The United Republic of Tanzania
Ministry of Agriculture
NATIONAL IRRIGATION COMMISSION

The Comprehensive Guidelines

for Irrigation Scheme Development

Volume 3: Operation, Management and Maintenance

Fifth Revision, June 2025

(Revised based on World Bank Irrigation of the Future Toolkit)

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Acronyms

CGL	Comprehensive Guidelines
DIO	District Irrigation Office
DIE	District Irrigation Engineer
DO	Directorate of Operations and support services
GIS	Geographic Information System
GPS	Global Positioning System
IO	Irrigators' Organization
IOF	Irrigation of the Future
JICA	Japan International Cooperation Agency
LGA	Local Government Authority
NIRC	National Irrigation Commission
O&M	Operation and Maintenance
OMM	Operations, Management and Maintenance
RIO	Regional Irrigation Office
TOR	Terms of Reference

Measurement Units

Extent
cm^2 = Square centimeters (1.0 cm x 1.0 cm)
m^2 = Square meters (1.0 m x 1.0 m)
km^2 = Square kilometers (1.0 km x 1.0 km)
ha = Hectares (10,000 m^2)
ac =Acres (4,046 m^2 or 0.40468 ha)

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

Currency
Tsh = Tanzanian Shillings

Volume
cm^3 = Cubic centimeter (1.0cm x1.0cm x 1.0 cm)
m^3 = Cubic meters (1.0m x 1.0m x 1.0m)
lit(l) = Liter (1,000 cm^3)
MCM = Million Cubic Meter

Weight
gr = Grams
kg = Kilogram (1,000 gr)
ton = Metric ton (1,000 kg)

Time
sec = Seconds
min = minutes (60 sec)
hr = Hours (60min)

CHAPTER 1

1. INTRODUCTION

1.1 Background

The need for enhanced irrigation system performance with greater adaptability continues to rise due to increased demand pertaining to climate and sustainability considerations. Within developing countries, water managers face a number of difficulties including obsolete infrastructure, inadequate finances, weak institutional capacity and shifting climate factors.

To address such concerns, the World Bank's "Irrigation Operator of the Future (iOF)" Toolkit, alongside Comprehensive Guidelines for irrigation scheme development Volume 3 (CGL Volume 3) for Operation, Management and Maintenance (OMM) issued by the National Irrigation Commission of Tanzania form a coherent response. The iOF promotes a performance and service-oriented paradigm while CGL Volume 3 proposes defined national frameworks tailored towards effective OMM implementation in irrigation schemes.

With these new guidelines in place, there is progress towards overcoming outdated approaches that focus on simple delivery systems towards more advanced holistic frameworks that prioritize customer satisfaction responding to their needs in a multi-dimensional manner while incorporating resiliency as well as accountability into service provision.

1.2 What is in the Guidelines

This guideline has been revised to incorporate the requirements of the Irrigation of the Future(iOF) toolkit. The Operation, management and Maintenance (OMM) guideline for irrigation scheme development (CGL Volume 3) describes the procedures for Tanzania's OMM water systems which includes formation of OMM plans, budgeting, execution of water distribution and maintenance activities, asset and finances management, and performance monitoring whereas, the iOF toolkit which contains a comprehensive set of 18 performance indicators along with strategic planning tools, capability matrices and structured facilitation processes that aims at assessing, diagnosing and improving irrigation OMM of the irrigation facilities through implementation of the developed and signed OMM Contract between NIRC and Irrigators organizations.

This OMM guideline integrates action plans through stakeholder engagement with IO, DIO, RIO and NIRC HQ applying the operational frameworks and analytical tools provided by iOF.

1.3 Importance of the Guidelines

The guidelines serve to:

- Aid in the improvement of irrigation systems governance and service provision by offering a uniform approach along with adaptable strategies tailored to specific local needs.
- Assist in identifying gaps during operations alongside developing results-driven pathways with actionable indicators framed within measurable criteria.
- Enhance coordination towards institutional capacity development among diverse actors supporting inclusive participatory planning.
- Promote governance inclusiveness alongside stewardship towards financial sustainability and responsible environmental practices within irrigation systems.
- Bolster climate change resilience while enhancing efficiency and scheme maintenance standards.

Collectively, they allow for modernized serviced provision shift aligned with International and Tanzania best practices to incorporates transformative global standards into Tanzania irrigation systems.

1.4 Scope of the guidelines

The scope of this guideline includes:

- Public and private investment in small, medium and large scale irrigation schemes
- Water distribution, infrastructure services, operation and maintenance, finance and human resource management, customer service, ecosystem, governance, environmental impact stewardship alongside issue tracking and cross cutting performance monitoring.
- Institutional Development Capability assessment tools including Strategic capability planning and investment roadmap aligning with organizational goals.
- Strategic frameworks with irrigation result oriented governance innovation systems with focus on multidisciplinary stakeholder involvement.
- Even though the iOF offers global application diagnostic planning, toolkit parts are always embedded contextually through Tanzanian law compliance or policy within CGL volume 3 OMM guideline.

1.5 Users of the Guidelines

These guidelines are intended for:

- An individual evaluating and overseeing any scale of an irrigation system within public or private organisations acting as Irrigation Operators.
- The Irrigators' Organizations (IOs) responsible for the execution and supervision at the scheme level via participatory planning.
- The District and Regional Irrigation Offices (DIOs and RIOs) in-charge of training, providing technical assistance, monitoring, evaluation, and supervisory functions.
- Upper Level NIRC Personnel dealing with policy compliance directs on strategy execution, alignment with regulations, monitoring actions undertaken by respective bodies.
- Facilitating consultants and partners enact policies directed towards scheme upgrading as well as capacity enhancing interventions.

Along with the combination of stakeholder engagement processes alongside technical systems frameworks, these users can spearhead the shift toward sustainable delivery of irrigation services

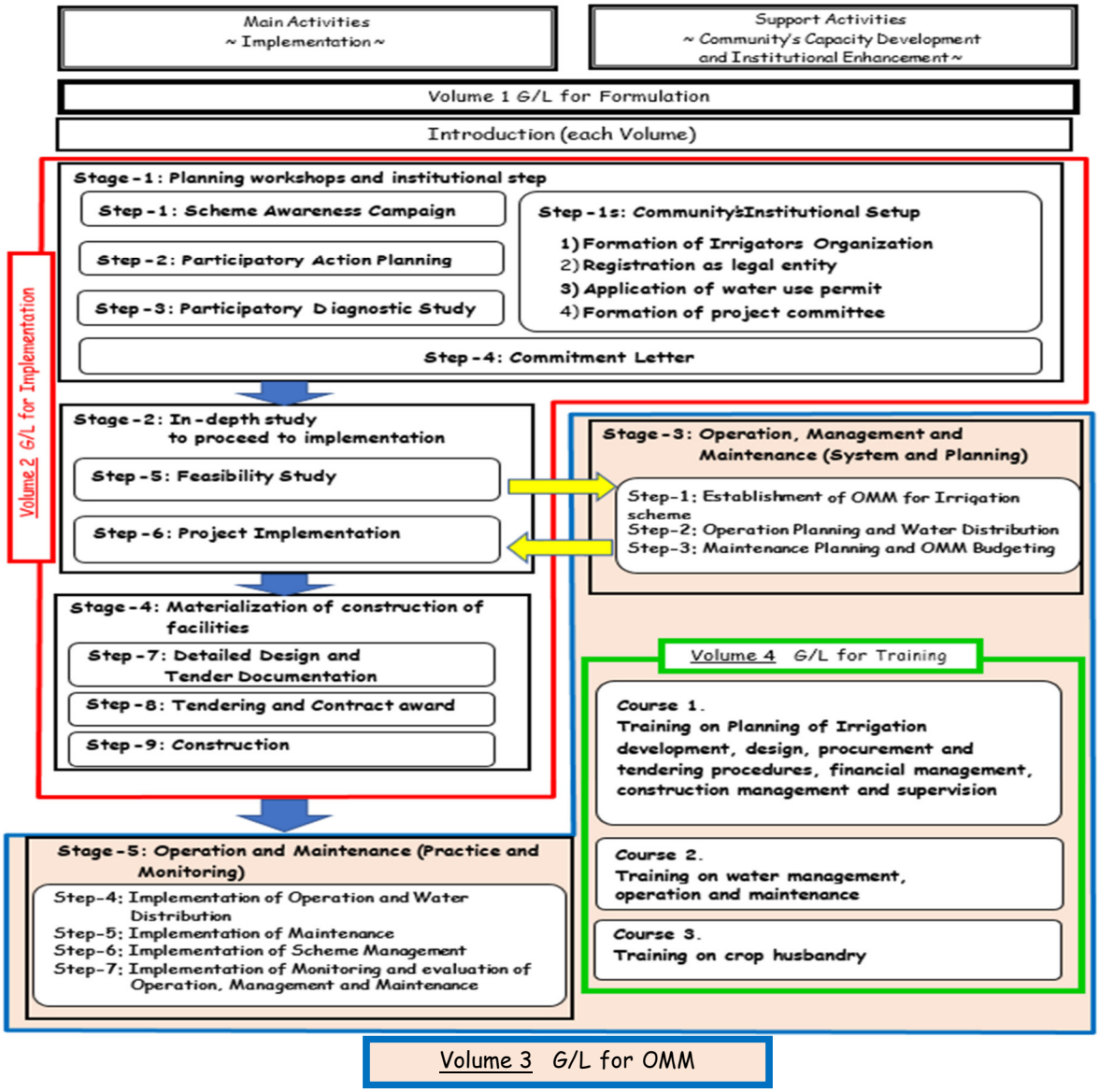
CHAPTER 2

2. STEPS

2.1 Outline of the steps

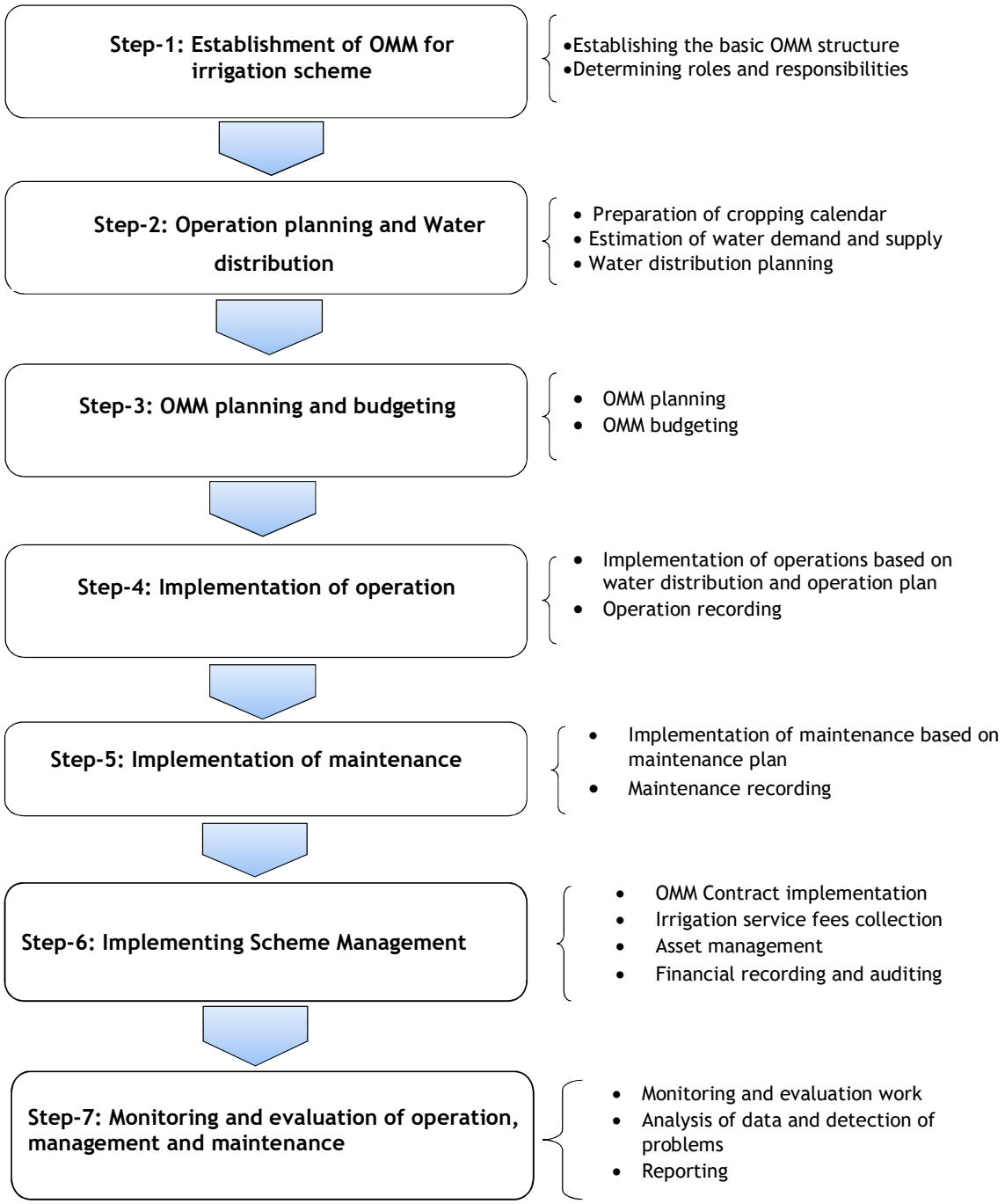
The Guidelines for Irrigation scheme development is divided into four volumes namely Formulation, Implementation, Operation, Management & Maintenance(**OMM**) and Training.

The diagram below depicts steps of the four volumes of irrigation scheme development.



2.2 Outline of the steps for Operation, Management and maintenance (OMM)

The steps to be followed in the process of implementing operation, management and maintenance are outlined in the flow chart below:



2.2.1 Step 1: Establishment of Operation, Management and Maintenance (OMM)

i. Key Message

The irrigators' organization will make decisions on the basic structure for operating, managing and maintaining irrigation facilities and other related facilities properly.

ii. Why establishing OMM is required?

Determining the basic structure for operation, management and maintenance activities will contribute to effective and efficient management of the irrigation facilities for the sustainability of the scheme.

iii. Key for the success of establishing OMM for irrigation scheme

The IO members understanding of the importance of establishing the OMM structure and reaching an agreement on the operation, management and maintenance contract signing and implementation.

iv. Required inputs

- Facilitator: District Irrigation Office(DIO), Regional Irrigation office(RIO), Department responsible for Operations (DO) as required
- Management Committee and other members of the irrigators' organization (IO)
- Feasibility Study Report
- Training material and manuals on operation, management and maintenance
- Operation plan (**Form-1**)
- Water distribution diagram prepared at the Detailed Design (DD) stage
- Basic maintenance plan (**Form-2**)
- Operation and maintenance budgeting (**Form-3**)
- Operation record (**Form-4**)
- Maintenance record (**Form-5**)
- Financial record (**Form-6**)
- Reporting format (**Form-7**)
- Water Distribution Manual

v. How is establishing OMM carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the IO Management Committee and other members of the IO to identify problems, do scheme performance assessment, identify roles and responsibilities, propose solutions and then prepare practical action plan.

DIO in collaboration with RIO will provide necessary assistance in IO's activities. DIO will receive the copies of the final outputs of Form-1 to Form-7 from the IO Management Committee so that the DIO can provide support to the IO's activities of operation, management and maintenance in in the future when necessary.

The IO will go through the following sub-steps when establishing and implementing OMM.

Sub-step 1: Engage IO for establishing OMM of the irrigation scheme

The IO Management Committee and other stakeholders will be facilitated by NIRC to identify problems, do scheme performance assessment, propose solutions and prepare practical action plan for purpose of establishing and implementing OMM for the scheme. IO and NIRC will then prepare and enter into OMM contract.

The OMM contract preparation will follow the following principles:

- Consult widely and address diverse interests of all parties
- Define specific roles, rights and responsibilities of both parties
- Define the service level targets with measurable indicators
- Take into account the cost of providing the service
- Build capability on OMM through the engagement process
- Amend annually, if necessary, after doing monitoring and evaluation and replan.

The OMM contract must define:

- Purpose and objective
- Rights of both parties
- Roles and responsibilities of both parties
- Implementation of the agreement

Sub-step 2: Make arrangement and call for a general meeting to establish OMM of the irrigation scheme.

The IO Management Committee will make arrangements for a general meeting to discuss on operation, management and maintenance of irrigation scheme.

The proposed agenda items for the general meeting will be:

(1) Concept of operation, management and maintenance of irrigation scheme.

(2) Roles and responsibilities in operation, management and maintenance
- Operation planning and Water distribution
- Maintenance planning
- Operation, management and maintenance budgeting
- Obligation of paying irrigation service fees per area per season
- Problem solving, decision making and conflict management
- Financial management
- Environmental management
- Asset management
- Human resources management
- Land management

(3) Method of recording and reporting
- Recording formats and methods of recording operation records, management records and maintenance records
- Reporting formats and methods of reporting when problems arise

(4) Method of monitoring and evaluation

(5) Establishing OMM contract

Sub-step 3: Preparation for the general meeting

The IO Management Committee will prepare the proposed agenda, venue, all the materials and logistics needed for the general meeting.

(1) Concept of operation, management and maintenance of irrigation scheme

The IO Management Committee will prepare to explain the proposed concept of operation, Management and maintenance of irrigation scheme to IO members at the general meeting. The IO management committee should read **Technical Guidance** (**Explanatory Note 1) and OMM manuals** with assistance of DIO and prepare for such explanation.

(2) Roles and responsibilities in operation, management and maintenance

The IO Management Committee will prepare to explain the roles and responsibilities of the IO and NIRC in operation, Management and maintenance of irrigation scheme to IO members at the general meeting.

The IO management committee should read **Technical Guidance** (**Explanatory Note 1)** with assistance of DIO and prepare for such explanation.

- ***Operation planning and Water distribution:*** The IO Management Committee will prepare a proposal of the operation plan and water distribution plan using **Form-1**, and following the instruction given in **Technical Guidance** (**Explanatory Note 1)**, and **Water Distribution Manual,** in collaboration with some IO members. The irrigation blocks will usually be determined by secondary canals, groups of tertiary canals or tertiary canals.

- ***Maintenance planning:*** The IO management committee will prepare a proposal of the basic maintenance plan using **Form-2**, and following the instruction given in **Technical Guidance** (**Explanatory Note 1)**, with the assistance of DIO. The IO management committee can refer to the scheme assessment and design reports for maintenance planning.

- ***Operation, management and maintenance budgeting:*** The IO Management Committee will prepare a proposal of the operation, management and maintenance budget for one or two seasons, using **Form-3**, with the assistance of DIO.

  The OMM budget for one or two seasons shall be based on the prepared operation plan and the maintenance plan.

  The IO Management Committee will explain the Irrigation service fee calculated based on **National Irrigation Act No.4 0f 2023** and its regulations to IO members and their responsibility to pay this fee.

  Management Committee can refer to the Scheme assessment and design reports for operation and maintenance budgeting.

- ***Method of Scheme management:*** The IO Management Committee will explain to IO members at the general meeting the method of

Problem solving, decision making, conflict management, financial management, Environmental management, Asset management, Human resources management, Land management with the assistance of DIO.

The IO management committee should read **Technical Guidance** (**Explanatory Note 1)** and prepare for such explanation.

(3) ***Methods of recording and reporting:***

The IO management committee will have to explain the methods of recording and reporting formats to IO members at the general meeting. The IO management committee should read **Technical Guidance** (**Explanatory Note 1)** and prepare for such explanation.

The responsible persons for keeping records using **Form-4** to **Form-6** are as follows:

- **Form-4**: *Operation record* - persons in charge of managing operation, for example, subcommittee members responsible for operation and gate operators.
- **Form-5**: *Maintenance record* - persons in charge of managing maintenance, for example, subcommittee members responsible for maintenance.
- **Form-6**: *Financial record* - persons in charge of managing financials, for example, Accountant (or Treasurer) and subcommittee members responsible for finance.

Every IO member can use **Form-7**: *Reporting format* when problems arise and he/she would like to report about the problems to the IO management committee and/or the general meeting.

(4) Method of Monitoring and Evaluation of operation

The IO Management Committee will explain to IO members at the general meeting the method of monitoring and evaluation of operation

The IO management committee should read **Technical Guidance (Explanatory Note 1)** and prepare for such explanation

(5) ***Establishing OMM Contract:***

The IO management committee will have to explain terms and conditions of the OMM contract to IO members at the general meeting. The IO management committee should read **Technical Guidance** (**Explanatory Note 1)** and **sample OMM contract** and prepare for such explanation.

Sub-step 4: Holding the general meeting – discussion and decision on operation, management and maintenance of irrigation scheme.

At the general meeting, the IO management committee will facilitate the discussion and decision on the following agenda:

- Concept of operation, management and maintenance of irrigation scheme
- Roles and responsibilities in operation, management and maintenance
  - Operation planning and Water distribution
  - Maintenance planning
  - Operation and maintenance budgeting
  - Obligation of paying irrigation service fees and other fees
  - Method of problem solving, decision making and conflict management
  - Method of financial management, Environmental management, Asset management, Human resources management and Land management.
- Method of recording and reporting
  - Recording formats and methods of recording – operation records, maintenance records, and management records
  - Reporting formats and methods of reporting when problems arise
- Method of monitoring and evaluation of operation
- Establishing OMM contract
  - Signing of OMM contract
  - Implementation plan of the OMM contract

Sub-step 5: Compilation of minutes and forms of the general meeting

The IO management committee will prepare minutes of the general meeting with the assistance of DIO and compile the following:

- **Form-1**: Operation plan
- **Form-2**: Basic Maintenance plan
- **Form-3**: Operation, management and maintenance budgeting
- **Form-4** to **Form-7**: Recording and reporting formats
- Signed OMM contract

The IO management committee will keep the records of the general meeting including the minutes, compiled Form 1 – form 7 and signed OMM contract.

Sub-step 6: Submission of copies of Form-1 to Form-7 and signed OMM contract to the DIO

The IO management committee will submit copies of **Form-1** to **Form-7** and a copy of signed OMM contract to the DIO so that IO members can receive assistance of the DIO when it is necessary.

2.2.2 Step 2: Operation Planning and Water Distribution

i. Key Message

The irrigators' organisation (IO) members will prepare the cropping calendar, gain their understanding for water demand and water supply, and prepare an irrigation schedule and a plan of water distribution.

ii. Why Operation Planning and water Distribution is required?

Operation planning and water distribution is the process of organizing and executing the delivery of water from a source to users, ensuring it's done efficiently and effectively. This involves both planning the distribution strategy and managing the ongoing operations.

Proper irrigation scheduling and water distribution planning based on the agreed cropping calendar and the appropriate data of expected water demand and supply are the basis of the proper water management. Proper water management based on appropriate data will provide useful data for future irrigation planning and water management.

iii. Key for the success of Operation Planning and water Distribution

The IO members should understand the importance of cropping calendar, expected water demand and supply, and reach an agreement on the water distribution planning.

iv. Required inputs

- Facilitator: District Irrigation Office (DIO), RIO, DO as required
- Management committee and other members of irrigators' organization (IO)
- Feasibility study report
- Past irrigation records, if any
- Operation plan (**Form-1**)
- Cropping calendar (**Form-8**)
- Calculation sheet for water demand in each month (**Form-9**)
- Estimation of water supply in the coming seasons (**Form-10**)
- Irrigation schedule and water distribution plan (**Form-11**)

- Water Distribution Manual

v. How is Operation Planning and water Distribution carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the IO Management Committee and other members of the IO to identify problems, assess operation performance, identify roles and responsibilities, propose solutions and then prepare practical action plan related operation and water distribution.

DIO in collaboration with RIO will provide necessary assistance in IO's activities. DIO will receive the copies of the final outputs of Form-1, Form-8 to Form-11 from the IO Management Committee so that the DIO can provide support to the IO's activities of operation, management and maintenance in in the future when necessary,

The IO will go through the following sub-steps when preparing operation planning and water distribution.

Sub-step 1: Make arrangement and call for the general meeting for operation planning and water distribution

The IO management committee will make arrangements for the general meeting for discussions on operation planning and water distribution for a year and/or for a season.

In the general meeting, the irrigation schedule and plan of water distribution will be discussed and decided for the coming one or two seasons.

The agenda items for the general meeting will be:
- Division of the whole irrigation area into irrigation blocks
- Preparation of cropping calendar
- Estimation of water demand and water supply
- Irrigation scheduling and water distribution planning
- Water distribution diagram

The IO management committee will request the assistance of the District Irrigation Office(DIO) if necessary.

Sub-step 2: Preparation for general meeting

The IO Management Committee will prepare the proposed agenda, venue, all the materials and logistics needed for the general meeting.

(1) Review of operation plan

The IO management committee will review, modify if necessary, and prepare a proposal of the operation plan, using **Form-1**, with the assistance of DIO.

(2) Cropping calendar and pattern of planting

The IO management committee will prepare a proposal of the cropping calendar and pattern of planting, using **Form-8** and following the instruction given in **Technical Guidance (Explanatory Note 2)**, OMM Manuals and Water Distribution Manual with the assistance of DIO.

(3) Estimation of water demand

The IO management committee will estimate the expected water demand of the whole irrigation area, using **Form-9** and follow the instruction given in **Technical Guidance (Explanatory Note 3)**, Water Distribution Manual and with the assistance of DIO.

(4) Estimation of water supply in the coming seasons

The IO management committee will estimate the expected water supply from the water source, using **Form-10** and following the instruction given in the footnote of **Form-10**, with the assistance of DIO.

(5) Irrigation scheduling and water distribution planning

The IO management committee will prepare a proposal on irrigation scheduling and water distribution planning, using **Form-11** following the instruction given in the footnote of **Form-11**, OMM Training Manual for scheme facilitators and Water Distribution Manual with the assistance of DIO.

(6) Preparation for presentation at general meeting

For presentation at the general meeting, The IO management committee will prepare flip charts, forms and other materials needed, with the assistance of DIO.

The IO management committee will review the training materials on operation, management and maintenance manuals provided by DIO and prepare some flip charts if necessary.

Sub-step 3: Holding a general meeting – Discussion and decision on operation planning and water distribution

At the general meeting, The IO management committee members will facilitate the discussion and the decision on the following:

- Division of the irrigation area into irrigation blocks
- Cropping calendar
- Expected water demand and supply
- Irrigation schedule and plan of water distribution
- Water distribution diagram

Sub-step 4: Compilation of minutes and forms of the general meeting

The IO management committee will prepare minutes of the general meeting with the assistance of DIO and compile the following:

- **Form-1**: Operation plan
- **Form-8**: Cropping calendar
- **Form-9**: Calculation sheet for water demand in each month
- **Form-10**: Estimation of water supply in the coming seasons
- **Form-11**: Irrigation schedule and water distribution plan

The IO management committee will keep the record of the general meeting including the minutes, form 1 and form 8 – form 11.

Sub-step 5: Submission of copies of final outputs of Form-1, Form-8 to Form-11 to DIO

The IO management committee will submit the finalized Form-1, Form-8 to Form-11 to the DIO so that the IO members can receive the assistance of the DIO when it is necessary.

2.2.3 Step 3: OMM Planning and Budgeting

(i) Key Message

The IO will make a concrete plan of maintenance activities for one or two seasons, and prepare a budget plan for operation, management and maintenance

(ii) Why is the OMM Planning and Budgeting required?

Operation, management and maintenance (OMM) planning and budgeting involves creating a financial plan for the day-to-day activities needed to keep an irrigation system running smoothly. It encompasses both the planning of maintenance activities and the allocation of resources (financial, human, and material) to execute those plans.

Effective OMM planning and budgeting ensures the efficient, safe, and sustainable operation of assets and minimizes the risk of costly breakdowns

Effective Operation and maintenance work can be done through appropriate planning of activities as well as identification of necessary resources needed for those activities to be done.

(iii) Key for the OMM Planning and Budgeting

The IO members understanding of the importance of maintenance work and express their intention to participate in the maintenance work.

(iv) Required inputs

Facilitator: District Irrigation Office(DIO), RIO and DO as required

- The IO management committee and other members of irrigators' organization (IO)
- Basic Maintenance plan (**Form-2**)
- Operation, management and maintenance budgeting (**Form-3**)
- Maintenance plan (**Form-12**)
- OMM Manuals
- Farmers Participatory Repair Work Manual

(v) How is the OMM Planning and Budgeting carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the IO Management Committee and other members of the IO on key considerations when doing OMM planning and budgeting.

DIO in collaboration with RIO will provide necessary assistance in IO's activities. DIO will receive the copies of the final outputs of Form-2, Form-3 and Form-12 from the IO Management Committee so that the DIO can provide support to the IO's activities of operation, management and maintenance in in the future when necessary,

The IO will go through the following sub-steps when preparing OMM planning and budgeting.

Sub-step 1: Make arrangements and call for the general meeting for OMM Planning and Budgeting

The IO management committee will make arrangements for the general meeting for discussion and decision on maintenance planning for a year and/or for a season.

The agenda items for the general meeting will be:

- Maintenance planning for one or two seasons
- OMM budgeting for one or two seasons

The IO management committee will request the assistance of the DIO if necessary

Sub-step 2: Preparation for general meeting

The IO Management Committee will prepare the proposed agenda, venue, all the materials and logistics needed for the general meeting.

(1) Basic maintenance planning

The IO management committee will review, modify if necessary, and prepare a proposal of the basic maintenance plan, using **Form-2**, with the assistance of DIO if necessary.

(2) Specific maintenance planning

The IO management committee will prepare a proposal of the specific maintenance plan, using **Form-12** and follow the instruction given in **Technical Guidance** (**Explanatory Note 4),** OMM manuals and Farmers Participatory Repair Work Manual with assistance of DIO if necessary.

(3) OMM budgeting

The IO management committee will prepare a proposal of the operation, management and maintenance budgeting, using **Form-3 and OMM manuals** with assistance of the DIO if necessary.

(4) Preparation for presentation at general meeting

For presentation at the general meeting, the IO management committee will prepare flip charts, forms and other materials needed, with the assistance of DIO.

The IO management committee will review the training materials on operation, management and maintenance manuals provided by DIO and prepare some flip charts if necessary.

Sub-step 3: Holding general meeting -Discussion and decision on OMM Planning and Budgeting

At the general meeting, The IO management committee will facilitate the discussion and the decision on the following:

- Maintenance planning for one or two seasons
- OMM budgeting for one or two seasons

Sub-step 4: Compilation of minutes and forms of the general meeting

The IO management committee will prepare minutes of the general meeting with the assistance of DIO and compile the following:

- **Form-2**: Basic maintenance plan
- **Form-3**: Operation, management and maintenance budgeting
- **Form-12**: Maintenance plan

The IO management committee will keep the record of the general meeting including the minutes, form 2, form 3 and form 12.

Sub-step 5 Submission of copies of final outputs of Form-2, Form-3 and Form-12 to DIO

The IO management committee will submit the finalized Form-2, Form-3 and Form-12 to the DIO so that the IO members can receive the assistance of the DIO when it is necessary

2.2.4 Step-4: Implementation of Operation and Water Distribution

i. Key Message

The Water, Operation and Maintenance(O&M) subcommittee is in charge of management of operation, gate operation and other related facilities within the irrigation scheme in accordance with the operation plan.

ii. Why is the implementation of Operation and Water Distribution required?

The implementation of operation and water distribution involves managing the physical infrastructure and processes to deliver water to irrigators. This includes ensuring adequate pressure and flow, maintaining water quality, and optimizing flow performance. Key aspects include monitoring water flow, managing water quality, and addressing emergencies. Effective and efficient water use can be achieved through planned Operation and Maintenance.

iii. Key for the success of the implementation of Operation and Water Distribution

The success of implementing operation and water distribution is when the irrigators follow the planned cropping calendar and irrigation schedule.

iv. Required inputs

- Facilitator: District Irrigation Office(DIO), RIO and DO as required
- The IO management committee and other members of irrigators' organization (IO)
- Operation plan (**Form-1**)
- Cropping calendar (**Form-8**)
- Irrigation schedule and water distribution plan (**Form-11**)
- Operation record (**Form-4**)
- OMM Manuals
- Water Distribution Manual

v. How is the implementation of operation and water distribution carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the Water, Operation and Maintenance subcommittee and other members of the IO on key areas when implementing operation and water distribution.

DIO in collaboration with RIO will provide necessary assistance in IO's activities. DIO will receive the copies of the final outputs of Form-1, Form-8, Form-4 and Form-11 from the subcommittee so that the DIO can provide support to the IO's activities when necessary.

The Water, O&M subcommittee will go through the following sub-steps when implementing operation and water distribution.

Sub-step 1: Practice of operation

The Water, O&M subcommittee will operate the irrigation and other related facilities in accordance with the following:

- Operation plan (**Form-1**)
- Cropping calendar (**Form-8**)
- Irrigation schedule and water distribution plan (**Form-11**)
- OMM Manuals
- Water Distribution Manual

The operation is organized in accordance with planned cropping calendar, water distribution and operation plan

Sub-step 2: Operation recording

The Water, O&M subcommittee will keep records of operation, using **Form-4**.

2.2.5 Step-5: Implementation of Maintenance

i. Key Message

The Water, O&M subcommittee which in charge of management of maintenance will make arrangements and implement maintenance work in accordance with the maintenance plan for one or two seasons.

ii. Why is the Implementation of Maintenance required?

Through organized maintenance work, facilities can be maintained well, and damaged facilities can be repaired without difficulties before the damage becomes severe.

iii. Key for the success of the Implementation of Maintenance

The irrigators participate in the planned and agreed maintenance activities

iv. Required inputs

- Facilitator: District Irrigation Office(DIO), RIO and DO as required

- The IO management committee and other members of irrigators' organization (IO)
- Basic maintenance plan (**Form-2**)
- Maintenance plan (**Form-12**)
- Maintenance record (**Form-5**)
- OMM Manuals
- Farmers Participatory Repair Work Manual

v. How is the Implementation of Maintenance carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the Water, Operation and Maintenance subcommittee and other members of the IO on key areas when implementing maintenance.

DIO in collaboration with RIO will provide necessary assistance in IO's activities. DIO will receive the copies of the final outputs of Form-2, Form-5and Form-12 from the subcommittee so that the DIO can provide support to the IO's activities when necessary.

The Water, O&M subcommittee will go through the following sub-steps when implementing maintenance.

Sub-step 1: Practice of maintenance

The Water, O&M subcommittee in charge of management of maintenance will make arrangements for maintenance work and implement the maintenance work in accordance with the following:

- Basic maintenance plan (**Form-2**)
- Maintenance plan (**Form-12**)
- OMM manuals and
- Farmers Participatory repair work manual

The maintenance is organized in accordance with maintenance plan.

Sub-step 2: maintenance recording

The water, O&M subcommittee in charge of management of maintenance will keep records of maintenance, using **Form-5**.

2.2.6 Step-6: Implementation of Scheme Management

i. Key Message

The subcommittee in charge of Administration, Planning and Finance will make sure that financial management, Asset management and Human resource management are managed accordingly.

Whereas, the subcommittee in charge of Agriculture and Environment will make sure that environment management and land management are also managed accordingly.

ii. Why is Scheme Management required?

Through proper scheme management, it facilitates transparency and accountability to IO members and other relevant stakeholders; it encourages their participation in OMM activities of the irrigation scheme.

iii. Key for the success of Scheme Management

Payment of Irrigation service fee, proper maintenance and record of assets, capable human resources, conserved environment and proper land use.

iv. Required inputs

- Facilitator: District Irrigation Office(DIO), RIO and DO as required
- OMM Manuals.
- IO Constitution and bye laws
- National Irrigation Act (4), 2013
- National Irrigation Regulation, 2015
- The IO management committee and other members of irrigators' organization (IO)
- OMM Budgeting (**Form-3**)
- Financial record (**Form-6**)
- OMM contract

v. How is the Scheme Management carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the Administration, Planning and Finance subcommittee, Agriculture and Environment subcommittee and other members of the IO on key areas of financial management, asset management, human resource management, environment management and land management.

DIO in collaboration with RIO will provide necessary assistance in these IO's activities. DIO will receive the copies of the final outputs of Form-3, Form-6 and a copy of OMM contract from the subcommittees so that the DIO can provide support to the IO's activities when necessary.

The Administration, Planning and Finance subcommittee and the Agriculture and Environment subcommittee will go through the following sub-steps when implementing scheme management.

Sub-step 1: Implementation OMM contract

The IO management committee and NIRC will oversee the implementation of **signed OMM contract** in accordance with the following:

- IO Constitution and by laws
- National Irrigation Act (4), 2013
- National Irrigation Regulation 2015
- Operational and maintenance plans;
- Scheme Rehabilitation Plan
- Water use permit from Basin Authority;
- List of Key Performance Indicators agreed between two parties;
- National Irrigation (Service Fees) Order, 2021 GN No. 496P;
- IO Registration Certificate under Cap. 435; and
- Scheme layout map.

Sub-step 2: Irrigation Service Fee Collection

The IO management committee will receive Irrigation Service Fee (**ISF)** invoice from NIRC and task subcommittee in charge of Administration, Planning and Finance to issue bills to IO members and collect the same accordingly. IO member will pay to Treasurer whereby IO receipt will be issued. In other case, IO members will directly receive **ISF** invoice from NIRC and pay direct using the Government control number. Once paid using Government control number, IO member will submit to the Treasurer a payment receipt (control number receipt/message) as a proof of payment whereby a Treasurer will issue IO receipt. The fee collection process will be done in accordance with the following:

- OMM Budgeting **(Form- 3)**
- Financial recording **(Form-6)**
- National Irrigation (Service Fees) Order, 2021 GN No. 496P;

Sub-step 3: Financial management

Treasurer will collect the fee (cash, cheque or Control number payment receipt) from IO members, record in Record of fee collection (form - 6). Collected fee in cash or cheque will be deposited to NIRC Bank Account based on control number issued. Auditing (Internal & External) should be done regularly, Financial report to be shared to the General meeting according to IO constitution. Report sharing encourage transparency and accountability to IO members and other relevant stakeholders;

Fee Collection and Financial Management is organized in accordance with financial plan and supporting relevant documents.

2.2.7 Step-7: Monitoring and evaluation of Operation, Management and Maintenance

i. Key Message

The Administration, planning and finance subcommittee will be responsible for monitoring and evaluating operation, management and maintenance activities.

ii. Why is Monitoring and evaluation of Operation, Management and Maintenance required?

Monitoring and evaluation of Operation, management and Maintenance (OMM) is the process of continuously observing and assessing the performance and condition of an irrigation Asset or equipment during its operational life, with the aim of identifying potential issues, ensuring optimal functionality, and preventing failures. It involves tracking Key Performance Indicators (KPI), conducting routine inspections, and analysing data to proactively address problems and maintain the system's health and efficiency.

Through organized maintenance work, facilities can be maintained well, and damaged facilities can be repaired without difficulties before the damage becomes severe. Financial monitoring ensures transparency and accountability to the IO. The monitoring and evaluation results can be utilized for future Operation, management & Maintenance planning and implementation

iii. Key for the success of Monitoring and evaluation of Operation, management and Maintenance

The success of Monitoring and evaluation of Operation, management and Maintenance is when problems are seen, the sources of the problems are identified and necessary actions are taken proactively

iv. Required inputs

- Facilitator: District Irrigation Office(DIO), RIO and DO as required
- OMM Manual
- The IO management committee and other members of irrigators' organization (IO)
- Operation plan (**Form-1**)
- Basic maintenance plan (**Form-2**)
- OMM Budgeting **(Form-3**)
- Financial record (Form- 6)
- Cropping calendar (**Form-8**)
- Irrigation schedule and water distribution plan (**Form-11**)
- Maintenance plan (**Form-12**)
- Operation record (**Form-4**)
- Maintenance record (**Form-5**)
- Reporting format **(Form – 7)**
- Monitoring and evaluation sheet and Check form
- Financial report

v. How is the Scheme Management carried out?

DIO in collaboration with RIO and DO will organize training sessions and train the IO management committee and the Administration, planning and finance subcommittee on how to perform monitoring and evaluation activities taking into account issues of consideration.

DIO in collaboration with RIO will provide necessary assistance in these IO's activities.

The IO management committee and the Administration, Planning and Finance subcommittee will go through the following sub-steps when performing monitoring and evaluation activities.

Sub-step 1: Monitoring work

The Administration, planning and finance subcommittee will monitor operation, maintenance and management activities, following the instruction given in **Technical Guidance** (**Explanatory Note 1), OMM manuals OMM Monitoring** and **evaluation sheet** and **OMM Check form.**

For monitoring of operation, the following data can be used:

- Operation plan (**Form-1**)
- Cropping calendar (**Form-8**)
- Irrigation schedule and water distribution plan (**Form-11**)
- Operation record (**Form-4**)
- Observation of irrigation situations of fields, canals and structures
- Measured flow rate at different points of the irrigation infrastructure

For monitoring of maintenance, the following data can be used:

- Basic maintenance plan (Form-2)
- Maintenance plan (Form-12)
- Maintenance record (Form-5)
- Observation of irrigation situations of fields, canals and structures

Sub-step 2 Evaluation of data, detection of problems and reporting

The Administration, planning and finance subcommittee will evaluate the monitoring data, detect the problems and report the problems to the IO management committee, using **(Form – 7), Training report** and **progress report (Quarterly report).**

CHAPTER 3

3. FORMS

3.1 Form-1: Operation plan

(1) Irrigators organization (IO) member list

Scheme name: _____

IO name: _____

IO Reg. No: _____

District name: _____

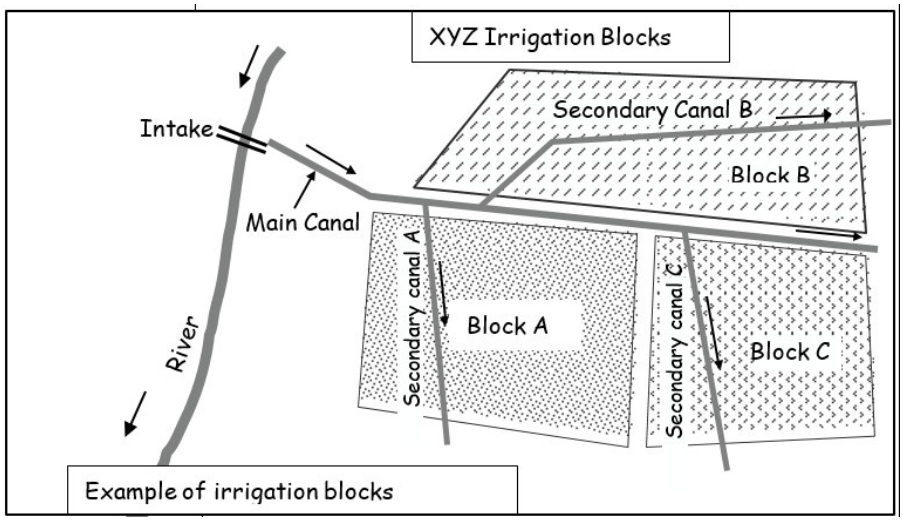
Region name: _____

S/N	NAME	GENDER	DATE OF BIRTH	EDUCATION	VILLAGE	BLOCK NAME	ACREAGE	CROPS	NIDA NUMBER	PHONE NUMBER
eg	PILI J. Masanja	F	15/07/1985	Primary	Usoke	Braison	1	Paddy	19700516890 1234567890	0786000121
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10										

(2) Division of irrigation area into several irrigation blocks

The proposed irrigation area will be divided into the following irrigation blocks. This will be a basis for water distribution planning.

Example of irrigation scheme sketch divided by irrigation blocks.



Sketch of whole irrigation area divided into irrigation blocks

NOTE: Major structures, such as intake gates, head gates of secondary canals and major tertiary canals, major turnouts, and flow measuring devices, shall be drawn on this sketch.

(3) Area of irrigation blocks

Name of irrigation block	Area (acre)	Remarks
Total		

(4) Basic method of operation

Location	Name of Infrastructure	In charge of Operation	Method of operation
Intake	*Intake Gate*	*Block A O&M sub committee*	*Time sharing*

NOTE: In the column of "Method of operation," the following descriptions, for example, can be entered:

- In the case of gate facilities → "operating gate in the method of time sharing or flow sharing" (See **Technical Guidance** (**Explanatory Note 1**.)
- In the case of measuring facilities → "Checking flow rate every day or every week"

3.2 Form-2: Basic maintenance plan

(1) Routine maintenance and periodical maintenance – basic plan of activities for each element of the irrigation system

Irrigation facilities	Activities	Frequency of implementation	Water, O&M Subcommittee and any other support
Intake weirs and gates	Cleaning and removal of floating debris and foreign materials around weir bodies, trash racks, and scouring sluice gates		
	Cleaning of the site around the intake		
	Lubrication – oiling or greasing of gates		
	Anticorrosion treatment – painting of metal works		
	Monitoring of water quality of the river		
	Removal of solid deposition – silt and stones, if possible		
Irrigation network - lined canals	Repair of damaged joints, slabs and lining concrete with cracks		
	Weed control at joints and on surface of slabs		
	Removal of silt		
Irrigation network – unlined canals	Removal of silt		
	Cutting and removal of earth weeds and waterweeds on wetted parts of canal slopes, and floating waterweeds		
	Plugging small holes and replacement of porous soils to prevent seepage		
	Rebuilding of eroded banks		
Head gates, check gates and other structures	Removal of silt and obstructions		
	Lubrication – oiling or greasing – of gates		
	Anticorrosion treatment – painting of mechanical elements		
Dams and reservoirs	Removal of waterweeds		
	Removal of foreign materials		
	Lubrication – oiling or greasing of gates		
	Anticorrosion treatment – painting of gates		
	Monitoring of water quality - Survey and remove, if possible, solid deposition – silt and stones		

Irrigation facilities	Activities	Time of implementation	Responsible Subcommittee of IO and any other support
Drainage network	Weed control in the canal section		
	Removal of silt		
	Repair and shaping of canal section		
Farm roads	Refilling of holes on road surface		
	Grading road surface		
	Repair of road shoulders eroded		
	Desilting and repair of side ditches and culverts		
	Provision of additional pavement materials for paved roads		
Flood dikes	Refilling of holes on dike surface		
	Grading dike surface		
	Repair of shoulders eroded		
Bunds in the fields	Weed control		
	Compaction		

(2) Special maintenance Plan

Measures in the case of damages by unforeseen disasters – what we shall do in case the irrigation facilities are damaged by unforeseen disasters, e.g. flood, heavy rainfall, earthquake, theft etc.

Plan of preventive actions – what we shall do to prevent or alleviate damages by unforeseen disasters.

3.3 Form-3: Operation and maintenance budgeting plan

The budget of operation and maintenance is planned for one or two seasons as follows:

Expected Revenue: **Period:** **From(Month/Year):** **To(Month/Year):**

Description	Unit	Quantity	Unit Rate (Tshs.)	Amount (Tshs.)
Irrigation service fees				
Others				
Subtotal				
Total				

Expected Expenditure: **Period:** **From(Month/Year):** **To(Month/Year):**

Description	Unit	Quantity	Unit Rate (Tshs.)	Amount (Tshs.)
Water use permit fee				
Materials				
Subtotal				
Labour				
Subtotal				
Utility cost for office				
Subtotal				
Others				
Subtotal				
Total				

3.4 Form-4: Operation record (Water distribution records)

Recorded by: ……

Date	Activities	Cost	Observations

NOTE: Water, O&M subcommittee and each of the gate operators – shall keep the operation record using this format. The contents of work, place of work, etc., should be described in the column of "Activities". The situations of the fields, canals, gates and other facilities and location of observation measured flow rate and its location should be described in the column of "Observation".

3.5 Form-5: Maintenance record

Recorded by: ……

Date	Activities	Cost	Observations

NOTE: Water, O&M Subcommittee shall keep the maintenance record using this format.

The contents of work, place of work, materials purchased, amount of money spent, etc., should be described in the column of "Activities".

The situations of fields, canals, gates and other facilities and location of observation should be described in the column of "Observation".

3.6 Form-6: Financial record

(1) Record of fee collection

Recorded by: .....

Name of irrigators' Organization	Irrigation area (acre)	Amount Required		Amount Received	
		Amount (Tshs.)	Deadline	Amount(Tshs.)	Date
Isa Hasan	*2*	*8000/=*	*1/2/2009*	*2000/=*	*5/2/2009*

(2) Record of revenue and expenditure

Recorded by: ....

Date	Description	Revenue (Tshs.)	Expenditure (Tshs.)	Balance (Tshs.)
01/02/2009	*OMM fee*	*1,000,000*		*1,000,000*
04/03/2009	*Repair of division boxes*		*100,000*	*2,900,000*
20/03/2009	*Water use fee*		*300,000*	*2,600,000*

(3) Record of Credit (Loan and Reimbursements)

Recorded by: .....

Date	Description	Loan (Tshs.)	Reimbursement (Tshs.)	Outstanding Balance (Tshs.)	Remarks
01/02/2009	*POWER TILLER*	*7,000,000/=*		*7,000,000/=*	
03/03/2009	*First Reimbursement - Power Tiller*		*5,000,000/=*	*2,000,000/=*	

(4) Financial statement

Date: ……..……

Balance in account

Recorded by: ……..….

Description	Balance in account (Tshs.)
Balance brought forward (B/F)	
A/c No. 123456 NMB - Mbinga (O&M Fund)	*2,690,250/=*
Total	

Credit

Description	Outstanding balance (Tshs.)
Loan Power Tiller	*2,000,000/=*
Total	

Revenue

Period: From(Month/Year): **To(Month/Year):**

Description	Budget (Tshs.)	Actual amount (Tshs.)
OMM irrigation fees	*12,000,000/=*	*9,000,000/=*
Total		

Expenditure **Period: From(Month/Year):** **To(Month/Year):**

Description	Budget (Tshs.)	Actual amount (Tshs.)
Water use permit fee		
Materials		
SubTotal		
Labour		
Subtotal		
Utility cost for office		
Subtotal		
Others		
Subtotal		
Total		

3.7 Form-7: Reporting format

To: Water, O&M Subcommittee

Date: ……..

Reported by (Block leader: ……

Description of problem:

Eg. Leakages at DB 12 Block A caused by damaged wall.

Proposed measures, solutions and actions:

Eg. Demolition of the damaged wall and construction of the new one. This is an emergency and needs a quick action

3.8 Form-8: Cropping calendar and patterns

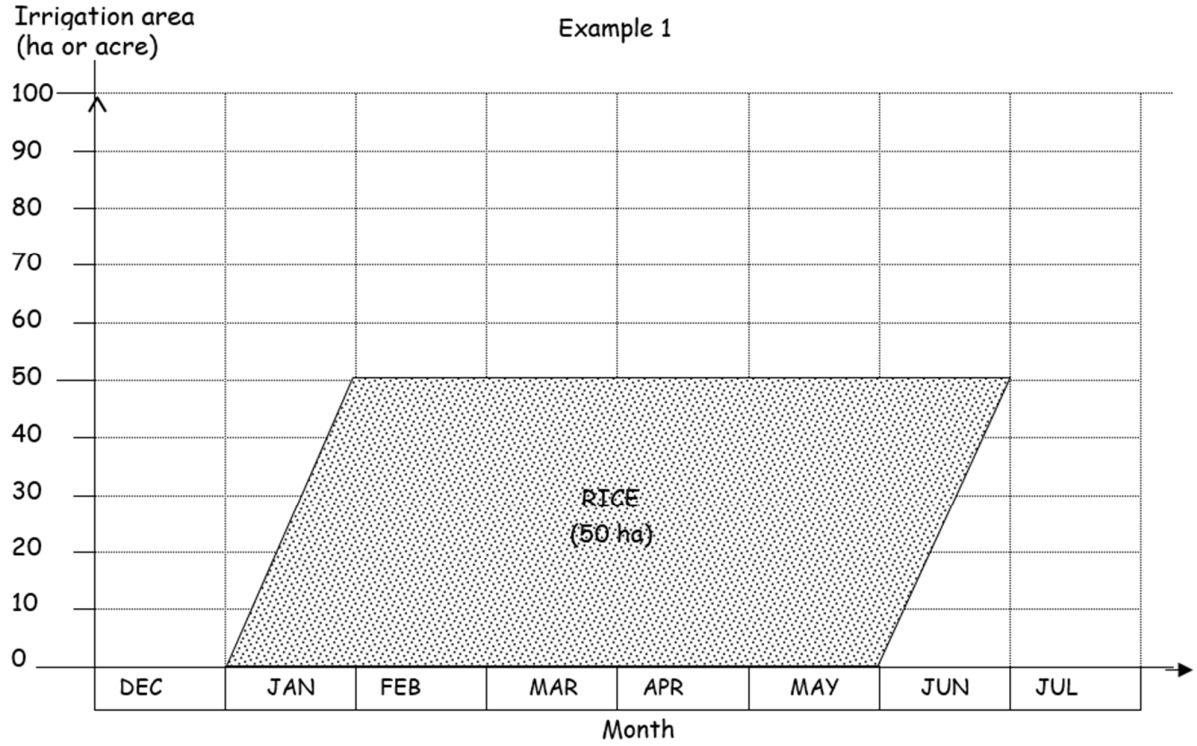
		RAINY SEASON																						DRY SEASON																							
SN	ACTIVITIES	JAN				FEB				MAR				APR				MAY				JUN				JUL				AUG				SEPT				OCT				NOV				DEC			
1	Ploughing																																															
2	Nursery preparations																																															
3	Seed sowing in the nursery																																															
4	Puddling																																															
5	Transplanting																																															
6	Weeding																																															
7	Pest and Disease management																																															
8	Fertilizer applications																																															
9	Bird scaring																																															
10	Harvesting																																															
11	Threshing																																															
12	Drying																																															
13	Storage																																															

Form 8-1 Cropping Calendar

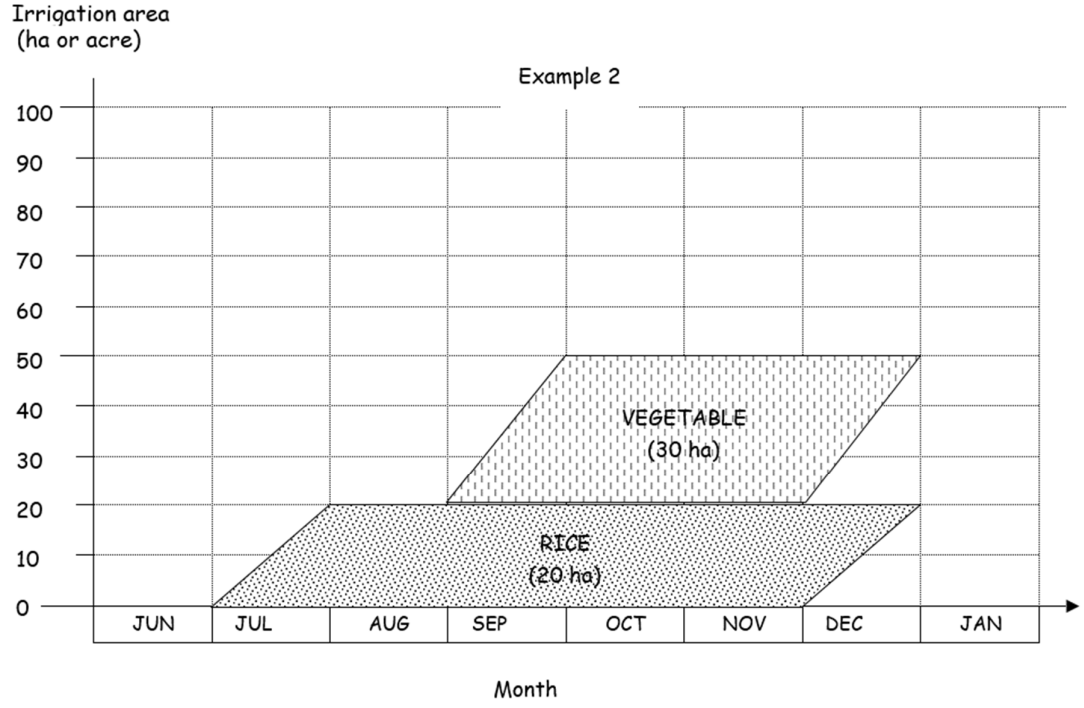
Note: Example of cropping calendar for two seasons of Rice crop

Form-8-2 Cropping pattern

(a) Rainy season



(b) Dry season



3.9 Form-9: Calculation sheet for water demand in each month

(a) Rainy season

		DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
Name of Block:	Gross unit water requirement (litre/sec/ha)								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	Gross unit water requirement (litre/sec/ha)								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	Gross unit water requirement (litre/sec/ha)								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	Gross unit water requirement (litre/sec/ha)								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	Gross unit water requirement (litre/sec/ha)								
	Area (ha)								
	Water demand (litre/sec)								
Total water demand (litre/sec)									

(b) Dry season

		JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Name of Block:	**Gross unit water requirement (litre/sec/ha)**								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	**Gross unit water requirement (litre/sec/ha)**								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	**Gross unit water requirement (litre/sec/ha)**								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	**Gross unit water requirement (litre/sec/ha)**								
	Area (ha)								
	Water demand (litre/sec)								
Name of Block:	**Gross unit water requirement (litre/sec/ha)**								
	Area (ha)								
	Water demand (litre/sec)								
Total water demand (litre/sec)									

NOTE:

1) Fill out the above form, assuming that you will irrigate the whole proposed irrigation area from the month of starting irrigation to the month of finishing irrigation.
2) The data of gross unit water requirement will come from the table on form-11.
3) Water demand for each block will be calculated by the following formula:

   Water demand (litre/sec) = Gross unit water requirement (litre/sec/ha) X Area (ha)

Form-9-1 Gross unit water requirement

(Summarized table (a) and (b) of Form-9)

Unit: litre/sec/ha

		JAN	FEB	MAR	APR	MAY	JUN
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
		JUL	AUG	SEP	OCT	NOV	DEC
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						
Name of Block:	Gross unit water requirement						
	Adjusted						

3.10 Form-10: Estimation of water supply in the coming seasons

		JAN	FEB	MAR	APR	MAY	JUN
Water availability (litre/sec)	**Average year**						
	Year of 80% dependability						
Proposed water supply (litre/sec)							
Expected water supply (litre/sec)							
		JUL	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Water availability (litre/sec)	**Average year**						
	Year of 80% dependability						
Proposed water supply (litre/sec)							
Expected water supply (litre/sec)							

NOTE:

1) The data of water availability in each month in the average year and in the year of 80% dependability are given in the feasibility study report. Try to find out the data of water availability from the feasibility study report and fill out the above form.

2) The data of proposed water supply, determined on the basis of the minimum irrigation area covered by the minimum water availability in the year of 80% dependability, are also given in the feasibility study. Try to find out the data of proposed water supply from the feasibility study report and fill out the above form. (Proposed means proposed in F/S.)

3) The year of 80% dependability means a dry year which occurs at the rate of once in 5 years. The amount of water availability in the year of 80% dependability can cover the proposed irrigation area in 4 years out of 5 years. It means that you will run short of water in 1 year out of 5 years.

4) The water right will be acquired for the proposed water supply – the minimum water availability in the year of 80% dependability. Note that you cannot abstract more water even if the water source has much available water.

5) The expected water supply equals the proposed water supply in normal years. If you predict that the coming season will be a drier year than the year of 80% dependability according to the long-range weather forecast and your past experiences, the expected water supply only in dry season shall be 80% to 95% of the proposed water supply.

6) Information to be filled can also be obtained from the relevant water basin offices

3.11 Form-11: Irrigation schedule and water distribution plan

(a) Rainy season

		DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
Expected water demand (litre/sec)	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Total								
Expected water supply (litre/sec)									
Plan of water distribution (litre/sec)									
Date of starting irrigation and Date of finishing irrigation	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								

NOTE:

1) The data of expected water demand comes from **Form-9**.

2) The data of expected water supply comes from **Form-10**.

3) The plan of water distribution will be determined by the following rule:

In case expected water supply > or = expected water demand,
plan of water distribution = expected water demand

In case expected water supply < expected water demand,
plan of water distribution = expected water supply

4) In case expected water supply < expected water demand, careful water management and particularly efficient water use will be needed.

(b) Dry season

		JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN
Expected water demand (litre/sec)	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Total								
Expected water supply (litre/sec)									
Plan of water distribution (litre/sec)									
Date of starting irrigation and Date of finishing irrigation	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								
	Name of block: ( )								

NOTE:

1) The data of expected water demand comes from **Form-9**.

2) The data of expected water supply comes from **Form-10**.

3) The plan of water distribution will be determined by the following rule:

In case expected water supply > or = expected water demand,
plan of water distribution = expected water demand

In case expected water supply < expected water demand,
plan of water distribution = expected water supply

4) In case expected water supply < expected water demand, careful water management and particularly efficient water use will be needed.

(c) Method of water distribution

1. Adopted method; ☐ **Flow sharing method**

☐ **Time sharing Method**

2. Irrigation schedule (in the case of time-sharing method)

Day	Block to be irrigated
1st day	A (98HA)
2nd day	B
3rd day	C
4th day	D
5th day	A
6th day	B
7th day	C
8th day	D
9th day	A
10th day	B

3.12 Form-12: Maintenance plan

Concrete planning of time and resources of maintenance activities planned in Form-2

Month / year	Week	Plan of activities	Necessary resources
JAN /	1		
	2		
	3		
	4		
	5		
FEB /	1		
	2		
	3		
	4		
	5		
MAR /	1		
	2		
	3		
	4		
	5		
APR /	1		
	2		
	3		
	4		
	5		
MAY /	1		
	2		
	3		
	4		
	5		

Month / year	Week	Plan of activities	Necessary resources
JUN /	1		
	2		
	3		
	4		
	5		
JUL /	1		
	2		
	3		
	4		
	5		
AUG /	1		
	2		
	3		
	4		
	5		
SEP /	1		
	2		
	3		
	4		
	5		
OCT /	1		
	2		
	3		
	4		
	5		
NOV /	1		
	2		
	3		
	4		
	5		
DEC /	1		
	2		
	3		
	4		
	5		

CHAPTER 4

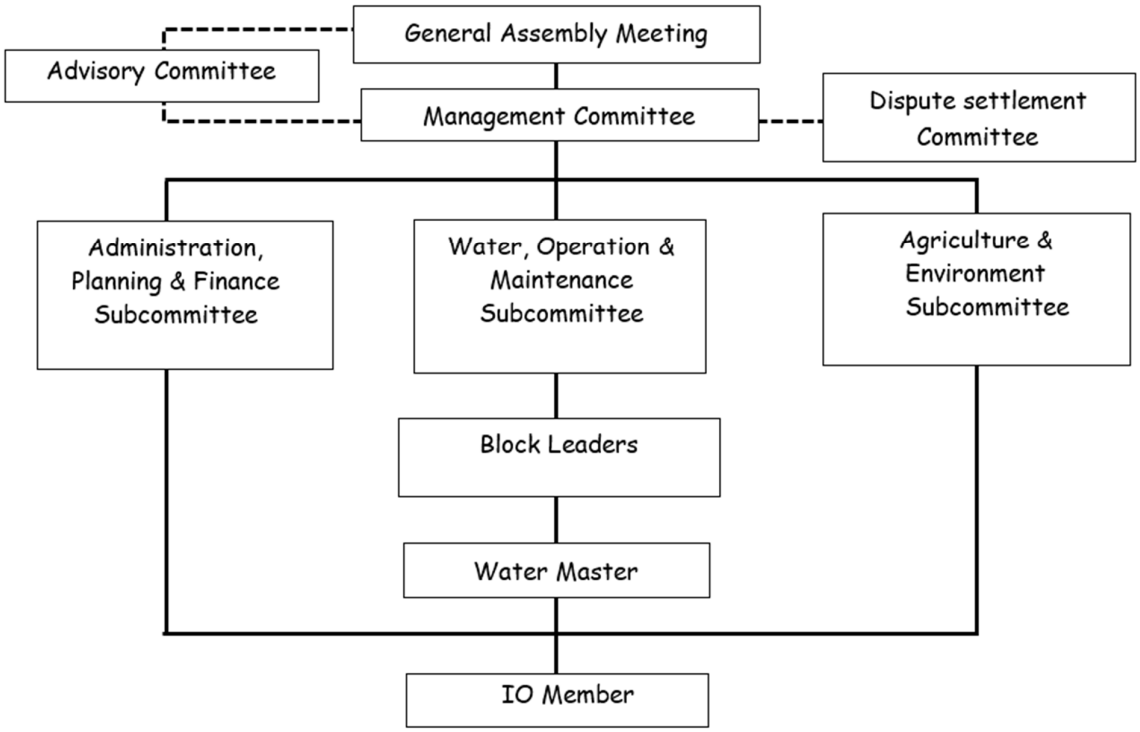
4. TECHNICAL GUIDANCE

Explanatory Notes

Explanatory Note 1: How to establish the operation, management and maintenance of irrigation scheme

Organization chart of the irrigators' organization.

A sample organization chart of the irrigators' organization (IO) is shown below. The IO can organise several subcommittees in accordance with the IO members' intention and needs.

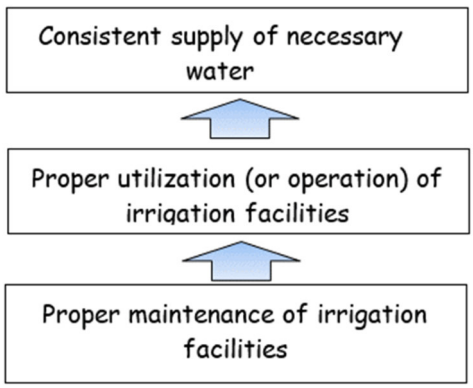


1. Concept of operation, management and maintenance system

The fundamental objective of the irrigation facilities is to supply necessary irrigation water consistently for the beneficiaries.

In order to supply necessary irrigation water consistently for beneficiaries, we need to utilize (or operate) the irrigation facilities properly.

In order to utilize (or operate) the irrigation facilities properly, we need to maintain the facilities.



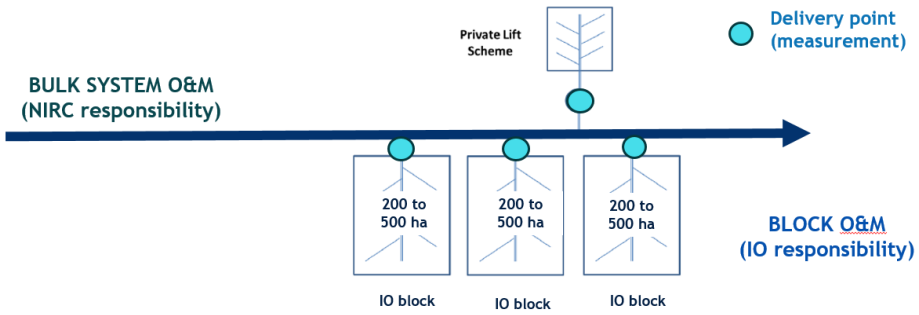
On the other hand, if we do not maintain the irrigation facilities properly, we cannot utilize (or operate) the irrigation facilities properly.
Also, if we do not utilize (or operate) the irrigation facilities, necessary irrigation water cannot be supplied consistently for the beneficiaries.

The IO members should understand that establishment of the operation and maintenance system means to establish the operation and maintenance roles and responsibilities for the purpose of satisfying basic objective of the irrigation facilities.

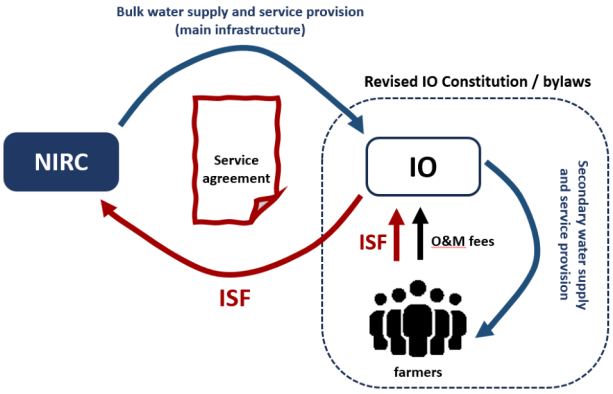
Building from the role definition exercise and the problem identification, a revised set of responsibilities for NIRC and IO is defined. This is the central part of developing an agreement.

The assignment of roles is a negotiated process conducted through an interactive process involving mapping, asset listing and specific maintenance tasks that related to each of the asset (eg. desilting bi-annually, ad-hoc repairs, routine gate maintenance, removing vegetation bi-annually, roads maintenance etc.), operational tasks for water distribution, coordination tasks between NIRC and IO, billings, reporting, financial, administration and customer relations.

Establishing and enabling effective service delivery through NIRC and IO roles and responsibilities



OMM service agreement implementation

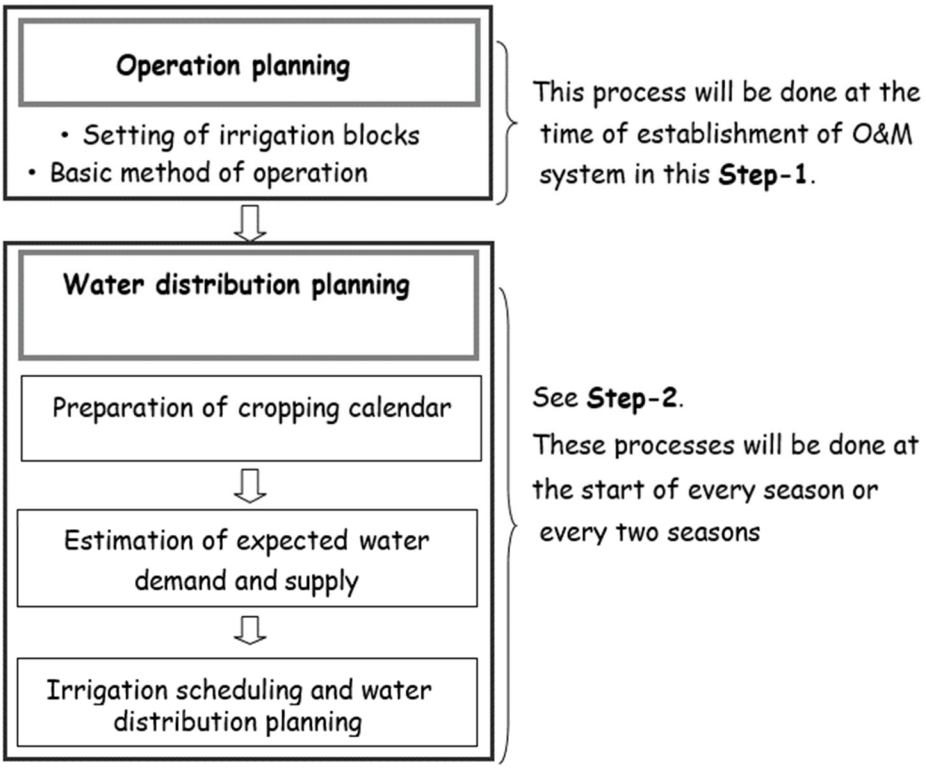


2. Water distribution based on operation plan

The effective OMM requires that infrastructure is functional to a minimum level and that the basic flow measurement is in place at key points in the system particularly where the NIRC bulk water supply responsibility is handed over to the IO secondary and tertiary functions.
An important issue in the basic operation plan is dividing the whole irrigation area into several irrigation blocks. The blocks will usually be determined by secondary canals. In case the blocks determined by secondary canals are too large, they can be divided into smaller blocks by groups of tertiary canals.

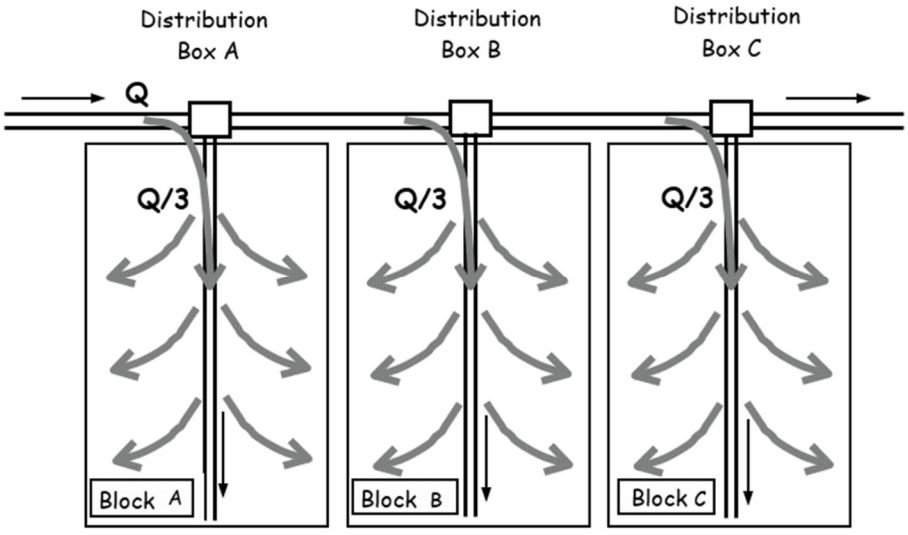
The water distribution diagram which was prepared during the Detailed Design stage shall be modified in accordance with the actual division of irrigation blocks and actual planting acreage (scheme layout map).

An irrigation block is a practical unit for managing the operation.

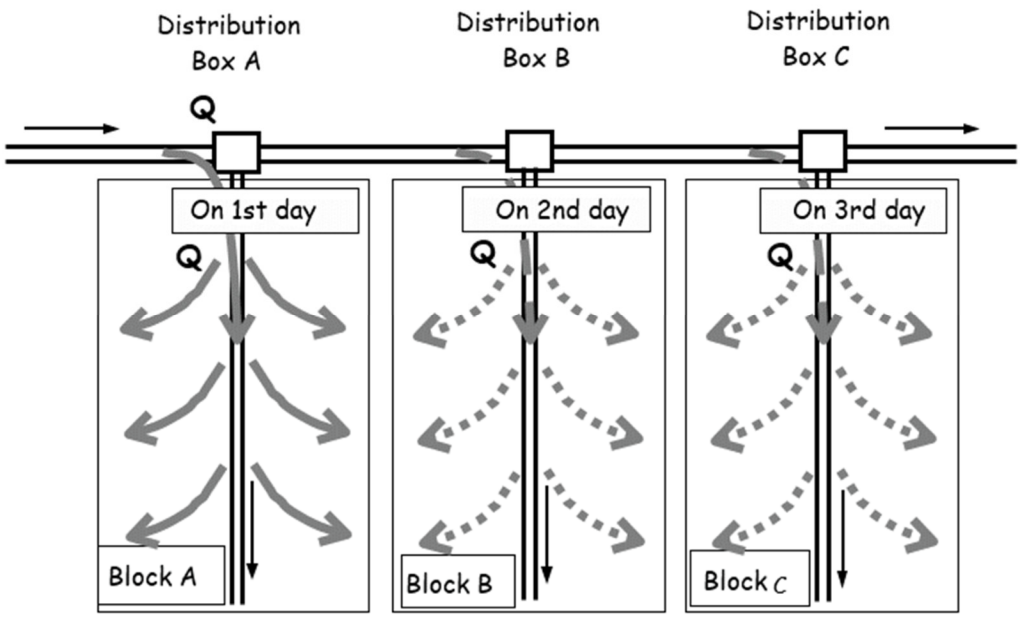


There are two different methods of water distribution, that is, flow sharing method and time sharing method.

(1) **Water flow sharing method**: distributing water continuously to each irrigation block



(2) Water sharing method by Time: distributing water by rotation

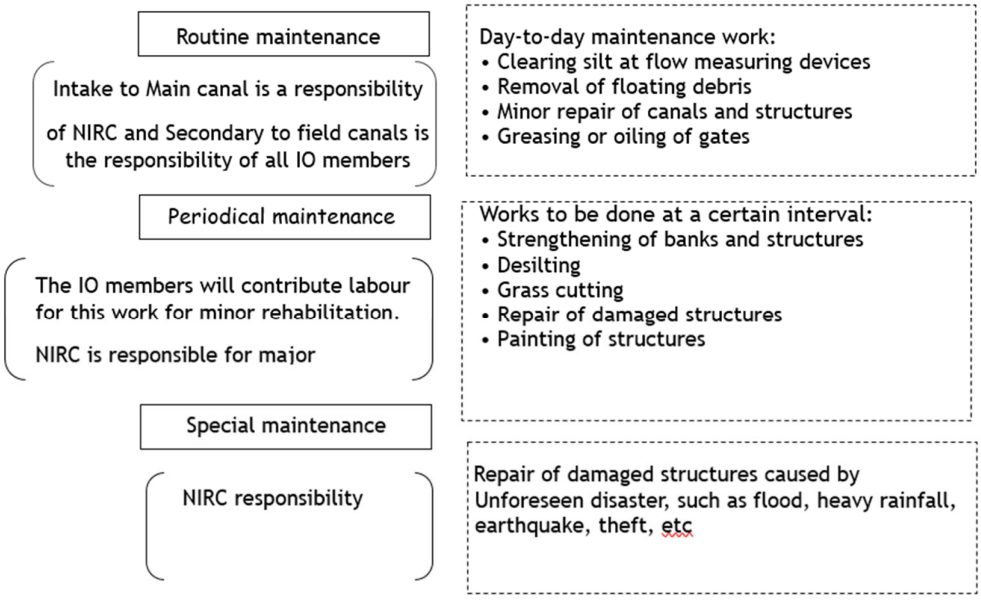


In the general meeting, the beneficiaries will discuss the following to determine the basic operation plan:

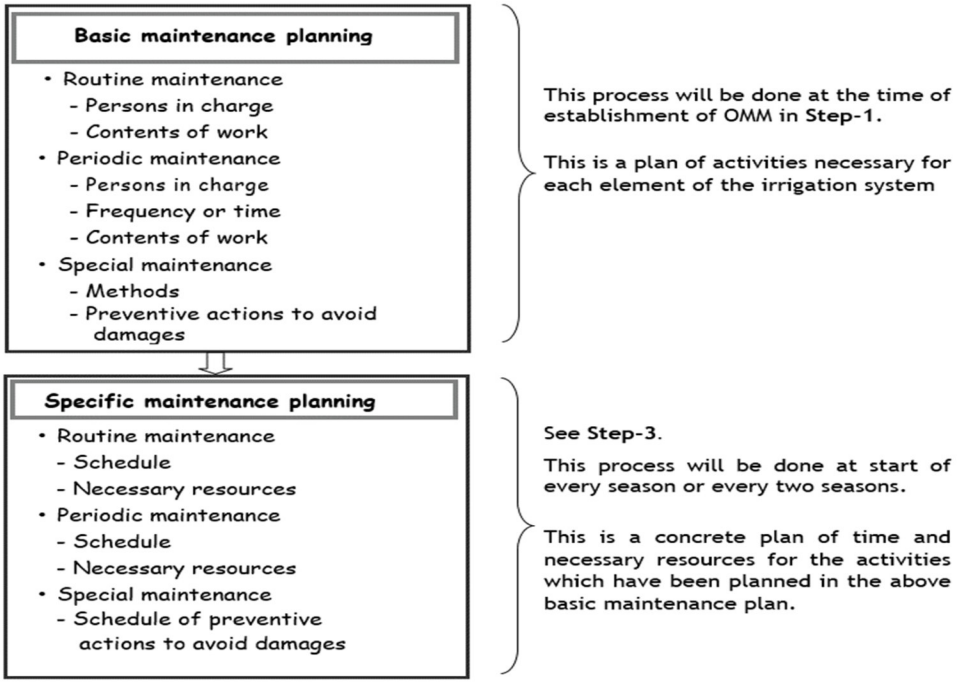
- How to divide irrigation blocks.
- Whether to adopt flow sharing method or time sharing method.
- How to coordinate the intention of farmers who have large farmland and farmers who have small farmland, farmers in upstream area and farmers in downstream area.

3. Maintenance planning

The maintenance work can be classified into the three types of work as follows:



The maintenance planning will be done through the following processes:

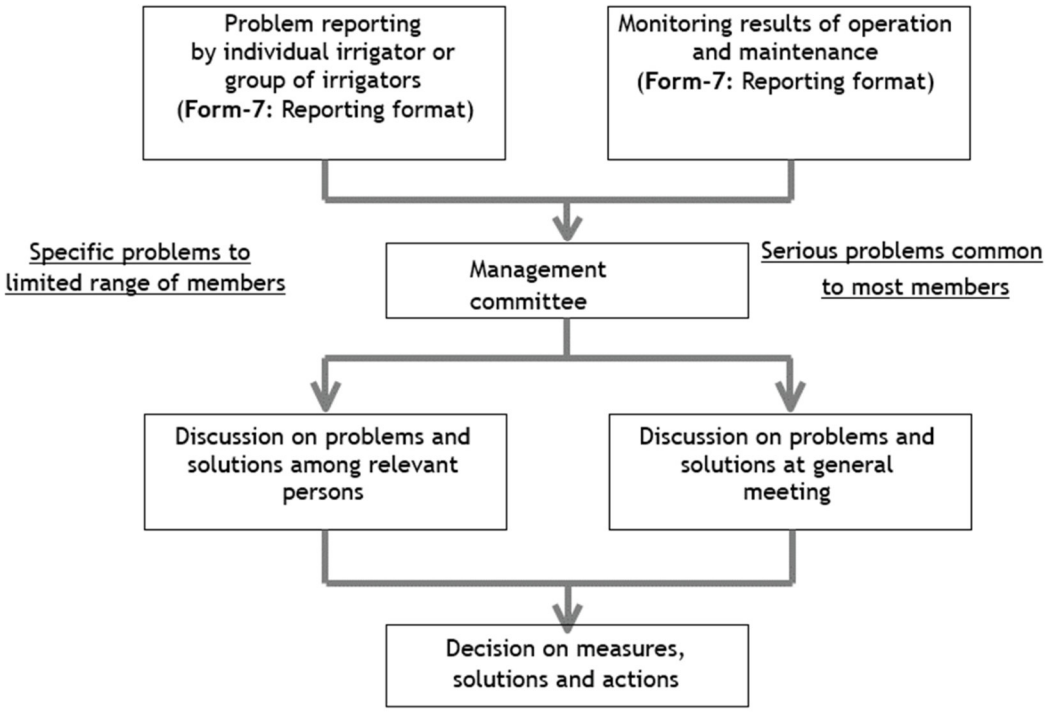


If the beneficiaries of the IO need some assistance from the village government or the district in the maintenance activities, the IO shall specify in the maintenance plan the contents of the necessary assistance.

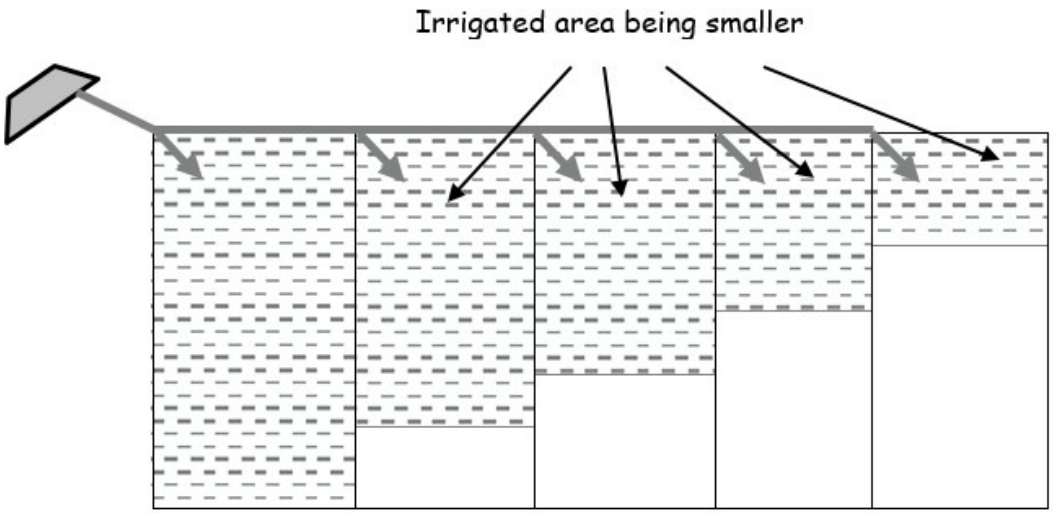
Furthermore, if the beneficiaries need to hire a contractor for the maintenance activities, the IO shall specify in the maintenance plan the works which are supposed to be done by the contractor.

4. Method of problem solving, decision making and conflict management

When some problems arise, the following procedure usually will be followed:



A common problem on water distribution is illustrated below. In particular, in case water supply is limited, the situation of unequal water distribution will be seen. More specifically, upstream land plot receives more water and downstream land plot receives less water. Also, in a single land plot, more water is supplied at head end and less water is supplied at tail end



Unequal water distribution

To minimize conflicts relating to water distribution, the following measures are possible:

- Strict implementation of the planned cropping calendar and pattern of planting.
- Strict implementation of the schedules of water delivery and distribution.
- Regular review of supply and use of irrigation water at different irrigation units.
- Immediate initiation of actions on inequity in water delivery and distribution

5. Method of financial management

Financial management has three components, namely:

- Financial planning – planning and budget preparation
- Financial recording – maintenance of accounts
- Financial control – auditing

For financial planning and budgeting, the IO shall:

- Identify and carry out assessment of sources of income – irrigation fee collected from the members is an important source of income for water management.
- Prepare estimates for expenditure over a specified period – usually, one or two seasons in a year.
- Agree on financial regulation.
- Develop a financial budget for the year to balance income and expenditure.

For financial recording – maintenance of accounts,

- For every income to the IO, an official receipt must be issued.
- For any expenditure by the IO, a cash sale must be obtained and recorded.
- A cashbook must be properly maintained.
- All accounts must be properly classified.
- Financial statements must be produced on a regular basis.

For financial controlling – auditing, it is recommended that the IO should:

- Procure a reputable agency to do auditing.
- Check legitimacy of expenditure and the procedure that was followed.
- Report anomalies for the purpose of making improvements.
- Take measures to implement the auditor's recommendations.

6. Method of Environmental management

Environmental management involves safeguarding natural resources and minimizing negative environmental impacts associated with irrigation activities. Its goals are sustainability, compliance with environmental regulations, and ecosystem protection.

Key Aspects:

- **Water conservation**: Promoting efficient water use through modern technologies like drip or sprinkler systems.
- **Pollution control**: Preventing contamination of water bodies from agrochemicals, waste, or sediment runoff.
- **Soil protection**: Avoiding waterlogging, erosion, and salinization through proper irrigation scheduling and land grading.
- **Ecosystem preservation**: Ensuring that irrigation projects do not degrade wetlands, forests, or habitats for wildlife.

Environmental Impact Assessments (EIA): Conducted before scheme establishment or expansion to evaluate and mitigate risks.

7. Method of Asset management

Asset management focuses on maximizing the performance and lifespan of physical infrastructure used in irrigation schemes while minimizing lifecycle costs.
Key Aspects:

- **Asset inventory**: Documentation of all infrastructure such as canals, pumps, pipelines, gates, and reservoirs.
- **Maintenance scheduling**: Routine and preventive maintenance to avoid equipment failure and service interruption.

- **Rehabilitation and upgrades**: Timely repair or replacement of aging infrastructure to maintain system efficiency.
- **Monitoring and inspection**: Regular assessment of asset conditions to detect wear and prioritize investments.
- **Asset financing**: Planning for the funding needed for asset upkeep and renewal.

8. Method of Human resources management

Human resource management deals with the recruitment, development, and retention of personnel necessary for planning, operating, and maintaining irrigation schemes.

Key Aspects:

- **Capacity building**: Training staff, water user associations (WUAs), and farmers in irrigation techniques, maintenance, and governance.
- **Staff recruitment and retention**: Hiring qualified personnel such as accountants, technicians, and administrators.
- **Performance monitoring**: Setting clear roles, responsibilities, and evaluating staff performance.
- **Motivation and incentives**: Providing fair wages, recognition, and career development opportunities.
- **Labour management**: Coordinating community contributions (e.g., labor for maintenance) where appropriate.

9. Method of Land management

Land management involves organizing, utilizing, and protecting land within the irrigation area to optimize agricultural productivity and ensure sustainable use.

Key Aspects:

- **Land use planning**: Zoning areas for specific crops, access roads, drainage, and canals.

- **Land levelling and preparation**: Ensures even distribution of water and efficient drainage, reducing runoff and erosion.
- **Soil fertility management**: Promoting practices that maintain or enhance soil health.
- **Conflict resolution**: Managing disputes over land rights and boundaries within the scheme.
- **Land tenure**: Clarifying ownership and user rights to promote investment and accountability.

10. Method of monitoring and evaluation of operation

The purposes of the monitoring of operation are:

- Comparing the actual pattern of water distribution with the plan.
- Identifying the reasons for divergence of the actual pattern from the plan.
- Accumulating information on water demand, supply and performance as a guide to planning and implementation of water distribution for the forthcoming seasons.

During the irrigation period, some irrigation blocks or units sometimes receive more irrigation water than required, and some irrigation blocks or units sometimes receive less irrigation water than required. To minimize such situations, the periodical assessment of irrigation is needed.

The water, O&M subcommittee – shall be responsible for monitoring of operation. Also, it shall decide the method and the interval of monitoring.

Furthermore, in case some problems are observed from the monitoring activities, the persons in charge shall report the problems to the management committee, using the reporting format **Form-7**.

11. OMM contract Preparation and Signing

Establishing a sound framework for Operation, Management, and Maintenance (OMMM) in irrigation schemes is critical for ensuring sustainability, optimal performance, and water use efficiency. The OMM contract preparation uses the following principles:

Principle 1: Consult widely and address diverse interests -Engage all relevant stakeholders comprehensively to understand and incorporate their diverse needs and perspectives into the agreement.

Principle 2: Define roles, rights and responsibilities: Clearly specify each party's distinct roles, responsibilities, and corresponding rights within the contract to ensure accountability.

Principle 3: Define the level of service: Establish precise, measurable service targets and performance indicators that define the expected quality and scope of delivery.

Principle 4: Take account of the cost of providing the service: Ensure the full, realistic costs associated with delivering the defined service levels are transparently identified and accounted for within the agreement.

Principle 5: Build capability through the process: Design the contracting process and agreement terms to actively foster and enhance the capabilities of all involved parties over time.

Principle 6: Measure, monitor, and Amend annually if necessary: Commit to formally reviewing, measuring performance, monitoring outcomes, and amending the contract annually if necessary to adapt and improve.

The following steps below will be followed when preparing the OMM contract.

Step1: Scheme mobilization and participatory diagnostic.

Mobilization approach need to be used and include participative scheme mapping exercise to better understand local dynamics.

This approach includes:

i. **Stakeholders identification:** using conventional stakeholders listing and then mapping the linkages between them. All stakeholders need to participate in the mapping and subsequent discussions on OMM functions, roles and responsibilities.
ii. **Participative mapping:** Water users will draw a scheme map and identify all main scheme elements including infrastructure, roads, water source, farms etc.
iii. **Roles and responsibilities:** The current roles and responsibilities are mapped using the guiding framework for OMM roles in the context of the map.
iv. **Performance assessment:** The aim is to identify performance strengths and weaknesses in order to prompt and guide discussion about problems. The root causes are identified using problems driven techniques and then grouped thematically. The output becomes the focus of new arrangements and actions to improve OMM and service delivery.

Step2: Defining new roles and responsibilities of NIRC and IO.

Building from the role definition exercise and problem identification, a revised set of roles and responsibilities for NIRC and the IO are defined. This is the central part of developing the new contract.

The assignment of roles and responsibilities is a negotiated process conducted through an iterative process involving scheme mapping, asset listing and specific maintenance tasks that relate to each of the assets (desilting, ad-hoc repairs, routine gates maintenance, removing vegetation, farm roads maintenance etc.), operational tasks for water distribution, coordination tasks between NIRC and the IO, billings, reporting, financial, administration and customer relations.

IO Discussion on roles and responsibilities

Step 3: Action Plan preparation

After all parties identified their roles and responsibilities the action plan will be prepared for conclusion of the legal contracts. Action plan will require a comprehensive OMM activities, to cover and showing who is responsible for IO and NIRC functions outlined in the new action plan. The prepared OMM manuals and guidelines will be used as a resource for capacity development for IOs with facilitation of NIRC. Once the IO and NIRC are both fully understand their roles and responsibilities they can be able to execute the contract in place. The outcomes of the signed contract will help to achieve the expected increase in performance and fees collection.

	MPANGO KAZI BAADA YA MAFUNZO YA AWALI-SKIMU YA MWENDAMTITU (05/01/2025)			MATARAJIO/MILESTONE
1	**Tathimini ya kitaalamu na mpango wa ukarabati wa skimu**	**Mtekelezaji**	**Muda**	
i	Kufanya uchambuzi na tathimini kwa kushirikiana na Chama kujua mahitaji yao	Tume na Chama	21/01/2025	
ii	Kuaandaa, Mchoro wa skimu ukionesha mpango wa ukarabati na sehemu za kuweka vipima maji.	Tume na Chama	21/01/2025	
iii	Kuandaa makadirio ya gharama za ukarabati na vipima maji	Tume na Chama	21/01/2025	
iv	Kufikia makubaliano ya mpango wa ukarabati na uwekaji wa vipima maji	Tume na Chama	21/01/2025	Taarifa ya kitaalam ya ukarabati na mpango wa vipimo
v	Kuhitimisha mpango wa Uendeshaji, Usimamizi na Matunzo (weka mwezi)	Chama	21/01/2025	Technical rehabilitation and measurement plan
2	**Kutoa mafunzo ya kitaalamu juu ya wajibu na majukumu katika masuala ya fedha kwa shughuli za Uendeshaji, Usimamizi na Matunzo ya skimu.**	**Mtekelezaji**	**Muda**	
i	Kuaandaa mafunzo	Tume	5/1/2025	
ii	Kuweka wazi muda, mahitaji ya mafunzo (mahali na muda). Skimu ya Luganga	Tume	5/1/2025	
iii	Kupitia na kuboresha sheria ndogo zilizopo katika katiba ya chama	Chama	12/1/2025	Kukamilika kwa mafunzo ya awali ya Chama
iv	Kufanyika kwa mafunzo ya awali kwa chama	Tume	5/1/2025	IO Initial Training completed
v	Kuandaa mpango na kufanyika kwa mafunzo ya kina chini ya mtaalamu mwelekezi	Tume	Machi, 2025	
3	**Kuhamasisha wakulima kuhusu utekelezaji wa programu ya mradi**	**Mtekelezaji**	**Muda**	
i	Kuandaa taarifa na ujumbe mahususi kuwaeleza wanachama	Chama	15/01/2025	
ii	Weka wazi namna ujumbe wa mpango utakavyo wasilishwa na kuwafikia wakulima	Chama	15/01/2025	
iii	Kuandaa taarifa za wakulima kuendana na mahitaji ya mfumo wa IMIS (Kuboresha daftari/ orodha ya wakulima)	Chama	21/01/2025	Wakulima kuhamasishwa na kuwa na taarifa ya mradi
iv	Kuingiza taarifa za wakulima kwenye mfumo wa kielektroniki wa IMIS	Tume	20/02/2025	Farmers mobilized and aware
v	Kuandaa vitini vya katiba na sheria ndogo mpya baada ya maboresho juu ya makubaliano kati ya NIRC na IO.	Chama	12/1/2025	
iv	Kusambaza taarifa na jumbe hizo zilizo andaliwa kwa wanaumwagiliaji	Chama	15/01/2025	
4	**Kukamilisha kusaini mkataba wa makubaliano**	**Mtekelezaji**	**Muda**	
i	Kupitia na kuuboresha mkataba	Tume na Chama	5/1/2025	
ii	Kuaanda na kusaini mpango wa Uendeshaji, Usimamizi na Matunzo(Hivi ni viambatanisho vya mkataba)	Tume na Chama	20/01/2025	MKATABA WA HUDUMA ULIOSAINIWA
iii	Kuandaa wajibu na majukumu ya Tume na Chama na kuyaweka kama kiambatishi(contract annex)	Tume na Chama	4/1/2025	SERVICE CONTRACT SIGNED
5	**Kukusanya taarifa na viambatishi vya uhakiki.**	**Mtekelezaji**	**Muda**	
i	Mkataba ulio sainiwa	Tume na Chama	5/1/2025	
ii	Mpango wa ukarabati na orodha ya gharama	Tume	21/01/2025	KAZI ILIYOHAKIKIWA NA KUTOA FEDHA ZA UKARABATI
				VERIFIED WORK AND FUNDS FOR REHABILITATION MADE

Sample of Action Plan

Step 4: Investment in infrastructure, control and basic flow measurement

Effective OMM requires that irrigation infrastructure is functional and that basic flow measurement is in place at key points in the system particularly where the NIRC bulk water supply responsibility is handed over to IO for secondary and tertiary water supply functions.

Investment planning is needed to rehabilitate critical infrastructure of the scheme and measurement structures to improve water distribution equity and reliability.

The targeted infrastructure intervention is prioritised based on the available budget.

Step 5: OMM contract preparation and review

NIRC and IO Management committee will work together to prepare/review terms and conditions of OMM contract to get insight on its contents, purpose, roles, rights and responsibilities of both parties and make necessary changes as agreed by both parties before the contract is signed.

Step 6: OMM contract signing

IO Management committee will call and organize a special general meeting to discuss, deliberate, agree and sign the OMM contract.

The IO Management Committee with assistance from NIRC will explain the concept of operation, Management and maintenance of irrigation scheme, the roles and responsibilities of IO and NIRC to IO members at the general meeting.

The IO Management Committee will allow discussion, questions and answers from IO members and then deliberate if the contract can be signed. Once the majority of the IO members agree on the terms and conditions of the contract, then the contract is signed.

Sample OMM contract is shown below.

Sample of OMM Contract

CONTRACT

BETWEEN

NATIONAL IRRIGATION COMMISSION (NIRC)
DODOMA, TANZANIA

AND

…… IRRIGATORS ORGANIZATION,

P.O.Box ……,

……

THIS CONTRACT is made on ……. of…….. 2025,

BETWEEN

The National Irrigation Commission ('the Commission) of P.O. Box146, Dodoma is the Government institution established under Section 3 of the National Irrigation Act of 2013 responsible for coordination, promotional and regulatory functions in the development of the irrigation sector;

AND

The _____ Irrigator's Organisation ('the User) of P.O. Box _____ is an Irrigators Organization registered under the National Irrigation Commission with registration number……..

PREAMBLE:

WHEREAS the parties share a common interest of ensuring availability of water for irrigation in order to increase crop production and productivity;

i. That the Commission has constructed and developed irrigation infrastructure for and on behalf of the Government of the United Republic of Tanzania;

ii. That the user of the irrigation infrastructure is an Irrigators' Organisation established pursuant to the National Irrigation Act of 2013 and the Regulations of 2015;

iii. That the user is required by the National Irrigation Act (2013) to operate, manage and maintain the irrigation infrastructure stated in Para (i) which is located at …… Irrigation scheme of P.O. Box……., …… District in ……. Region for irrigated agricultural purposes;

THEREFORE, the parties have recognized the desire to establish a contract in order to enhance operation, management and maintenance (OMM) of irrigation infrastructure within the stated irrigation scheme such that OMM upstream of the Delivery Point will be the responsibility of the Commission, and OMM downstream of the Delivery Point will be the responsibility of the IO.

The **TERMS AND CONDITIONS** for this Contract are hereby agreed between the Parties to establish a formal agreement of cooperation to reflect their agreement as follows;

DEFINITIONS:

Operations, Management and Maintenance (OMM): OMM means the day to day, month to month, and seasonal planning, hydraulic operations to control and transfer water through the system, flow monitoring, and the routine, periodic and emergency maintenance. OMM also includes supporting administration, financial, human resources and asset management functions. Effective OMM is essential to achieve effective irrigation scheme functioning and water service delivery.

Routine maintenance: Planned maintenance undertaken at frequent intervals of days, weeks, or months, usually during the irrigation season (desilting, greasing, weed removal etc.).

Periodic maintenance: Planned maintenance undertaken at longer time intervals usually during the off-season when the system is drained, either seasonally, or at intervals of multiple years (parts replacement, overhaul, painting, desilting, reforming embankments, lining repair etc.).

Unplanned maintenance: Maintenance work required to repair damage arising from incidences that could not be easily anticipated and planned for (such as floods, infrastructure failure etc.).

Rehabilitation investments: Capital investment to rectify degraded infrastructure or infrastructure damage due to unplanned events (usually paid for by the Government).

Delivery Point: The location on the hydraulic distribution network where the main canal discharges into a secondary canal.

ARTICLE 1: TITLE

The title for the cooperation shall be "contract for operation, management and maintenance of irrigation infrastructure between National Irrigation Commission and……Irrigators Organization''.

ARTICLE 2: DESIRE AND PURPOSE

I. To enter into a mutual agreement of cooperation among the Commission and the stated IOs for the operation, management and maintenance of irrigation infrastructure.

II. To promote overall improvement in agricultural production, productivity, profitability, and revenue collection from the users to ensure sustainable OMM into the future.

ARTICLE 3: RIGHT OF THE PARTIES

3(1) The User's rights

The user shall:

i. Use the Irrigation Infrastructure for the purpose of supplying irrigation water to its members for Agricultural purposes;

ii. Benefit from the ancillary access and user's rights over land that does not form part of the Irrigation Infrastructure developed by the Commission to enable accessibility to the scheme and usage of the irrigation infrastructure; and

The user shall not:

iii. sell, mortgage or transfer the Irrigation infrastructure;

iv. Assign its use right created by virtue of this contract to any other person, either in whole or in part, or seek to let or sub-let any part of the Irrigation Infrastructure.

3(2) The Commission's Rights

i. At all times, the infrastructure shall remain the property of the Government owned by the National Irrigation Commission;

ii. The Commission through its duly authorized officers has the right to inspect the Irrigation Infrastructure from time to time to ensure that operations, management and maintenance have been completed in accordance with the agreed Operations and Maintenance Plan.

iii. The Commission has the right to be paid by the IO for bulk water supplied to the IO through the irrigation infrastructure, as measured at the Delivery Points. The method of irrigation service fee calculation and the basis for the fee amount is included in Annex 3.

ARTICLE 4: RESPONSIBILITIES OF THE PARTIES

4(1) Responsibilities of the User

The User shall:

i) Prepare an operation and maintenance plan in collaboration with the Commission and update that plan on an annual basis; (the OMM work plan and inspection sheets shall be stored and made available for inspection by the Commission in the IO administrative records)

ii) **Operate, manage and maintain irrigation infrastructure of secondary and tertiary conveyance and control systems** to ensure that farmers are supplied with water and the infrastructure is maintained in a sound and usable condition, as per the agreed operations and maintenance plan which is attached to this Contract (Annex 1).

iii) Monitor the Commission in their measurement of water quantities supplied to the IO at the Delivery Points, as per the agreed operations and maintenance plan;

iv) Ensure that all OMM records and water measurement records are kept at the IO administration office.

v) Carryout regular inspection of irrigation facilities

vi) Prepare and implement the cropping calendar;

vii) Implement good agricultural practices in accordance with cropping calendar; (Percentage of yield increased from the contract start date shall be recorded)

viii) Ensure collection and recordkeeping in relation Irrigation Service Fees and other fees; (Data on fee collection shall include a digital register of the amount paid by each farmer, amount owing by each farmer, and a summary analysis of fee collection status)

ix) Maintain all records but not limited to farmer registration list, financial, production and operation, maintenance and annual and general meetings; (Reports shall be kept on record in digital and hardcopy at the IO administration office)

x) Obtain and comply with any licences or permits necessary to operate and maintain the Irrigation Infrastructure or any component element; and

xi) Take all reasonable measures to prevent unauthorised encroachment on the Irrigation Infrastructure including any adjacent land, as per the bye- laws.

The User shall not:

i) Modify, reconstruct or improve the Irrigation Infrastructure without the written agreement of the Commission, and such agreement shall not be unreasonably withheld.

4(2) Responsibilities of the Commission

The Commission shall:

i) Rehabilitate irrigation infrastructure as per the Scheme Rehabilitation Plan and ensure at the time of contract that the infrastructure can be used effectively for irrigation of the scheme.

ii) **Ensure proper operation, maintenance and management of headwork and main conveyances systems**;

iii) The Commission shall provide training to farmers on good agronomic practices and irrigation scheme management; (The number of farmers trained shall be recorded)

iv) The Commission shall support the IO in the preparation and implementation of operation and maintenance plan for the main canal and provide that to the IO for reference; and

4(3) Joint responsibilities

i) Promote water use efficiency in order to increase crop productivity;

ii) Supervise rehabilitation work within the scheme;

4(4) Agreement on the supply volume and reductions in time of low supply of water at the primary source

i) Six weeks before each irrigation season,

   a) the Commission shall verify the amount of water that can be withdrawn from the intake by communication with the Basin Water Board, and communicate that amount and information on the water use permit to the User; (The amount of water available for the irrigation season as informed by the Basin Water Board shall be communicated to the User).

   b) The User shall, with support from the Commission, prepare a cropping plan and irrigation schedule for the irrigation season and present the cropping plan and estimated water required for the season to the Commission.

iii) If the water is sufficient for the User's requirements, the Commission shall supply that water to the Delivery Point.

iv) If the water is not sufficient for the User's requirements, the volume supplied to the Customer shall be reduced and the Commission shall notify the User, explain the reasons and implications, and adjust the payment required for services proportionately.

ARTICLE 5: IMPLEMENTATION OF THE CONTRACT

i) The language use for this Contract shall be Kiswahili.

ii) The parties agree that this Contract will be supplemented by activity including the budgets, workplan, intellectual property rights, and other responsibilities and rights of each party.

iii) Valid and binding contract communications will only be those that are made in writing or e-mail between the two representatives below:

a. Director General,
National Irrigation Commission,
P. O. Box 146, Dodoma,
Email: info@nirc.go.tz

b. Chair Person,
……. Irrigators' Organization,
P. O. Box ……,
……

ARTICLE 6: AMENDMENTS, MODIFICATIONS AND RENEWAL OF THIS CONTRACT

i) Any amendments to the Contract shall be attached as an addendum to the Contract.

ii) Any activity already in progress shall continue until completion, as originally planned provided resources are available.

iii) Not less than twelve months before the expiry of this Contract either party may request renewal of the Contract.

iv) Overall performance for the Contract shall be reviewed every year or whenever necessary.

ARTICLE 7: DURATION

This Contract shall take effect when duly signed and dated by the designated personnel and shall remain in force for five (5) years (renewable) as long as the parties wish to continue with the collaboration.

ARTICLE 8: TERMINATION

This Contract may be terminated subject to notice of ninety (90) calendar days of a contract breach:

i) When either of the parties has consistently breached the provisions of this Contract thereby causing a risk of serious harm to the Irrigation Infrastructure, property or human life; or
ii) On occurrence of force majeure/ an act of God; and
iii) On other grounds provided by law.

ARTICLE 9: DISPUTE RESOLUTION

Disputes arising under this Contract shall be resolved by the mutual agreement of the Parties (Alternative Dispute Settlement Mechanism). In case mutual agreement cannot be achieved, disputes shall be resolved by the Court in accordance with the procedure provided by the law.

ARTICLE 10: AUTHORIZED SIGNATORIES

Each party represents that the individuals signing this Contract have the authority to sign on its behalf in the capacity indicated

10(1) For and on behalf of **National Irrigation Commission**

……..……

Raymond W. Mndolwa Stamp/Seal
DIRECTOR GENERAL
Date: ……..……

In the presence of

……..……..……
Name: Andrew Lugarabamu Stamp/Seal
Designation: **LEGAL OFFICER**
Date: ……..……

10(2) For and on behalf of …… **Irrigator's Organization**

……..……

Name: …… Stamp/Seal
CHAIR PERSON
Date: ……..……

In the presence of

……..….…….
Name: …… Stamp/Seal
SECRETARY
Date: ……..……

List of Annexures

The following Annexures goes with this contract for verification purposes; -

i. Operational and maintenance plan;
ii. Scheme Rehabilitation and Measurement Installation Plan
iii. Invoice of ISF to be paid by the IO to the NIRC for services provided;
iv. Water use permit from Basin Authority;
v. IOs Constitution and bye-laws;
vi. List of KPI agreed between two parties;
vii. Comprehensive Guideline Volume 3;
viii. National Irrigation (Service Fees) Order, 2021 GN No. 496P;
ix. User Registration Certificate under Cap. 435; and
x. Scheme layout map.

12. Method of monitoring maintenance

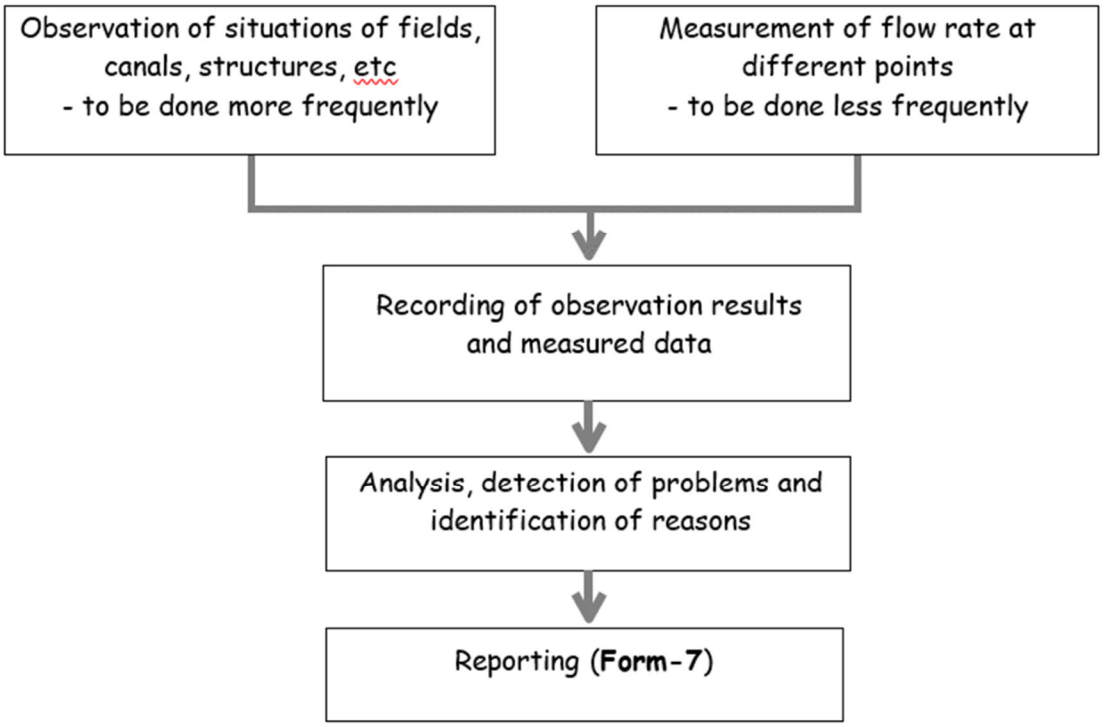
The purpose of the monitoring of maintenance is:

Finding whether the planned maintenance is carried out as planned.

It is recommended that the persons who are NOT in charge of managing maintenance activities should be responsible for monitoring of maintenance. This is because the persons who are NOT in charge of managing maintenance can check the maintenance activities from a third person's standpoint.

The persons in charge of monitoring shall decide the method and the interval of monitoring. Furthermore, in case some problems are observed from the monitoring activities, the persons in charge shall report the problems to the management committee, using the reporting format in **Form-7**.

A common process of monitoring is shown below:



Regarding the measurement of flow rate, measuring devices are not installed at different points. In that case, we can use the following simple method as mentioned in the Formulation Guidelines.

1) Determine measurement point

Find a suitable point for measurement.

2) Estimate flow area

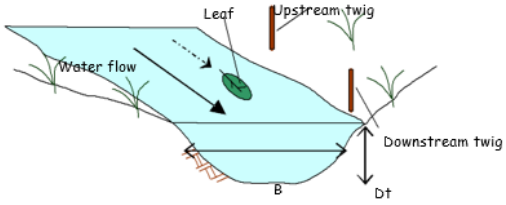
Measure canal width and water depth

B = ☐ m (canal width) Dt= ☐ m (water depth)

At= ☐ m^2 (flow area) (At = B x Dt)

3) Measure water flow velocity

a) Drive two twigs into the ground along the canal at a measured distance between the two twigs. b) Float a leaf on the water from the upstream twig to the downstream twig and measure the travel time. c) Calculate the flow velocity.



Ls = ☐ m (length between twigs) Tt= ☐ sec (travel time)

Vt = ☐ m/sec (V t = Ls/ Tt)

4) Calculate river discharge on the day of survey

Qt= ☐ m^3/sec (discharge) (Qt = At x Vt)

Explanatory Note 2: Cropping calendar and patterns

2-1 Cropping Calendar

What is cropping calendar?

The Cropping Calendar is a fundamental tool that provides sufficient information on crop production which enables enhancement of high yields. This tool supports farmers and agriculture extensionists across the world in taking appropriate decisions on crops and their sowing period, respecting the agro-ecological dimension.
It is a schedule of crop growing season from the fallow period and land preparation, to crop establishment and maintenance, to harvest and storage. It contains information on proper crop husbandry, harvesting and storage periods of locally adapted crops in specific agro-ecological zones.

The cropping calendar allows a farmer to:

- Plan for input purchase and use
- Plan for Water distribution to avoid water conflicts in irrigation scheme
- Determine labour requirements and plan for peak usage times
- Cultivate and produce crops in the same time
- Fetch good market prices for the produce
- Control pests (birds) and diseases for equal distribution of pests and diseases among farms of farmers
- Organize contractors for land preparation and harvesting
- Develop cash flow budget for year
- Determine credit needs and period required

HOW TO DEVELOP A CROPPING CALENDAR

1. Determine the best date to plant. This information can be gathered from local experience, agricultural advisors and leading farmers in the district.
2. Determine the time the variety takes from planting to harvest.
3. Mark on the calendar the date of planting/sowing and then when each other operation needs to be done (ploughing, weeding, fertilizing, and harvesting).
4. Then determine how much labour, equipment and finance will be required at each step during the growing period.
5. Pin the calendar in a prominent place to remind you when things need to be done.

2-2 Cropping pattern

What is cropping pattern?

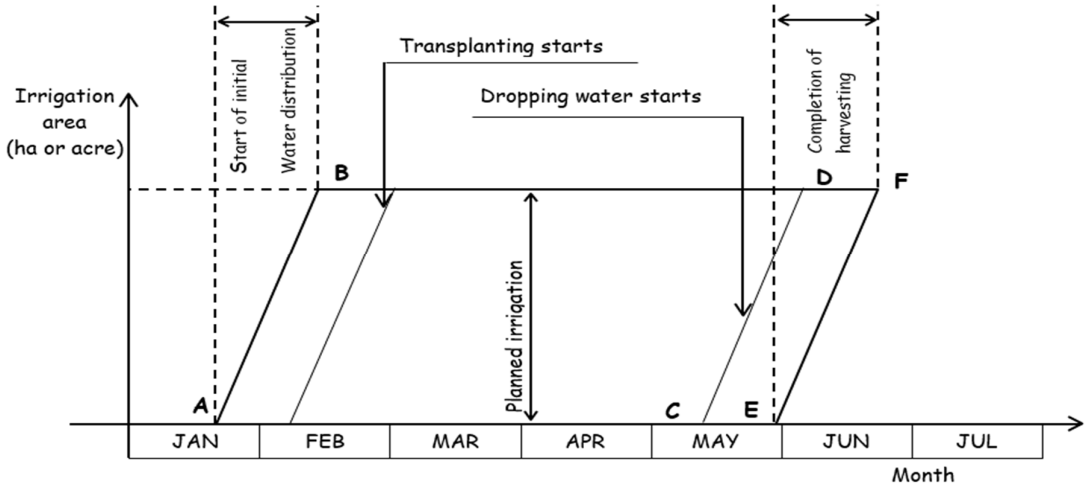
Cropping pattern means a diagram which shows when the crop will be planted, and when the crop will be harvested in a particular irrigation area, as shown below.

The horizontal axis represents the time which shows the growth stage of the crop, the time of farming activities and irrigation activities. On the other hand, the vertical axis represents the irrigation area in ha or acre.

In the diagram below, initial water distribution starts at point A, and has started in the whole area at point B. In a similar way, harvesting starts at point E, and has finished in the whole area at point F.

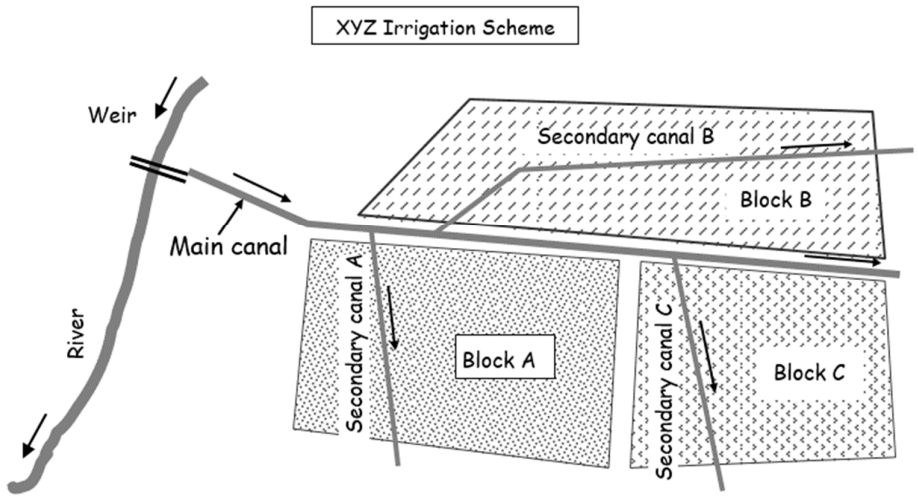
The irrigation area gradually increases in the period from A to B, is at a peak in the period from B to C, and gradually decreases in the period from C to D.

Also, the period from B to C shows full utilization of planned irrigation area with maximum water demand and maximum water utilization.



Example of pattern of planting

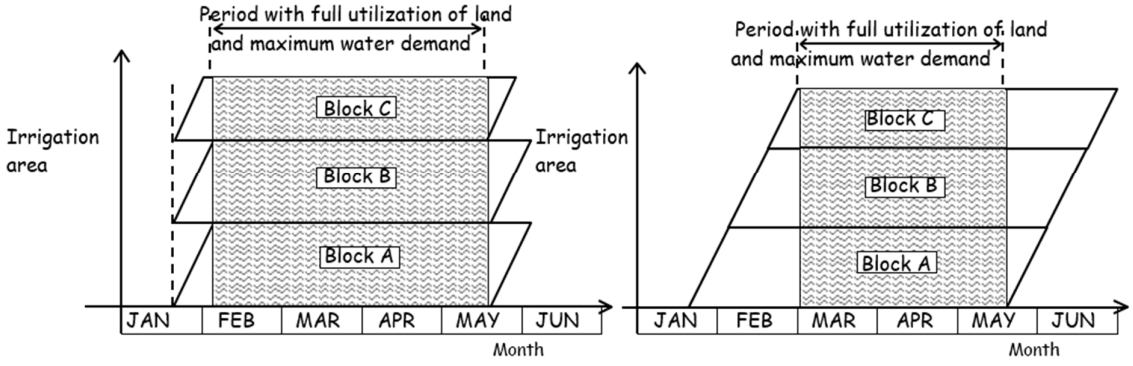
Now, let us take a more specific example which is closer to the actual situation to explain examples of pattern of planting. In the figure below, the irrigation area of the XYZ Irrigation Scheme is divided into three irrigation blocks – Block A, Block B and Block C – by the secondary canals, the groups of the tertiary canals or the tertiary canals.

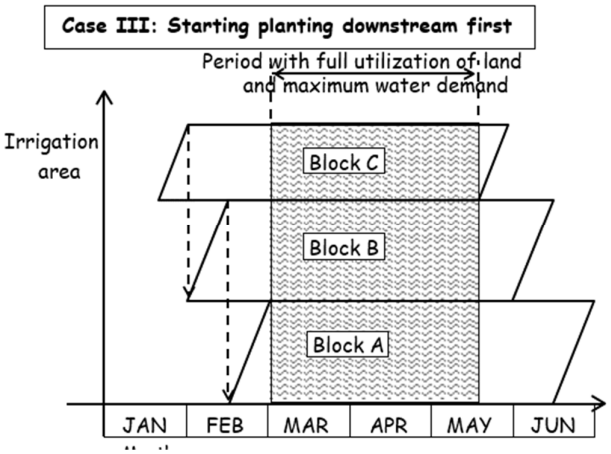


We have three possible patterns of planting as follows:

- **Case I**: Starting planting simultaneously in the whole area regardless of irrigation blocks
- **Case II**: **Starting planting** upstream first – Block A first, then Block B and Block C
- **Case III**: Starting planting downstream first – Block C first, then Block B and Block A

The cropping calendar for each pattern of planting is shown below:



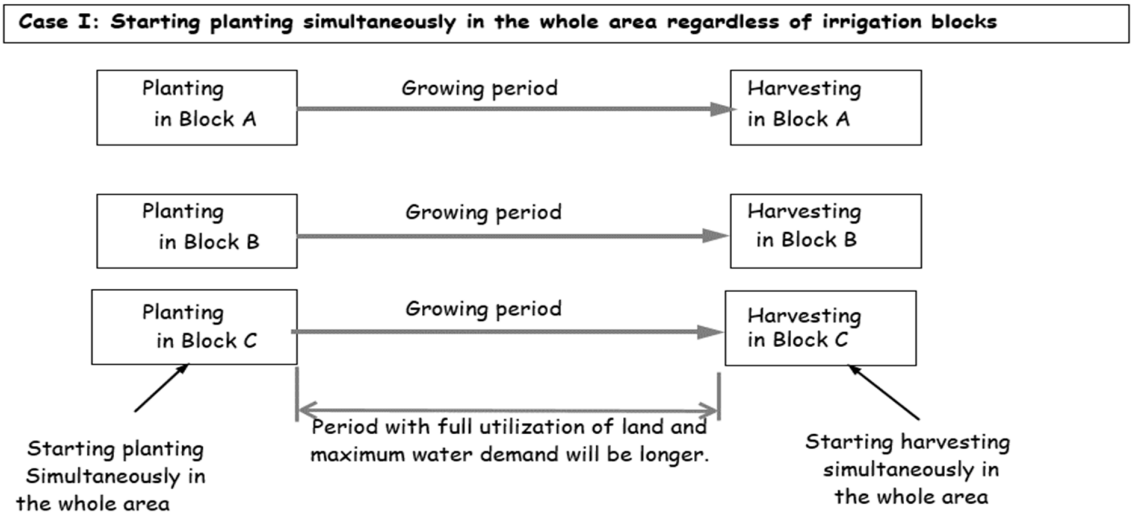


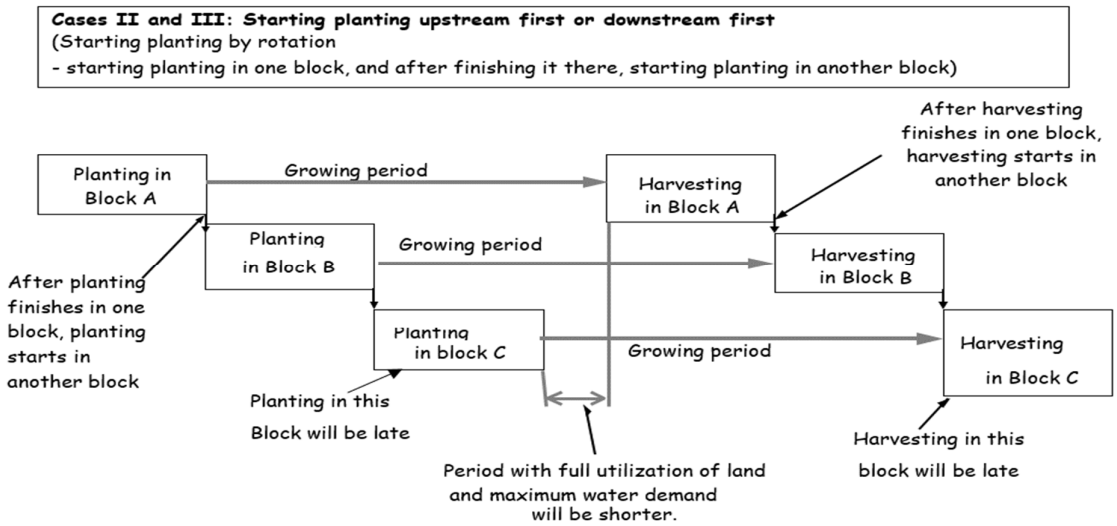
Relationship between pattern of planting and water demand variation within a season

As shown in the above diagrams, the period with full utilisation of land and maximum water demand is longer in the case of starting planting simultaneously in the whole area (Case I), and shorter in the case of starting planting upstream first or downstream first (Case II and III).

On the other hand, in the case of starting planting downstream first or upstream first (Case II and III), start of planting will be late in some irrigation block because, when planting finishes in one block, planting starts in another block. Also, start of harvesting will be late in some irrigation block.

These situations are illustrated below:

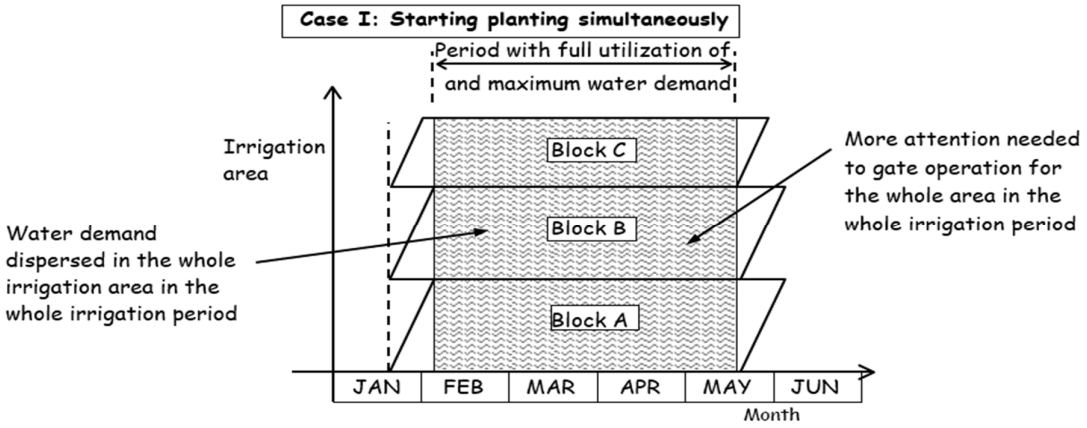




Relationship between pattern of planting and activities of gate operation

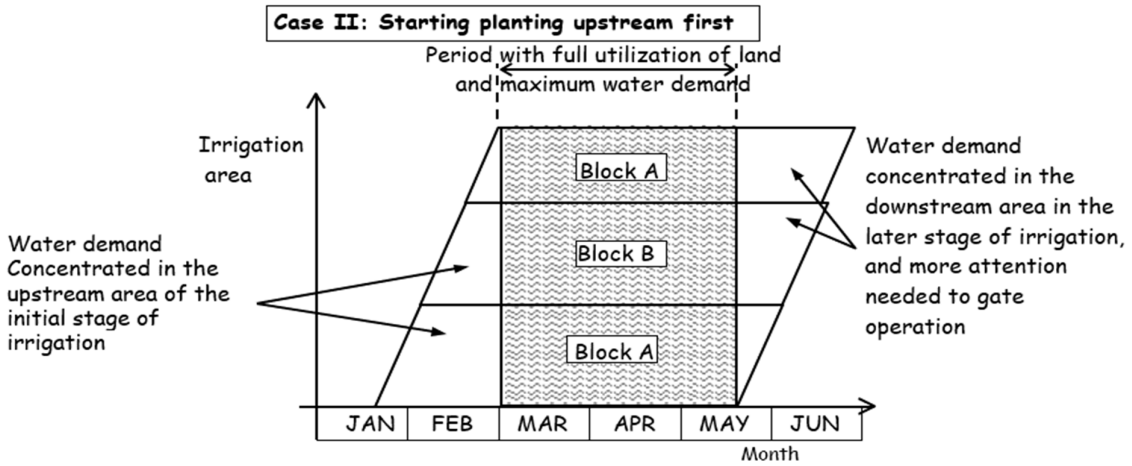
In the case of starting planting simultaneously in the whole area (Case I), water demand is dispersed in the whole irrigation area in the whole irrigation period. In this case, the entire canal network needs to have a larger volume of irrigation water in the whole irrigation period.

Therefore, more attention needs to be paid to gate operation for the whole irrigation area in the whole irrigation period.



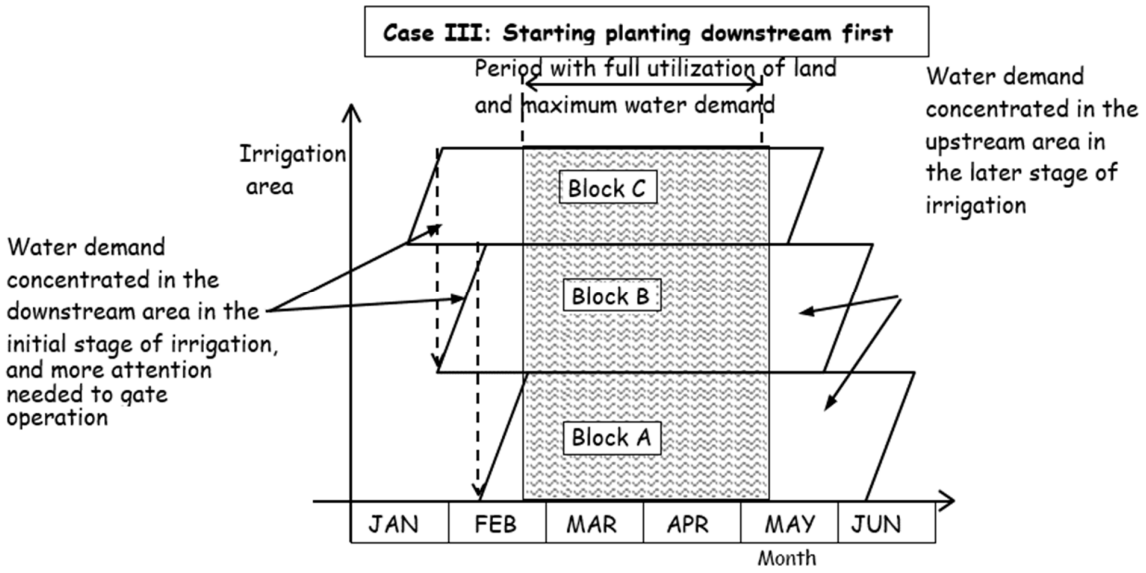
In the case of starting planting upstream first (Case II), water demand is concentrated in the upstream area in the initial stage of irrigation, and in the downstream area in the later stage of irrigation.

In case water demand is concentrated in the downstream area, a larger volume of water needs to be stored in the whole course of the main canal. Therefore, more attention needs to be paid to gate operation in the later stage than in the earlier stage of irrigation.



In the case of starting planting downstream first (Case III), water demand is concentrated in the downstream area in the initial stage of irrigation, and in the upstream area in the later stage of irrigation.

In case water demand is concentrated in the downstream area, a larger volume of water needs to be stored in the whole course of the main canal. Therefore, more attention needs to be paid to gate operation in the earlier stage than in the later stage of irrigation.



Which is better, Case I, Case II or Case III?

This shall be decided after taking the following into consideration:

a) Variation of water availability within a season

In order to make a water distribution plan properly, it is important to understand the variation of water availability within a season – how much water is available in the beginning stage, in the middle stage, and in the later stage of irrigation. This issue is quite important particularly in dry season when water availability is limited.

The organized irrigation of Case II or Case III – starting planting upstream first or downstream first – is recommended in terms of efficient distribution and use of a limited amount of water.

b) Easiness of operation activities, especially activities of gate operation

Regarding the easiness of gate operation, the unorganized irrigation of Case I – starting planting simultaneously in the whole area – makes gate operation more difficult than in the other cases. Case II or Case III would be recommended in terms of easiness of gate operation.

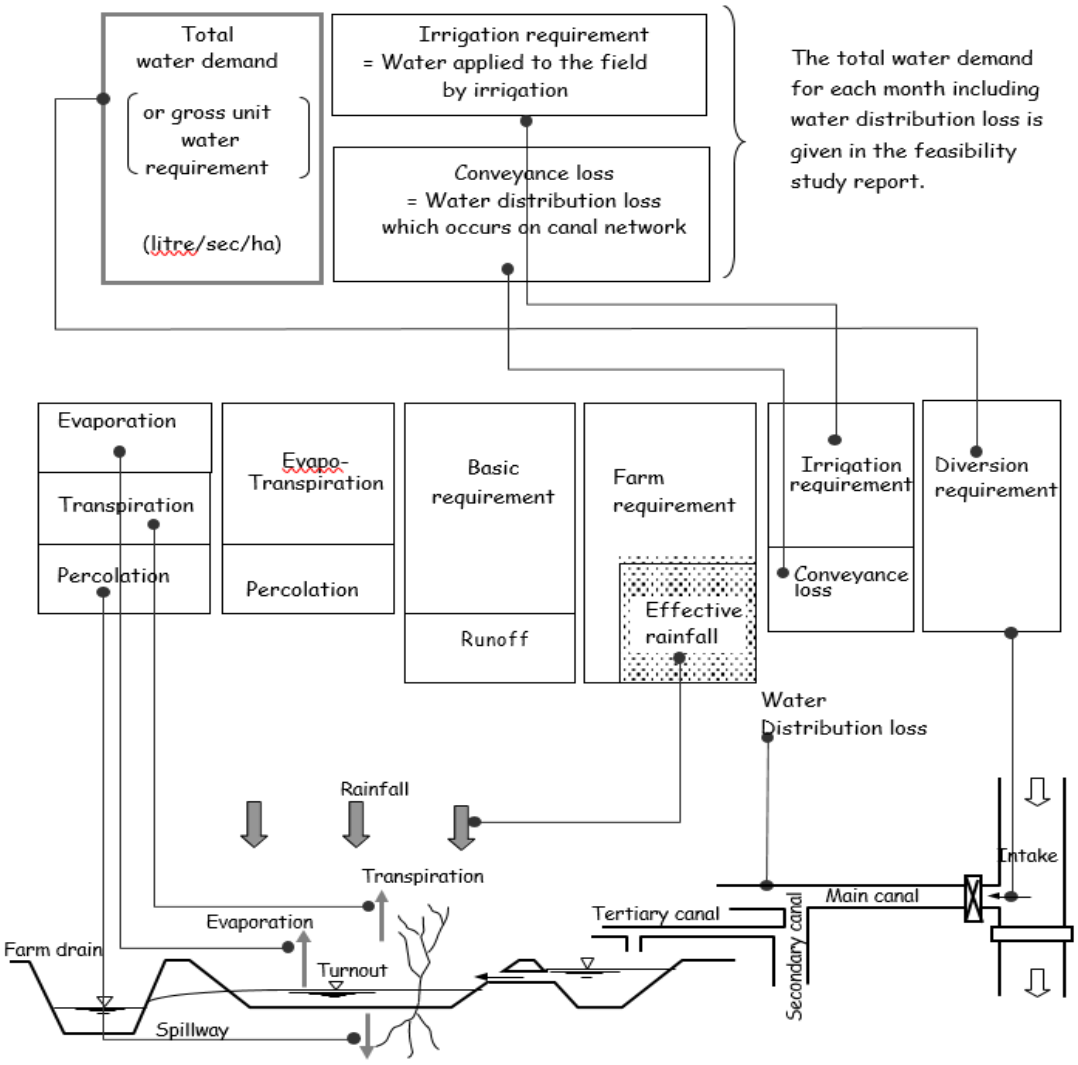
c) Irrigators' intention in each irrigation block

The irrigators' intention about when to start planting and when to start harvesting shall be coordinated in the general meeting facilitated by management committee.

Explanatory Note 3: Estimation of water demand

The irrigators need to understand the amount of water required in each month of the period with full utilization of land and maximum water demand. **Form-9** is the calculation sheet for water demand in each month.

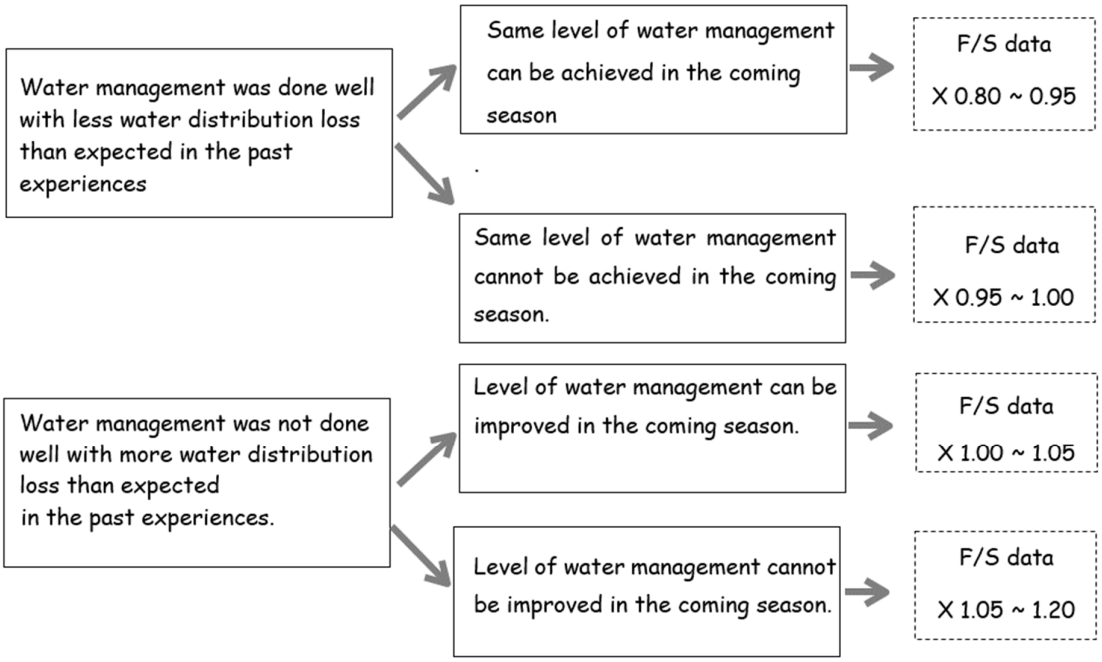
Water demand is the total amount of water required for irrigation of the whole irrigation area. It includes not only water for crops but also runoff and deep percolation from the field, and water distribution loss which occurs on the canal network.



Water demand including water distribution loss, expressed in litre/sec/ha, which is called 'gross unit water requirement,' is given in the feasibility study report.

The gross unit water requirement may differ by irrigation block. In that case, the unit water requirement for each irrigation block is also given in the feasibility study report.

Note that you can use the data of water requirement given in the feasibility study report without modification, or you may adjust the data given in the feasibility study report according to your past experiences. In case you adjust the data, refer to the following guide. Note that you can avoid overestimating or underestimating the water requirement using this guide.

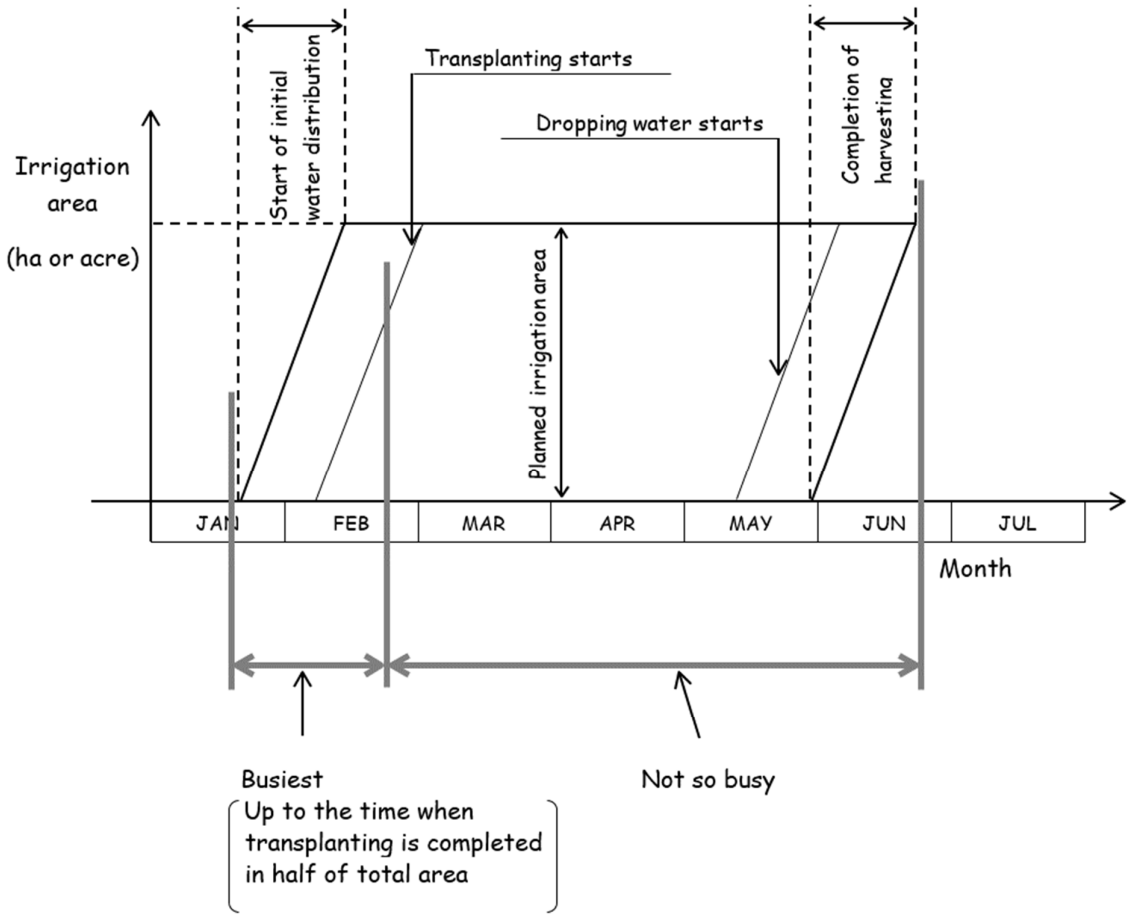


Find out the data of the water requirement from the feasibility study report, to fill out the following form, and if necessary and appropriate, to adjust the data.

Gross unit water requirement in litre/sec/ha, or in case it has been adjusted, adjusted water requirement in litre/sec/ha will be used in the calculation of water demand by **Form-9-1**.

Explanatory Note 4: Maintenance planning

Maintenance work for irrigation and other related facilities requires the labour of IO members. Therefore, maintenance activities shall be planned, taking into consideration whether farming practices are busy or not



Explanatory Note 5: How to maintain irrigation facilities

As shown below, maintenance activities can be grouped by major elements of an irrigation system.

- Intake weirs
- Irrigation network
- Dams and reservoirs
- Drainage network
- Roads and flood dikes
- Ancillary works

Major maintenance activities

Element of irrigation system	Major maintenance activities
Intake weirs	• Removal of large pieces of floating debris or dangerous materials especially large floating woods to protect trash racks, weir bodies and associated structures • Cleaning of the scouring sluice gates • Maintenance of the flow measuring facilities to obtain accurate records • Cleaning of all sites and areas adjacent to the facilities • Removal of weeds and any other foreign materials at the trash racks and the scouring sluice gates • Keeping all gates, accessories and metal works in workable conditions – lubrication (oiling or greasing) and anticorrosion treatment (painting) • Monitoring of water quality (pH, EC, salt content and biological standpoint) of the river • Removal of solid deposition – silt and stones
Irrigation network	**Concrete-lined canals** • Replacement of joints • Replacement of damaged slabs • Weed control at joints and on the surface of concrete slabs • Control and treatment of filters • Control and removal of silt • Repair of damaged lining concrete with cracks **Earth canal** a. **Silting** – mainly caused by defective design, inefficient maintenance, improper operation • Removal of silt by hand or machine, with attention to keeping canal section in correct shape, using a profile board • Preventive measures: - Controlling flow velocity – avoiding situations that water flows at low velocity and at small sectional area of flowing water - Avoiding abrupt operation of gates, which may cause rapid change in flow velocity, bank erosion near gates, and water flow with much silt carried

Element of irrigation system	Major maintenance activities
	b. **Weed infestation** • Cutting earth weeds and waterweeds growing on wetted parts of canal slopes, and removal of floating waterweeds • Excavation when silt is being removed, manually or by machine • Chemicals not recommended – because they are expensive, and because they may be harmful to people, animals and crops c. **Water seepage -** mainly caused by burrowing animals, rotting plants and roots, porous soils • Plugging of small holes with soil using spades and small hand compactors • Excavating out damaged sections of bank, and replacing them with new compacted soil • Trenching porous soils, burying plastic membrane or thick slurry made from excavated materials from canal banks, and backfilling of the trench with sand d. **Erosion of banks** – mainly caused by heavy rainfall, wind, improper operation, stock grazing and passage • Rebuilding of worn out banks, taking care of joints of old parts and new parts • Preventive measures: - Seeding grass on unwetted parts of canals - Fencing canals - Construction of water troughs for animals to drink
Dams and reservoirs	**Reservoir** • Controlling waterweeds • Removal of large floating debris (e.g. tree trunks) which may damage hydraulic works • Monitoring of water quality (pH, EC, salt content and biological standpoint) in order to detect possible sources • Survey, and removal if possible, of solid deposition at the bottom of the reservoir **Irrigation dam** • Lubrication – oiling or greasing – of gates • Anticorrosion treatment – painting – of gates • Cleaning of debris • Control of filters and some minor works • Weed control of the upstream slope of the dam • Monitoring of water quality (pH, EC, salt content and biological standpoint) in order to detect possible sources • Survey, and removal if possible, of solid deposition at the bottom of the reservoir

Element of irrigation system	Major maintenance activities
Drainage network	• Weed control in the canal section • Maintenance of flow gauges and other measuring devices • Removal of silt • Repair and shaping of canal sections
Roads and flood dikes	**Roads** • Refilling of pot holes on road surface • Grading road surface • Provision of additional pavement materials for paved roads • Repair of road shoulders eroded • Desilting and repair of side ditches and culverts **Flood dikes** • Refilling of holes on dike surface • Grading dike surface • Repair of eroded shoulders • Preventive measure: prohibition of traffic on dikes
Ancillary works	**Head gates, check gates, siphons, inlets, spillways, outlets, etc** • Removal of silt and obstructions • Antirust treatment – painting – of mechanical elements • Repair of field bunds