian side shall submit the comments on each Report at the

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

VII. UNDERTAKING OF THE GOT

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

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

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

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

(iv) To exempt the members of the Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Study Team for their services in connection with the implementation of the Study;

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

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

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

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

7.2 The GOT shall bear claims, if any arises, against members of the Study Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Study Team.

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

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

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

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

(ii) Counterpart personnel,

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

(iv) Credentials or identification cards.

VIII. UNDERTAKING OF JICA

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

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

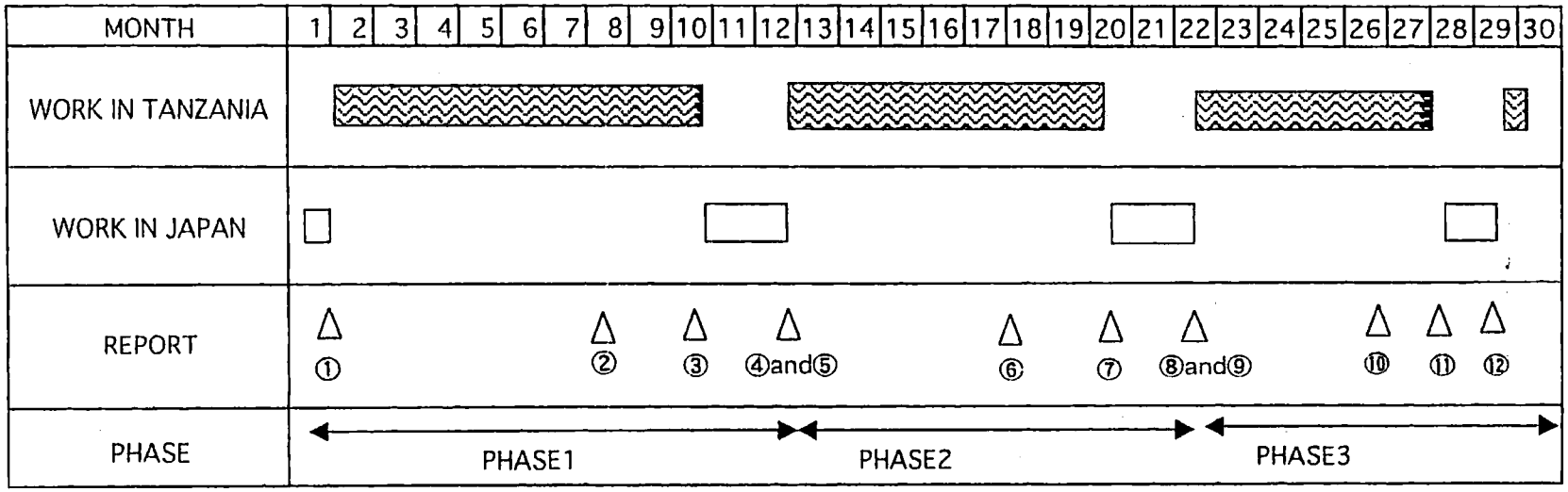
(ii) To pursue technology transfer to the Tanzanian counterpart personnel in the course of the Study.

IX. CONSULTATION

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

ANNEX

TENTATIVE SCHEDULE



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

Attachment 3

Minutes of Meeting for Inception Report 2

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

The thirty (30) copies of the Inception Report were submitted to the Ministry of Agriculture and Food Security (hereinafter referred to as "MAFS"), in accordance with the Scope of Work for the Study signed between MAFS and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on April 10, 2001.

A meeting on the Report was held with the Steering Committee on December 17, 2002. In the meeting, the Study Team explained the contents of the Report and further highlighted the basic approaches to the Action Plan and Verification Study. Thereafter, a series of discussions were made. As a result of the discussions, in principle the Report was agreed by the Steering Committee. The main issues discussed in the meeting and the list of participants are shown in ANNEXES attached hereto.

Dr.N.P. Sibilima
for Permanent Secretary
Ministry of Agriculture and Food Security
The United Republic of Tanzania
Date: December 23, 2002

Mr.Hitoshi Shimazaki
Leader
The Study Team
Date: December 23, 2002

Mr.Hitoshi Fujiie
Project Programme
Japan International Cooperation Agency
Date: December 23, 2002

(ANNEX I)

Main Issues Confirmed and Agreed at the Meeting

(1) The Irrigation Sub-sector's staff shall explain the concept of NIMP to the local government authorities for their conversance with irrigation development.

(2) The Action Plan should be prepared taking into consideration the river basin management approach as recommended in the Master Plan Report.

(3) Irrigation Sub-sector stakeholders should be involved in discussion on the proposed Water Act before it is enacted.

(4) Policy environment should be so revised as to enable the private sector to take part in irrigation development as mentioned in the Master Plan Report.

(5) Other sub-sectors in the Agriculture Sector should be advised to urgently prepare their development plans in the same manner with the NIMP, to realize the inter-sectoral coordination.

(6) The "Candidate Schemes" termed in the Inception Report 2 should be changed into the "Model Scheme" to avoid any misunderstanding by other government agencies.

(7) MAFS shall send counterpart personnel to the Model Scheme sites where the JICA Study Team will not properly visit according to the latest JICA Security Guideline, to collect further data and information necessary for preparation of the Action Plan.

NB

(ANNEX II)

List of Participants

1. Tanzanian Side

(1) Steering Committee

(a)	Dr.N.P. Sicilima	Director for Crop Development, MAFS
(b)	Eng..C.K.Chiza	Assistant Director of Irrigation Services Section, MAFS
(c)	Eng. E.H.Masija	Project Coordinator, RBMSIIP, MAFS
(d)	Eng. A.H.Simba	Senior Irrigation Engineer (Chief counterpart), MAFS
(e)	Eng. Mbogo Futakamba	Irrigation Engineer (Counterpart), MAFS
(f)	Ms.R.A.Kweka	Soil Scientist (Counterpart), MAFS
(g)	Mr.Ronald Komanga	Sociologist (Counterpart), MAFS
(h)	Eng. I.A.Masenza	Water Resources Engineer (Counterpart), MAFS
(i)	Mr.P.M.Mafuru	Agricultural Economist (Counterpart), MAFS
(j)	Mr.R.Rushomesa	Land Use Planner (Counterpart), MAFS
(k)	Mr.Washington Mutayoba	Project Coordinator, (for P/S of Ministry of Water and Livestock Development)
(l)	Mr.A.E.Madetei	Assistant Director, VPO-Division of Environment
(m)	Mr.G.S.Ngaleya	Assistant Director, PMO-Coordination of Government Business
(n)	Mr.J.F.Kanyasi	PORALG
(o)	Dr.J.Nozaka	Irrigation Advisor, MAFS

(2) Ministry of Agriculture and Food Security

(a)	Ms.Margaret Ndaba	Senior Economist
(b)	Mr.A.D.Lwena	Agricultural Engineer
(c)	Mr.E.W.Siyame	Zonal Irrigation Engineer, Mwanza
(d)	Mr.Rajabu Libuhi	Acting Zonal Irrigation Engineer Mtwara
(e)	Mr.A.G.Ruhangisa	Zonal Irrigation Engineer, Morogoro
(f)	Mr.R.L.Daluti	Zonal Irrigation Engineer, Kilimanjaro
(g)	Mr.M.J.Ndonde	Representative of Zonal Irrigation Engineer, Mbeya
(h)	Mr.J.L.Bayaga	Zonal Irrigation Engineer, Tabora

(3) Other

(a)	Mr.F.L.W.Oslen	Chief Advisor, DANIDA

2. Japanese Side

(1) JICA Monitoring Team

(a)	Mr. Hitoshi Fujiie	Project Management

(2) JICA Tanzania Office

(a) Ms. Debora Sungusia — Senior Programme Officer

(3) JICA Study Team

(a) Mr. Hitoshi Shimazaki — Leader

(b) Mr. Shuichi Matushima — Staff

(c) Mr. Takuya Igawa — Staff

NBS

Attachment 4

Minutes of Meeting for Draft Action Plan

MINUTES OF MEETING
ON
DRAFT ACTION PLAN REPORT
FOR
THE STUDY
ON
THE NATIONAL IRRIGATION MASTER PLAN
IN
THE REPUBLIC OF TANZANIA

In accordance with the Scope of Work for the Study on the National Irrigation Master Plan in the United Republic of Tanzania (hereinafter referred to as the "NIMP"), signed between the Ministry of Agriculture and Food Security (hereinafter referred to as the "MAFS") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on April 10, 2001, the Study Team submitted thirty (30) copies of the Draft Action Plan Report to the MAFS (hereinafter referred to as the "Report").

In connection with the Report, the Steering Committee Meeting was held on August 4, 2003 at the conference room of MAFS. In the meeting, the Study Team explained the contents of the Report, focusing on the objectives of Action Plan, analysis of Model Irrigation Schemes and selection of Priority Components, special study on major issues identified in problem analysis, Action Plans for Priority Components and Model Irrigation Schemes, and selection of objective items for Verification Study. This was followed by discussions on the contents of the Report among the Participants. As a result of the discussions, the contents of the Report were in principle accepted by the Steering Committee. The main issues raised and discussed among Participants and the list of Participants are shown in ANNEXES attached hereto.

Mr.Simon A.N.Muro
Acting Permanent Secretary
Ministry of Agriculture and Food Security
The United Republic of Tanzania
Date: August 5, 2003

Mr.Hitoshi Shimazaki
Leader
The Study Team
Date: August 5, 2003

(ANNEX I)

Main Issues Confirmed and Agreed at the Meeting

(1) Issues Raised and Replies

(a) Role and entry point of private sector are not clear in the Draft Action Plan Report.

The Master Plan Report states that the private sector plays important roles for realizing the self-reliant irrigation development through the Public Private Partner and investment by the private companies at the Long Term stage. There is no restriction of involvement of private sector in area size. At the Short Term stage, involvement of private sector is focused on irrigator groups and private contractors.

(b) Environmental matter is not included in the selection criteria on Model Irrigation Schemes.

Study purpose of Model Irrigation Scheme is to grasp problems envisaged with the irrigation schemes. Environmental concerns are treated as problems to be addressed when developing irrigation schemes. At this stage, they cannot be taken as criteria for selecting irrigation schemes. However, the follow up stage (feasibility study) must consider environmental concerns.

(c) How does the Master Plan address the ASDS/ASDP?

The purpose of Master Plan is to make sustainable irrigation development through effective use of national resources for supporting ASDS' objective which is to create an enabling and favorable environment for improving productivity and profitability of agricultural sector.

(d) How does the Master Plan follow the River Basin concept?

The Master Plan is a continuation of NIDP which was prepared on the River Basin concept in 1994.

(e) Are the Model Irrigation Schemes included in DADPs?

Some Model Irrigation Schemes are included in DADPs, but some schemes are not included, because Model Irrigation Schemes are not priority ones as mentioned in the Draft Action Plan Report. Using the Model Irrigation Schemes, a workable Action Plan can be developed for other projects and the selected components in the Master Plan can be confirmed.

(f) Confusion of WUA

The Master Plan Report clearly mentions that WUA is an organization of irrigator groups.

(g) Any training programme is not seen in the Draft Action Plan.

The Draft Action Plan Report proposes the training programme of LGA staff and farmers.

(h) How does the Action Plan accommodate the interest of WUA?

In the Action Plan study, RRA was conducted for selected Model Irrigation Schemes by inviting beneficial farmers, to grasp their opinions and intentions on the Schemes. At the RRA, most of farmers actively took part in group discussions. These discussion results were duly incorporated in the Action Plan.

(i) In course of the study, was the water source assessed?

Water source for the Model Irrigation Schemes was assessed, and results were shown in the project proposal.

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

(3) Chapter 8 Selection of Objective Item for Verification Study should be deleted in final version of the Action Plan Report, and mentioned in the coming Verification Study Report.

(4) Further comments on the Report if any, will be sent to the Study Team by August 31, 2003, through the Irrigation and Technical Services Division of MAFS.

(ANNEX II)

List of Participants

1. Tanzanian Side

(1) Steering Committee Member

(a) Mr. Simon A.N.Muro	Acting Permanent Secretary, MAFS
(b) Mr. C.K. Chiza	Director of Technical and Irrigation Services Division, MAFS
(c) Mr. Julius F. Kanyasi	Senior Planning Officer, PORALG
(d) Prof. A.M. Hayuma	Special Assistant to Permanent Secretary, Ministry of Lands
(e) Mr. S. Nkondokaya	Senior Environmental Officer, Division of Environment Vice President Office
(f) Ms. Amina Akida	Senior Officer of MIS, MNRT
(g) Mr. Washington Mutayoba	Project Coordinator, RBMSIIP, MAFS
(h) Mr. Clifford Tandari	Agricultural Economist, VPO
(i) Mr. Ezamo Maponde	Economist, POPP
(j) Mr. Fabian Mukome	Senior Forest Officer, MNRT
(k) Mr. Nicodemus A. Ngwala	Planning Officer, MEM
(l) Mr. Mbogo Futakamba	Assistant Director (Counterpart), MAFS

(2) MAFS Staff

(a) Mr. E.H. Masija	Project Coordinator, RBMSIIP, MAFS
(b) Mr. A.H. Simba	Senior Irrigation Engineer (Chief counterpart), MAFS
(c) Mr. M.N.W Mnzava	Irrigation Agronomist, MAFS
(d) Ms. R.A. Kweka	Soil Scientist (Counterpart), MAFS
(e) Mr. Ronald Komanga	Sociologist (Counterpart), MAFS
(f) Mr. I.A. Masenza	Water Resources Engineer (Counterpart), MAFS
(g) Mr. P.M. Mafuru	Agricultural Economist (Counterpart), MAFS
(h) Mr. R. Rushomesa	Land Use Planner (Counterpart), MAFS
(i) Mr. E.W. Siyame	Zonal Irrigation Engineer, Mwanza, MAFS
(j) Mr. N.J. Chikoleka	Zonal Irrigation Engineer Mtwara, MAFS
(k) Mr. A. G. Ruhangisa	Zonal Irrigation Engineer, Morogoro, MAFS
(l) Mr. R.L. Daluti	Zonal Irrigation Engineer, Kilimanjaro, MAFS
(m) Mr. J.W. Kaduma	Zonal Irrigation Engineer, Mbeya, MAFS
(n) Mr. J. Bayaga	Zonal Irrigation Engineer Tabora, MAFS
(n) Mr. L.A.G. Gallet	Project Coordinator of PIDP, MAFS
(o) Mr. O.M. Wahure	Sociologist, MAFS
(p) Mr. Amandus Lwena	Agricultural Engineer, MAFS
(q) Mr. R.I.M. Temu	Technical Advisor, ASPS MAFS

(r)	Dr. J. Nozaka	Irrigation Advisor, MAFS
(s)	Mr. Peter Zoutewelle	Irrigation Advisor for ASPS, MAFS

2. Japanese Side

(1) Embassy of Japan

(a)	Mr.Naoki Ito	Second Secretary

(2) JICA Tanzania Office

(a)	Ms.Kaori Matsushita	Assistant Resident Representative

(2) JICA Study Team

(a)	Mr. Hitoshi Shimazaki	Leader
(b)	Dr. Shuichi Matushima	Staff
(c)	Dr. Mamoru Osada	Staff
(d)	Mr. Hiroyasu Onuma	Staff
(e)	Mr. Takuya Igawa	Staff
(f)	Mr. Yuki Ishikawa	Staff