NILE BASIN INITIATIVE
Initiative du Bassin du Nil

PARTICIPATORY OPERATION AND MAINTENANCE OF IRRIGATION SCHEMES

Nile Basin Initiative – NELSAP

Regional Agricultural Trade and Productivity Project (RATP)

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By:

Bancy M. Mati

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Contacts:
NELSAP/Regional Agricultural Trade and Productivity Project
Quartier Kigobe Sud, Kigobe Main Road, Plot No: 7532/C
P.O Box: 4949
Bujumbura- BURUNDI

About this Training Manual

The Nile Basin Initiative (NBI) is a partnership of the riparian states (Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda**,** Eritrea is participating actively in the NBI as an observer) that seeks to develop the river in a cooperative manner, share substantial socioeconomic benefits, and promote regional peace and security through its shared vision of "sustainable socioeconomic development through the equitable utilisation of, and benefit from, the common Nile Basin water resources". NBI's *Strategic Action Programme* is made up of the *Shared Vision Programme (SVP) and Subsidiary Action Programmes (SAPs).* The SAPs are mandated to initiate concrete investments and action on the ground in the *Eastern Nile (ENSAP) and Nile Equatorial Lakes sub-basins (NELSAP).*

NELSAP through its sub basin programmes implements pre-investment programmes in the areas of power, trade and development and natural resources management. As part of its pre-investment framework, the Regional Agricultural Trade and productivity Project (RATP), in concert with the NELSAP, intends to promote and disseminate best practices on water harvesting and small scale irrigation development as a contribution towards agricultural development in the NEL (Nile Equatorial Lakes) region. NELSAP has previously implemented completed a project called Efficient Water Use for Agriculture Project (EWUAP). One of the recommendations of EWUAP was the need to develop Training/Dissemination materials on "*adoption of low cost technologies for water storage, conveyance, distribution, treatment and use for agriculture that can be adapted by communities and households of the rural and peri-urban poor*". This Training Manual is the initiative of NELSAP, for that purpose.

This Training Manual summarises some guidelines on participatory approaches for the planning, development, operation and maintenance of irrigation schemes, focusing on smallholder group schemes. The manual describes how communities could be mobilised into strong water user groups to manage irrigation systems sustainably. It is a general manual and should be used in conjunction with respective designs and tailored to realities of specific irrigation schemes and stakeholders. However, major technical issues require the resolution of qualified engineers or other professionals. This Training Manual is meant to inform, educate, enhance knowledge and practice targeting smallholder irrigation in the NEL region. The information contained here may not be exhaustive and thus, readers are encouraged to seek further information from references cited in this publication and elsewhere.

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Glossary of Key Terms

Term	Definition/Brief description
Agricultural (crop) production	Actual harvested production from fields, orchards or gardens, excluding harvesting and threshing losses and the part of crop not harvested for any reason
Agricultural water management (AWM)	The holistic management of water for agriculture (crops, trees, livestock) in the continuum from rain fed systems to irrigated agriculture. It includes irrigation and drainage, soil and water conservation, rainwater harvesting, agronomy, in-field water management, integrated watershed management and all relevant aspects of the management of water and land.
Agriculture	Production, processing and marketing of crops and livestock from producer to consumer.
Agro biodiversity	The diversity of plants, animals, insects, and soil biota found in agricultural systems
Agro-ecological zones	Land classification based on the average annual length or growing period for crops, which depends on, inter alia, precipitation and temperature.
Aquaculture	The farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants with some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators
Basin Governance	The sum of river basin essential water management functions carried out by various actors
Biodiversity	Biodiversity is the variability among living organisms. It includes diversity within and among species and diversity within and among ecosystems
Biological resources	Biological resources includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity
Biotechnology	Technological application that uses biological systems, living organisms, or derivatives thereof, to make or to modify products or processes for specific use
Blue water	The proportion of rainfall which flows on or beneath soil surface to accumulate in rivers, streams, springs, swamps, lakes, ground water, aquifers or into storage structures such as dam, ponds and tanks, and which is extractable as liquid fresh water.
Capacity building	The long-term investment in people and their institutions to enable them to effectively and efficiently carry out specific activities to achieve their development objectives.
Committed water	Water reserved for use by the environment, downstream countries, or other downstream uses that have a right to the water.
Community mobilisation	A facilitative process of strengthening the organisational and management capacities of people in such a way that they become self reliant in solving their own problems and/or initiating and managing their developmental issues.
Conflict	A disagreement resulting from individuals or groups that differ in attitudes, beliefs, values or needs. It can also originate from part rivalries and personality differences.

Term	Definition/Brief description
Conflict Resolution	The art of solving or settling a problem, dispute.
Conjunctive use	The coordinated and planned management of both surface and groundwater resources in order to maximise the efficient use of the resource; that is, water is stored in the groundwater basin for later and planned use by intentionally recharging the basin during years of above-average surface water supply.
Crop water depletion	The amount of water depleted for the process of crop production by transpiration (T), evaporation from soils, and field ponds or channels (E).
Crop yield	The harvested production per unit of harvested area for crop products.
Decision-maker	A person whose decision and actions can influence a condition, process, or issue under consideration.
Degradation (of land/water)	The sum of the processes that render land or water economically less valuable for agricultural production or for other ecosystem services.
Drainage	The diversion or orderly removal of excess water from the surface of the land by means of improved natural or constructed channels, supplemented when necessary by the shaping and grading of land surfaces to such channels.
Economic efficiency	The allocation of resources in the economy that yields an overall net gain to society as measured through valuation in terms of the benefits of each use minus its costs
Ecosystem	A dynamic complex of plant, animal, and microorganism communities and the nonliving environment, interacting as a functional unit
Ecosystem Approach	A strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way
Ecosystem Services	The benefits people obtain from ecosystems
Empowerment	An ongoing process that strengthens the self-confidence of disadvantaged sections of the population, enables them to articulate their interests and participate in the community, and provides them with access to and control over resources
Environment	The complex set of physical, geographic, biological, social, cultural and political conditions that surround an individual or organism and that ultimately determines its form and nature of its survival
Environmental flows	The minimum flows of water (by volume and season) necessary to maintain aquatic biota and ecosystem processes
Equity	The fairness, the standard by which each person and group is able to maximise the development of their latent capacities.
Extension	A series of professional communicative interventions amid related interactions that is meant, among others, to develop and/or induce novel patterns of co-ordination and adjustment between people, technical devices and natural phenomena, in a direction that supposedly helps to resolve problematic situations.
Externalities	Effects of a person's or firm's activities on others which are not compensated.

Term	Definition/Brief description
Farming System	A population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate.
Food security	A situation whereby all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life
Freshwater resources	Water available in rivers and aquifers of sufficient quality to be used for human purposes.
Gender	The attributes and opportunities associated to being a man or a woman and the relations with each other
Gender approach	Socio-political and systemic development which directs attention to the different roles allocated to men and women in society, which are reflected in shared resources and responsibilities.
Gender equality	Equal visibility, empowerment and participation of both sexes in all spheres of public and private life. It means that rights, responsibilities, and opportunities cannot depend on having been born a man or woman
Gender Equity	The elimination of economic, political, legal, and social barriers so that men and women may enjoy equal opportunities and equitable benefits
Gender mainstreaming in water management	The process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in any area and at all levels.
Governance	The framework of social and economic systems and legal and political structures through which humanity manages itself
Gravity-fed irrigation	Irrigation in which water is available or made available at a higher level so as to enable supply to the land by gravity flow.
Green revolution	A significant increase in agricultural productivity resulting from the introduction of high-yield varieties of grains, the use of pesticides, and improved management techniques.
Green water	The proportion of infiltrated rainfall stored in the soil profile that is available for root water uptake by plants. It includes evaporation, interception and transpiration and is the main water resource used in rain fed agriculture.
Groundwater	Water that exists beneath the earth's surface in underground streams and aquifers.
Household	All the persons, kin and non-kin, who live in the same dwelling and share income, expenses and daily subsistence tasks.
Hunger	A condition in which people lack the basic food intake to provide them with the energy and nutrients for fully productive, active lives
Impact	Impacts are changes in a situation brought about by an intervention. They may be intended or unintended, expected or unexpected, positive or negative.
Indigenous (local) knowledge	The knowledge that is unique to a given culture or society.

Term	Definition/Brief description
Institution	Social arrangements that shape and regulate human behaviour and have some degree of permanency and purpose transcending individual human lives and intentions
Integrated natural resources management (INRM)	A conscious process of incorporating multiple aspects of natural resource use into a system of sustainable management to meet explicit production goals of farmers and other uses (e.g., profitability, risk reduction) as well as goals of the wider community (sustainability).
Integrated Water Resource Management (IWRM)	A process which promotes the co-ordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems
Irrigation	Any process, other than by natural precipitation, which supplies water to crops or any other cultivated plants.
Land	A spatial unit containing all natural resources – i.e. minerals, soils, water, flora and fauna – as well as to all the land use types occurring on it
Land degradation	The reduction in the capability of the land to produce benefits from a particular land use under a specific form of land management
Land tenure	The relationship, whether legally or customarily defined, among people, as individuals or groups, with respect to land and associated natural resources (water, trees, minerals, wildlife, and so on).
Livelihood	Comprises people, their capabilities and their means of living, including food, income and assets.
Livestock-water productivity (LWP)	The ration of sum of beneficial livestock products and services to the water depleted in producing them and animal keeping
Managers	Persons who, collectively or individually, are responsible for running a business, farm or organisation.
Marginal-quality water	Includes urban wastewater, agricultural drainage water, and saline/sodic surface water and groundwater
Model	A simplified representation of reality used to simulate a process, understand a situation, predict an outcome or analyze a problem
Multi-stakeholder processes	Processes which aim to bring together all major stakeholders for communication, decision-finding (or decision-making) on a particular issues
O & M	Operations and maintenance
Organisation	Groups of people with shared goals and some formalised pattern of interaction, often defined in terms of roles.
Participatory development	Participatory development is a process that involves people (population groups, organisations, associations, political parties) actively and significantly in all decisions affecting their lives.
Policy	A concise, formal statement of principles which indicates how a sector's objectives and rational outcomes will be achieved. A Policy provides the 'roadmap' for sector development.
Policy making	The sequential steps from problem formulation, to evaluation of alternatives, to implementation in the process of creating a policy
Policy-maker	A person with power to influence or determine policies and practices at an international, national, regional, or local level.
PPP	Public Private Partnership

Term	Definition/Brief description
Productivity	Output per unit of input, where 'input' can be land, labour and / or capital, and 'output' is agricultural produce
Protected area	A geographically defined area which is designated or regulated and managed to achieve specific conservation objectives
Public good	Where individuals may benefit from the existence of some good or service without reducing the benefit that others can receive from the same good or service
Recycled water	Water that has already been diverted and used at least once. Recycling takes place, for example, by reusing drainage water or urban waste water.
Resilience	The amount of change a system can undergo and still remain within the same state (producing essentially the same ecosystem services), or capable of self-organisation, and can adapt to changing conditions.
River basin	The geographical area defined by the watershed limits of a system of streams converging towards the same terminus, generally the sea or sometimes an inland water body (a sink).
River basin development	Constructing water control infrastructure on a river for multiple purposes (navigation, power, irrigation, flood control) and to having a central planning and development for the whole basin
Spate irrigation	An irrigation practice that uses the floodwaters of ephemeral streams (wadi or lugga) and channels guided through short, steep canals to bunded basins where cropping takes place (also referred to as floodwater harvesting).
Stakeholder	An actor having a stake or interest in a physical resource, ecosystem service, institution, or social system, or someone who is or may be affected by a public policy.
Strategic	Action, plan or reform that deals with fundamental issues and is forward-looking, politically feasible and integrated with the external environment.
Supplemental irrigation	Providing additional water to stabilise or increase yields where a rainfall is insufficient for crop growth
Sustainability	A characteristic or state whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs
Sustainable development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs
Sustainable land management (SLM)	A system of technologies and/or planning that aims to integrate ecological with socio-economic and political principles in the management of land for agricultural and other purposes to achieve intra- and intergenerational equity.
Sustainable Livelihoods Approach	A holistic approach that tries to provide a means of understanding, the fundamental causes and dimensions of poverty and sketch out the relationships between the different aspects (causes, manifestations) of poverty, allowing for effective prioritisation of action at an operational level.
Total water withdrawals	The amount of water diverted from its natural courses to various uses.
Trade-off	Management choices that intentionally or otherwise change the type, magnitude, and relative mix of services provided by ecosystems

Term	Definition/Brief description
Uncertainty	An expression of the degree to which a future condition (e.g. an assessment) is unknown.
Utilisable water resources	The part of water resources which is considered to be available for development.
Vector control	Process of controlling a (water-borne) disease, parasite or infection by control of the carrier
Virtual Water	An economic concept defined as the water used to grow exported food. It is normally expressed in litres of water per kilogram of produce.
Vulnerability	The propensity of social or ecological systems to suffer harm from external stresses and/or perturbations
Waste water	The water which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence.
Waste water treatment	Process to render waste water fit to meet applicable environmental standards or other quality norms for recycling or reuse and irrigation.
Water budget (Water balance)	Balance of inflow and outflow of water per unit area or unit volume and unit time taking into account net changes of storage
Water control	The physical control of water by measures such as conservation practices on the land, channel improvements, and installation of structures for reducing water velocity and trapping sediments.
Water diversion	The interception of surface runoff using a permanent or temporary structure to divert it to another outlet
Water harvesting	Activities where water from rainfall and/or surface runoff is collected, diverted, stored and utilised.
Water pricing	A charge levied on the beneficiaries for supplying irrigation water. It may be based on or cover one or more of the following
Water productivity (WP)	An efficiency term quantified as the ratio of product output (goods and services) to water input. It is expressed in term of yields (physical WP), income (economic WP) or environmental services (environmental WP).
Water resources management	The decision-making, manipulative, and non-manipulative processes by which water is protected, allocated, or developed.
Water rights	A legal system for allocating water from a water source to water users
Water use efficiency	The ratio of water used in crop evapotranspiration (ET_o) to crop yield
Water users association (WUA)	A group of land users (farmers, pastoralists, urban dwellers) within a given geographical location who come together for the collective interest of utilisation and sustainable management of a common water resource.
Water withdrawal	The gross amount of water extracted from any source, either permanently or temporarily, for a given use, including irrigation. It can be either diverted towards distribution networks or directly used.
Waterborne diseases	Disease that arises from infected water and is transmitted when the water is used for drinking or cooking
Watershed management	Use, regulation and treatment of water and land resources of a watershed to accomplish stated objectives

1. PARTICIPATORY APPROACHES IN IRRIGATION DEVELOPMENT

1.1 The need for participatory irrigation development

The sustainability of an irrigation scheme refers to the proper functioning of the infrastructure, the people, agricultural enterprises, management and social systems in the long run. This happens if all factors are considered at planning and design of the scheme, but require regular updating with changing circumstances. Generally, the social and institutional context of irrigation development has immense bearing on the ultimate performance of irrigation schemes. Over the years, the process of implementation of irrigation projects, especially those spearheaded by governments and some donors, followed a top-down approaches. However, experience has shown that if farmers are not involved in all the development stages of a project, they lose the sense of ownership and hence do not feel obliged to facilitate its functions. Consequently, long-term performance and sustainability of the scheme is negatively affected. Thus, projects planned with beneficiaries, rather than for them, have proved more sustainable and less costly. Problems of farmer participation are rarely encountered in privately owned schemes or those initiated by the farmers themselves. However, for schemes initiated by donors or governments, there is a need for close consultation between farmers and implementing agencies in all stages of development. This can be achieved through participatory planning, designing, construction and management of irrigation schemes. The following factors are taken into consideration:

- The importance of participatory planning in management irrigation systems.
- Indicators of sustainability of irrigation systems,
- Concepts of operation, function and maintenance of an irrigation system,
- Principles of establishing the organisation structure of an irrigation scheme and initiate preparation of an action plan from each participant,
- Interrelationships of the biophysical, social, economic and policy dimensions in sustaining an irrigation system.

1.2 What is participatory technology development?

Participatory technology development (PTD) refers to collaboration between farmers, development agents and scientists in a manner that combines their knowledge and skills. The heart of PTD is *farmer-led experimentation* to find better ways of using available resources to improve the well-being of families and communities. The purpose of supporting farmer experimentation is to strengthen farmers' capacities to seek and try out new ideas so that they are better able to experiment and to adjust to changing conditions. The idea is *not to convince farmers to adopt a new technology, but rather to encourage them to test new possibilities and choose what is right for their circumstances or adapt new ways of doing things suited to their conditions.* This kind of interaction between farmers and 'outsiders' reveals a common pattern, which consists of six main clusters of activity:

(i) *Getting started:* establishing contact between farmers and 'outsiders' and agreeing to take this approach to improved land husbandry.

(ii) *Analysing the situation:* farmers and 'outsiders' seek a joint understanding of local problems, resources and opportunities, often using tools of participatory rural appraisal (PRA).

(iii) *Looking for things to try:* joint identification of possible solutions or new opportunities for improving land husbandry and agreeing on what to try out first.

(iv) *Trying things out:* experimenting with and adapting the new idea(s) in trials planned and implemented by farmers, with the support of development agents and scientists, and monitored and evaluated jointly according to agreed criteria.

(v) *Sharing the results:* letting other farmers, development agents and scientists know what came out of the experiments and how they were done.

(vi) *Sustaining the process:* helping farmers to organise themselves to continue this kind of interaction and to obtain new ideas and inputs with which to experiment, and creating a political and institutional environment that foster PTD.

1.3 Participatory and strategic change process

To be effective, reform should be both participatory and strategic. A reform is *participatory* when it includes all stakeholders in the process of assessment, policy making, programme formulation and implementation. A stakeholder is any person or group which has an important interest in the prospective reforms. Reform is *strategic* when it deals with fundamental issues and is forward-looking, politically feasible and integrated with the external environment. Strategic change is difficult. It requires a methodology and coordination with stakeholders, in order to mobilise diverse inputs and build consensus. Participatory and strategic reform generally involves the following elements:

- Representational involvement of stakeholders;
- Setting objectives;
- Assessing management gaps and options for change;
- Developing a shared vision of the future;
- Developing policies and programmes;
- Facilitating teams to work on the process;
- Analysis, negotiation and possibly experimentation;
- Organisational restructuring; and
- Performance assessment.

1.4 Identification of stakeholders

Stakeholders are individuals, groups or organisations who have an interest in a particular project. For irrigation projects, these are normally farmers, persons displaced by the project, lending institutions, government, donors, input suppliers, service suppliers and buyers. The purpose of stakeholder participation in project development is to give planners and the parties involved an overview of the persons, groups, organisations and institutions involved in or connected with the project. Participation is expected to result in the incorporation of the interests and expectations of all parties significant to the project. It also provides opportunity for resolving potential conflicts.

1.4.1 Upholding inclusivity

To encourage inclusive participation of stakeholders in irrigation involves:

- Identifying the persons, groups and organisations connected with, influencing or influenced by the project,
- Identifying their level of influence on the project performance, e.g. persons who provide more labour, local leaders and displaced persons rank higher than middlemen
- Sensitising and involving them in all decision-making processes and characterize their influence on the project
- Assuring them and making them feel that they have the power to influence the course of development and their own welfare and lletting them take over and be the prime movers of the project.

During project identification, stakeholders of an irrigation scheme should be identified first. Irrigation projects should ideally be developed on farmers' requests in order to ensure that development is demand-driven. However, government, donors, NGOs or other agencies may identify a need for them and sensitise them to initiate the process. In this case it is incumbent upon the institution spearheading the development to mobilise farmers and other stakeholders so that they appreciate the benefits of irrigation. Meetings and continuous dialogue throughout the development process are necessary for the stakeholders to make contributions as well as to identify and defuse potential conflicts. There should also be agreements, preferably written and signed, that each party will execute its function throughout the planning, design, implementation, operation and maintenance of the scheme.

1.4.2 Roles of stakeholders

Smallholder irrigation supports livelihoods through crop production, food security and income generation. It is important to consider stakeholders in a water user association (WUA) value chain for so as to ensure coordination hence avoid duplication of roles and to waste of resources. In addition, it is important to recognise the capacities existing in the various actors and how these can be utilised for WUA activities. This helps to safeguard the interests of all stakeholders to ensure effective collaboration and sustainability of their operations. In this respect, stakeholders are individuals and institutions with an interest in WUA activities, who affect WUAs; and are themselves affected in one way or another by activities of WUAs.

1.4.3 Categories of WUA stakeholders

There are seven different categories of stakeholders in any irrigation scheme, clustered as follows:

a) Government institutions: These provide; (i) policy and guidelines, (ii) extension services, (iii) coordination of programmes, (iv) quality control (feasibility studies, survey, construction), and (v) monitoring and evaluation of performance.
b) NGOs - provision of credit, extension services, linking to financiers,
c) Suppliers - Provision of inputs, information provision
d) Consumers - End users of farm products
e) Marketing Agencies - Provision of market outlets, provision of market information, quality control
f) Financiers - Provision of credit and related information, provision of extension services on credit issues
g) Competitors - These may include large-scale horticultural growers, other WUAs, importers of similar products and manufacturers of various synthetic alternatives.

1.5 Participation of farmers in irrigation planning and design

To improve on the performance of the irrigation scheme and the productivity of water, it is important to instil best practice at planning, through detailed analysis of physical as well as social assets and limitations. This is because implementations of the identified technical solutions depend on the extent of understanding and addressing socio-economic issues first, followed by policy and biophysical constraints. Therefore, planners, engineers, technicians, managers and social workers charged with the responsibility of irrigation should initiate the process of participatory planning for harmonious working and ultimate improvement of the efficiency of the whole system. This should include the following:

- The farmers should be involved in the selection of lands to be irrigated and the irrigation agency should assist farmers by assessing the suitability of those lands
- The communities within the area to be developed should participate in the technical as well as the environmental impact assessment (EIA)
- Where possible, farmers should provide labour for topographic, soil and socio-economic surveys. They should, through their committees, decide who should do which activity
- Farmers could provide information on past experience with floods, point out areas with potential for flooding, and suggest to the planners locations for structures such as water abstraction from the river, hence preventing the pumping station from being flooded
- The farmers should be fully involved in the selection of crops to be grown and the agency should guide them on the technical, environmental and socio-economic matters related to the suitability of such crops including returns on investment, storage, processing and marketing potential.
- The irrigation agency should facilitate extension and training on various irrigation methods and enterprises pointing out the advantages and disadvantages of each. The farmers then

should propose the irrigation methods they prefer for the design.

- After completing the designs, the irrigation agency should explain the alternative designs to farmers and the implications of each vis-à-vis land redistribution, water resources potential, plot sizes and total area to be irrigated, cropping programmes, labour requirements, capital costs, operation and maintenance costs, environmental aspects, land use patterns and other considerations
- Finally, the farmers should decide which option to adopt, preferably one which serves the majority and has least risks.

1.6 Role of planners in irrigation development

Irrigation development includes both technical and socio-economic plans for which technically competent planers are needed. Planners should take into account the fact that new developments tend to alter traditional land use patterns and are a potential source of conflict. Potential conflict areas should be identified and addressed from the outset. Therefore, there is a need to actively involve the affected communities in the decision-making process right from the outset. Appropriate policies should guide the processes. In order to capture the determinant issues for farmer participation, planners should understand:

a) The characteristics of the farmer groups they are dealing with:
   – Social background, religion and cultural aspects,
   – Status of groups in society, formal or informal,
   – Organisational and leadership structures, and
   – Current constraints and farmers' priorities.

b) Farmers' interests, motives and attitudes:
   – Needs and aspirations,
   – Openly expressed, hidden and vested interests,
   – Hopes, expectations and fears related to the project, and
   – Attitudes, friendly or hostile, towards implementing agencies and other groups

c) The farmers' potentials:
   – Strengths of groups with regard to skills, resources, knowledge, rights,
   – Weaknesses and constraints, e.g. knowledge of benefits of project or otherwise,
   – What the group can contribute to or withhold from the project, and
   – The role of water user groups and other subsidiary actors in the project.

d) The implications of farmers' roles and responsibilities on the planning, design and construction of the project. This includes such issues as to how the project should be designed and implemented in order to address the concerns and needs of the farmers or farmer groups.

In this respect the use of the participatory rural appraisal (PRA) tool can facilitate the understanding of existing opportunities and constraints as well as farmers' perceptions of how irrigation can be used to remove some of the constraints in crop production. During the same process, and in order to avoid interference by individuals or groups that may have vested interests, farmers should identify the stakeholders that will be involved with the participatory planning. Also, right from the outset not only the advantages but also the responsibilities that come hand-in-hand with a new scheme should be made clear to all involved.

1.7 Farmer participation in the implementation of an irrigation scheme

The implementation of an irrigation project involves preparing tender documents for construction, evaluating the tenders, selecting the contractor and supervising construction. The farmers should be involved in all these processes, especially if they are contributing part of the finance, in cash or kind, for the project. The irrigation agency should provide technical information to assist

the farmers in reaching decisions. The farmers should contribute their own labour for certain construction activities, such as trenching, back-filling, pipe fitting, land levelling and concrete mixing. This will also assist them gain some experience needed later in the maintenance of the project. In this respect it is advisable to use labour-intensive methods, wherever possible. The supervision of construction still remains the responsibility of the irrigation agency. Where the farmers contribute money for the project, they should also sign certificates authorising payments to service providers.

1.8 Operation and maintenance responsibilities

The responsibilities of operation and maintenance (O&M) of an irrigation scheme should be clear to all parties from the outset. To assist farmers in selecting a design alternative, planners should estimate the O&M requirements at the planning stage and discuss them with farmers. If the irrigation agency is to pay for O&M for a specified time before hand-over to farmers, the farmers should be organised and prepared for take-over well in advance. While the experience gained by the farmers during the course of planning and development is a valuable tool for the O&M of the irrigation scheme, farmers would still require assistance from the irrigation agency and the extension service in the form of training in the following areas:

- Crop production and protection
- Irrigation scheduling and in-field water management
- Schedule of scheme maintenance
- Bookkeeping and accounting
- Access to markets and market information
- Sustainability of water user groups and other management structures

Such training should be practical, in order to provide the hands-on experience needed and should take into consideration that the background of most smallholders in Eastern and Southern Africa is in rain fed crop production. It is necessary to have appropriate guidelines, procedures and relevant material for the development of a participatory training and extension programme for technical staff, extension workers and other stakeholders. This helps farmers take charge of water management at field and scheme levels. The programme is particularly relevant to irrigation management transfer programmes, assisting water users associations in the operation and maintenance of irrigation systems, and in providing guidance on efficient water use techniques.

1.9 Monitoring and evaluation of smallholder irrigation schemes

Once an irrigation scheme has been implemented, there is need to continuously monitor its performance, in order to identify constraints and opportunities for improved performance. There are a number of parameters that can be measured or assessed as performance indicators. These include; technical system performance, which looks at performance in terms of water use efficiencies and other related parameters; economic analyses, which evaluates economic and financial performance; as well as socio-economic analyses, which evaluate the impact of economic performance on the social well-being of the people. Success resulting from irrigation development as associated with farmer participation, is reflected by the socio-economic benefits accrued to the beneficiaries.

1.10 Indicators of sustainability

The indicators of the sustainability of an irrigation scheme should be holistic and encompassing all the important dimensions, since they will be used in monitoring and evaluating the impacts of irrigation on environment and livelihoods. In carrying out the field study for the development of the new irrigation scheme or improving the existing ones, it is important to identify these indicators, based on the observed biophysical, technical and social constraints. These include:

- Biophysical/environmental indicators
- Economic indicators

- Social indicators
- Policy indicators

Most of the biophysical/environmental and economic indicators can be measured directly, while social and policy indicators are difficult to measure. The main challenge for the irrigating technicians, engineers, managers and farmers is the need to:

- Identify and map out the biophysical constraints
- Define the critical limits of the indicators below or above which the impacts of irrigation would be negative
- Define the mechanisms for monitoring the changes in these indicators

Sustainable agricultural productivity and improved water use efficiency requires integrated approaches that may include; (i) new knowledge, (ii) training, (iii) educational levels, iv) investment of financial capital, (v) cost sharing and loans, (vi) markets, (vii) facilitation, (viii) involving government institutions, (ix) infrastructure (roads, mobile phones), (x) involvement of youth, (xi) land tenure, and (xii) water availability. In addition, mapping and differentiating of the irrigated area should be based on detailed survey and laboratory analysis of soil, in addition to physical and hydraulic characterisation. Full water and fertility management packages for each production system along with irrigation scheduling, based on the hydraulic conditions of the soil, can lead to sustainable irrigated agriculture.

2. OPERATION AND MAINTENANCE OF IRRIGATION SCHEMES

2.1 Operational services required in an irrigation scheme

Irrigation operation and maintenance services require data for proper planning which can be obtained through regular monitoring of the system. Monitoring the operations and maintenance of the irrigation system is extremely important with two main purposes:

Short term: means of management control, comparing the actual flow with designed flow
Long term: uses information on performance, supply and demand as a guide to planning and implementation.

For proper functioning and good performance of the system, frequent observations, measurements and checks should be carried out frequently on the irrigation system. Only relevant information should be included and accuracy of the data should be checked not only on equipment but also on the staff who do the recording. There are several types of operational services required in an irrigation scheme.

2.1.1 Project operation service

The operation service takes care of the physical system, staffing and management. The various components of the system from capture to application must be run as per the design and the operation manuals to ensure timely and adequate delivery of water to satisfy crop water requirements.

2.1.2 System operation service

The water level at the intake, flow rates, opening and closing of valves, checking of leaks in the system and precipitation pattern of sprinklers requires right skills to ensure that quality operations are carried out for satisfactory service. The management team plans and implements the operation schedules of both the staff and water supply in the scheme. The operations of the scheme should be such that the supply and demand matches as closely as possible.

Depending on the system the operator provide the quality and matching rate of working to requirements while the management provides direction and control. An efficient management is therefore critical in running of irrigation scheme.

2.1.3 System maintenance service

To ensure that the irrigation system adequately serves the users and for a longer life, maintenance of the system is a must i.e. replacement of worn out or defective parts of the system. It is prudent for the management of any system to; plan, implement and monitor the maintenance activities. The most critical types of maintenance include; routine or the normal maintenance (preventive), special maintenance (corrective) and deferred maintenance (rehabilitation).

2.2. Operational activities

Operational activities are the periodic or day-to-day activities that keep an irrigation scheme functioning properly. These relate to the technical, administrative and socio-economic components of the scheme.

2.2.1 Types of O&M

There are several O&M management systems based on the institutions responsible. Some of the more common ones include:

a) O&M by a Central Body

This is applicable in centrally managed large schemes where farmers may be tenants and an authority does all the O&M activities. The farmers are left to carry out operations at the farm level. The O&M costs are recovered by the authority from farmers' produce.

b) O&M by WUAs

WUAs should be fully responsible for operation and maintenance of the irrigation or drainage system with some technical advice and occasional assistance from a government agency or any other stakeholder or collaborator. The advantages include:

(i) The approach facilitates self-determination, internal capacity building and hence enhanced sustainability
(ii) Afford WUAs an opportunity to participate in decision on O&M function
(iii) It enhances group cohesion and strengthens WUAs.
(iv) O&M issues are timely addressed.
(v) O&M costs are substantially reduced because most activities are carried out by WUAs

c) O&M by WUAs through a water undertaker

A water undertaker refers to an agency contracted by the WUAs to operate and maintain major infrastructure on their behalf at a fee. This is recommended in large smallholder schemes under the following circumstances:

(i) When farmers are unable to handle the necessary technical requirements
(ii) When their organisational capability is below that expected to efficiently run the scheme.
(iii) When the structures are massive and need specialised operation and maintenance

2.2.2 Operation and maintenance procedures

a) Establish the O&M tasks
b) Establish labour requirements to perform the tasks
c) Determine and mobilise other resources required
d) Prepare (with assistance of technicians) appropriate O&M schedules
e) Implement the tasks as per the schedules
f) Monitor and evaluate the implementation

2.2.3 Operating the Technical Components

Intake works

The water intake works require the following services:

- Controlling of sluice gates and scour pipe valves
- Checking the intake chamber cover conditions;
- Checking all the screens positioning and functioning;
- Check coarse and fine screens for blockage and clogging;
- Regular inspection for silt accumulation, cracks, leakages, blockages;
- Check obstruction of flow to or near the weir;
- Check the water level at the intake;
- Regular checking of flush/flood gates and scour pipes.
- Check and adjust the sluice gates to the recommended depth.

Sedimentation Basin

- Check that covers are locked and there is no overtopping
- Check that fine screens are properly in place and free from clogging and blockage;
- Regular inspection for silt accumulation, cracks, leakages;
- Check obstruction of flow to or near the outlet chamber;
- Check the scouring pipe and overflow/spill for blockage or malfunctioning.

Water Conveyance System

The water conveyance system could be piped or canal. In the case of canal system, more work is required to maintain canals in functional state and avoid water wastage. However, water conveyance should adopt the same principles of care and management. The notes here refer to piped conveyance system.

Pipe network

- Opening and closing of sluice valves to be done gradually until fully closed or opened to prevent surges, water hammer and air pockets in the pipeline
- Pressure surveys inspection along all the line to determine any hydraulic problems;
- Flushing: This is accomplished by opening washouts and end caps. Allow water to discharge until discolouration or odour disappears;
- Regular inspection for leakages (joints, couplers, bends) and bursts;
- Check for any damages of the anchors/thrust blocks, pillars, culverts and marker posts regularly.

Meters

- Regular inspection of the meters for flow rates leakages or blockages;
- Proper and accurate recording of the functioning conditions of the meters;
- Check the meter chambers for damages, water logging and silt.

Valves

- Mark and number all the valves and indicate the position/locations on the layout;
- When filling the system all valves should be in the open position;
- Operate valves in either direction and determine the number of turns to go fully closed or fully opened positions; show on record card, it gives direction on the level of operation of the system and also when the valve is not properly functioning;
- Check valves for leakages through packing of rings, assembly joints;
- Check air/vacuum valves for leakages past float.
- Do not leave valve in fully opened or closed position, but back off 1-2 turns,
- Regular inspection of pressure reducing valves for any malfunction (pressure range, leakages)
- Check all valves, boxes for damage, leakages and silt accumulation.
- Prepare record cards for each valve in the system.
- Inspection of functioning of the valve should be done regularly.

Wash outs

- Regular inspection of all washouts for malfunction by opening of the gate valves;
- Opening the valves to drain the system until discolouration and oduor disappear;
- Check that the valves are positioned properly before opening.

Operation of in-field system

- Flushing:- Regular flushing of the system by removing the last sprinkler head and letting water run for a few minutes;
- Opening and closing of gate valves at the hydrant and off take and checking for any malfunctioning;
- Shifting of sprinklers/lateral position to the correct positions as recommended;

- The lateral should be placed such that it is at level as possible to avoid pressure difference along the laterals;
- Observe spray patterns for clogging, misaligned heads and spacing;
- Check the precipitation of sprinklers and operation pressure regularly;
- Regular inspection of gate valves junctions, bends, joints and pipes for leakages, blockages and mal-functioning of sprinklers;
- Adjusting of flow control and pressure regulators to the designed flows and pressures.

2.3 Maintenance activities

Maintenance involves periodic activities that ensure proper functioning of the irrigation scheme in the long term. Regular maintenance reduces the chance of system breakdowns and results in sustainability of the system. Some of the activities involved include:

Maintenance of the intake

- Flushing out the accumulated silt regularly by opening the valves for the scour pipes and flush gate;
- Stir up the accumulated silt until all the silt is washed downstream through the provided gates;
- Clean the flush screens and sluice gates;
- Replace the damaged stop logs and screens
- Grease the movable metal parts;
- All the concrete and steel parts with defects should be repaired;

Sedimentation Basin

- Daily cleaning of the fine screens;
- Open the wash outs regularly until clear water comes out of the basin. Stir up the accumulated silt;
- Repair or replace the worn out or damaged valve, wash outs, rubber seats and screens;
- Repair the concrete structure and metal parts where damaged;
- Tighten all the loose movable parts.(e.g. cover hinges)

Maintenance of pipe network

- Regular flushing out of the pipe system by opening all washouts and end caps.
- Repair leakages and bursts promptly. It is recommended to remove a short length of pipeline on each side of the damage since the defects may be extended. If in doubt, replace the whole length of pipe;
- Replace the missing, damaged or vandalised pipes;
- Tighten the leaking joint and replace the damaged coupling/fittings. Avoid over tightening of steel couplers and must be protected against corrosion;
- Repair damaged thrust/anchor block and replace vandilised or damaged posts;
- Set the pressure as per the design and replace damaged pressure regulating devices;
- Repair damaged chamber covers and frame.

Note: precaution should be taken when repairing bursts under dirty conditions to ensure that pipe and joint surfaces are clean throughout the operation

Maintenance of meters

This should not be done by farmers. It is best to seek the guidance from the qualified technician if the meters are not working properly. Replace the meters if need be.

Valves and valve boxes

- Repair malfunctioning valves and replace the worn out or damaged valves;
- Remove dirt and mud from valve boxes. Add gravel to the bottom if necessary;

- Clean all valves regularly for blockage and repair all worn out parts;
- Grease bolts and other movable joints;
- Tighten the bolts;
- Bolts and nuts should be cleaned, greased and replaced if damaged or worn out;
- Flush the pressure reducing valves by pulling the easing lever up;
- Remove and clean strainers on diaphragm type valves;
- Repair any damage on the chamber walls, covers and frames.

Maintenance of wash outs

- Repair all the damaged drains and control valves;
- Repair all the leakages;
- Drain the chamber;
- Grease the chamber covers, hinges and repair the damaged or broken parts;
- Bolts and nuts to be greased and tightened.

Maintenance of in-field systems

- Repair leakages along the service lines, hydrants and repair them promptly;
- Replace the missing, damaged control valves;
- Ensure that loose connections are tightened;
- Flush the system at the beginning of the irrigation;
- Clean the clogged nozzles;
- Replace non performing accessories e.g. springs, clips, seals, bed head arm;
- Broken or missing sprinkler head must be replaced;
- Align the misaligned heads: use the manufacturers manual to align;
- Reposition the sprinkler heads and fasten the tripods;

Note: Periodic inspection of supply lines, mechanical equipment and other accessories should be made through out the irrigation season.

3.0. ORGANASATIONAL STRUCTURE IN IRRIGATION SCHEMES

3.1. Scheme organisation

When several farmers are carrying out irrigated agriculture using a common point of water supply, certain tasks or activities must be properly coordinated. To ensure the smooth running of the scheme and to avoid conflicts, it is important to have an Irrigation Water Users' Association for organisation and self management. Thus irrigation schemes should be managed by a legally registered irrigation water users' association. The organisation management structure should consist of the organs described in Figure 3.1 below:

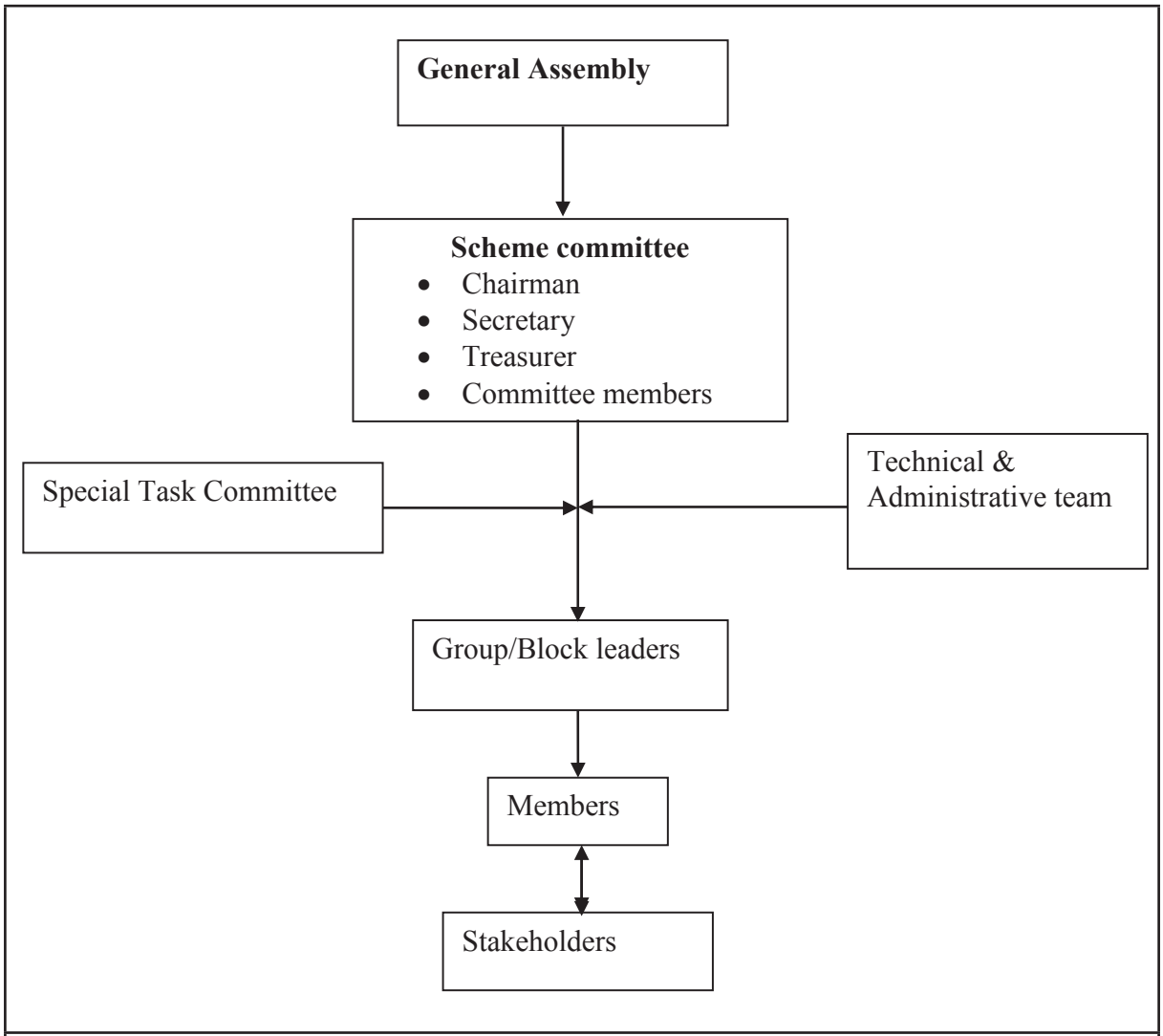

Figure 3.1: Illustration of the organisational structure of a group irrigation scheme

(*Source:* MoWRM&D 2003)

3.2 Functions of the various stakeholders

There are various types of stakeholders engaged in irrigation development, O & M, depending on scale and level of commercialisation. They range from the farmers themselves, government officers, water service providers, suppliers of inputs materials, buyers of produce and others in the value chain that are affected by the scheme, e.g. shopkeepers. At the O & M level, it is mainly the farmers and administrators who are actively engaged. The roles of each of these groups are described here as follows:

Farm level O & M

This is usually the responsibility of individual farmers. They should be responsible for the water application, and all in-field water management systems.

Unit (block) level

Most irrigation schemes are divided into smaller units, each of which has a unit committee and Leaders. At this level, there may be water guards (sometimes called water scouts) who oversee that farmers adhere to agreed water sharing bylaws or regulations. The block committee and the line patrollers should organise the operations of the main line and water distribution within the block and supervise the individual farmers at the farm level.

Scheme level

Irrigation schemes should have an irrigation water users association (IWUA) or scheme committee to facilitate equitable sharing of water and for coordinated development. The IWUA together with the patrollers is responsible for the operation from the intake, conveyance system and supervision of the block committees.

3.3 Responsibilities for Water Management

The water distribution should be synchronised with the cropping season which is designed to correspond to weather, market forces, and agreement with farmers as to their water demands, thus guiding when the intake or hydrant should be opened. The irrigation cropping/water distribution calendar and schedule should be adhered to in order to avoid over irrigation or under irrigation of crops. Proper planning of the operation is necessary in order to match the supply and demand as closely as possible. In case of water shortage, water rationing may be introduced: This could involve:

- Practicing alternative irrigation (rotation system between blocks)
- Reduce daily irrigation time (deficit irrigation)
- Reduce the number of sprinklers per plot.

At the scheme level, the responsibilities for operations and maintenance of irrigation water can be allocated at the scales of the farm, unit/block and scheme-wide. The persons responsible can be the farmers, field technicians and administrators as shown in Table 3.2.

Table 3.2 Organisation and maintenance chart

Levels	Tasks	Responsibility	Staff	Frequency
On farm	• Operating irrigation equipment (e.g. sprinklers) • Maintaining field equipment • Checking leakages and repairing the in-field system • Positioning and aligning water application equipment (e.g. sprinklers) • Pressure regulations • Flushing the System	Farmer	Plumber/ pipe fitter	Daily: ○ Operating water application systems ○ Check for leakages or malfunctions Seasonal: ○ Pressure checks ○ Flushing of the system ○ Valves inspection

Unit/ Blocks	• Inspection of all structures on the distribution lines • Repair of all bursts, leakages and damages • Regulations of water distribution and requests • Supervision of individual farmers • Organise cleaning of the chambers • Carry out preventive measures	Unit leader	Water technician	Daily: ○ Inspection of the System ○ Supervision ○ Water regulation Seasonal: ○ Cleaning of structures ○ Major repair works ○ Check and repair valves ○ Repair anchor and thrust blocks
Scheme	• Inspection of intake works and conveyance • Repair and maintenance of the head works and conveyance • Operation of the head works and conveyance • Supervise block leaders • Planning and implementation • Staffing • Monitoring the activities	Irrigation Water Users' Association (IWUA)	(i) Operations manager (ii) Water technician	Daily: ○ Inspection of head works and conveyance ○ Operation and Maintenance Seasonal: ○ Cleaning intake works ○ Major repair works i.e. Change of valves, silt removal, pipe replacement.
NOTE: The staff requirement will depend on the scheme size.				

(*Source:* MoWRM&D –Kenya, 2003)

3.4. Monitoring of operation and maintenance

The monitoring of the operations and maintenance (O & M) is an important activity and has two main purposes

(i) **Short-term**: it acts as a means of management control i.e. comparing the actual situation with the designed condition and helps identify the divergence, and

(ii) **Long-term**: it is used to amass information on water supply, demand and performance as a guide to planning and implementing forth coming seasons.

Frequent observations, measurements and checks should be carried out throughout the irrigation season and proper records obtained and analysed. Only relevant data/information should be included. Clear monitoring schedules and check lists should be made available for ease of recording

and consistency. These may include the following:

3.4.1. Materials and equipment

The relevant materials/equipment for monitoring includes but not limited to the following:

- Staffing: organisation structure of the scheme
- Comprehensive map (system layout)
- Section plans showing location of the system components i.e. intake, sedimentation basin, valves, infield system etc]
- Record cards/charts
- Check lists
- Operation and maintenance schedules
- Measuring equipments i.e. pressure gauge, flow meters, tension meter
- Crops and cropping calendars
- Irrigation schedules
- Agro-Meteorological data (preferably from weather station at scheme site).
- Report sheets (daily, monthly, semi-annual and annual)

Surveillance charts

These are charts prepared for ease of checking the various tasks to be performed along the irrigation system, where, when and by who. There is daily, seasonal and annual surveillance charts.

3.4.2 Daily schedule

For the intake

- Check Damage, clogging and blockage of the screens
- Check for rust on the screens
- Check Silt piling at the weir and chambers
- Check water flow quantities
- Check the conditions of the environment surrounding the intake weir and intake chamber

Conveyance and distribution line

- Check for leakages and bursts of pipes and fittings
- Check the conditions of the valves and wash outs

Infield system

- Check for blockage/clogging
- Inspect the Watering pattern
- Check sprinkler alignment and positioning
- Check the working pressures and application rates
- Check for missing, damaged or vandilised sprinklers

3.4.3 Seasonal schedules

Intake

- Remove any silt pilling at intake
- Repair any damages on the screens
- Scour the weir, chambers and flush the sediments

Conveyance and distribution line

- Inspect the system for leakages and bursts
- Inspect the conditions of the valves and washouts

- Inspect the condition of the chambers, break pressure tanks and anchor blocks/thrust blocks
- Check the pressures
- Flush the system

Infield system

- Check for blockages/clogging
- Inspect the watering pattern
- Check sprinkler alignment and positioning
- Check working pressures and application rates
- Check for missing, damaged or vandilised sprinklers

3.4.4 Annual schedules

Intake: Inspect the system for leakages and bursts Intake

Conveyance and distribution line

- Remove any silt pilling at intake
- Repair any damages on the screens
- Scour the weir, chambers and flush the sediments
- Inspect the conditions of the valves and washouts
- Inspect the condition of the chambers, break pressure tanks and anchor blocks/thrust blocks
- Check the system pressures
- Flush the system

Infield system

- Check for blockages/clogging
- Inspect the watering pattern
- Check sprinkler alignment and positioning
- Check working pressures and application rates
- Check for missing, damaged or vandilised sprinklers.

4. WATER USERS ASSOCIATIONS

4.1 What is a Water Users' Association?

A Water Users' Association (WUA) is a group of land users (farmers, pastoralists, urban dwellers) within a given geographical location who come together for the collective interest of utilisation and sustainable management of a common water resource.

4.1.1 What is an IWUA?

An Irrigation Water Users' Association (IWUA), on the other hand, is a WUA whose main goal is to develop, utilise and manage water resources for irrigation and/or drainage. The IWUA members make joint efforts to install, operate, maintain and manage the irrigation or drainage facility for the benefit of all the members. There are two types of IWUAs, categorised based on their dominant activity.

(i) **Irrigation WUAs** - These abstract water mainly for irrigation activities.
(ii) **Drainage WUAs** – These are basically involved in evacuation of excess water from the farms and construction of flood protection works to prevent flood waters reaching agricultural land.

An IWUA is meant to develop, viable and sustainable farmers' organisations that would own, operate and manage smallholder schemes on a sustainable basis. The idea is to efficiently and effectively manage irrigation schemes that would help increase crop production hence improve food security and promote higher income generation towards improved well-being of irrigation and drainage farmers. In the case of river basin management, an IWUA can be a component or member of a larger WUA. This manual uses the term WUA (since it is inclusive of IWUA).

4.1.2 Roles of WUAs in Irrigation and Drainage

These normally include:

- Pooling members' resources for the installation, maintenance and sustainable management of irrigation or drainage facility.
- Management of operation and maintenance of the irrigation facility for maximum benefits to members.
- Facilitate access and ensure effective management of development resources e.g. capital, credit, grants, land, water, technical etc.
- Provide irrigation water and drainage system to members.
- Develop and promote group cohesion.
- Capability building for members

The roles and functions of WUAs in small holder irrigation and drainage development (SHIDD) are needed as the project development progresses. These evolve from the information given during initiation phase to total assumption of management roles at O&M/sustenance phase, as shown in Table 4.1.

Table 4.1: Roles and functions of WUAs

Phase in Scheme development	Roles/Functions of WUA
Initiation	○ Generation of project idea from members ○ Transmission of idea to others ○ Participate in feasibility studies e.g. marketing
Planning /Design	▪ Prepare necessary information. ▪ Mobilise resources, finances, and manpower/member activities. ▪ Participate in activities ▪ Formulation of WUA by-laws
Implementation (provision of cash, materials, labour and logistics)	○ Mobilisation of resources for project implementation ○ Facilitation of acquisition of resources from members/ community. ○ Actual commitment of resources. ○ Participate in all activities. ○ Participate in major decisions pertaining to project policies, guidelines and procedures.
Operation and maintenance	▪ Prepare plans i.e. financial, technical organisational. ▪ Evaluate the plans ▪ Develop proposals ▪ Link/network with support institution ▪ Promote support programmes for members ▪ Develop capability of the members ▪ Develop, implement sustainability measures

4.2 Formation of a Water Users' Association

Before a group like a water users association (WUA) can function effectively and deliver the intended services to the members, it goes through a series of stages namely: Forming, Storming, Norming and Performing. After going through these development phases WUA should become mature and functional and perform their various tasks effectively. These roles include: (i) collection of water service fees, (ii) scheme operation, (iii) equitable water distribution to members, (iv) scheme/facility maintenance, (v) sourcing for irrigation support services, and resolution of group conflicts (Table 4.2).

a) Forming Phase

(i) Members are not yet a group but a set of individuals

(ii) Individuals want to establish personal identity within the group and make an impression

(iii) Participation is limited as individuals get familiar with each other

(iv) Individuals begin to focus on tasks at hand and discuss its purpose

(v) The group is essentially evolving ground rules on which future decisions and actions will be based.

Table 4.2 The formation process of a water users association

Mile-stones	Process	Specific objectives	Steps/strategies & Tactics
1. Core group formation	Identification of entry point	Baseline data established	Reconnaissance visits
		Initial contacts established	
	Social preparation	Existing groups identified	Mobilisation meetings
		Community action plan drawn	Resource mobilisation Conduct PRAs,
	Leader identification& development	Potential leaders identified & developed based criteria	Small group & individual discussions (situation analysis) Local mobilisations
	Core group formation Member recruitment	Potential leaders categorised	Mobilisation meetings Statement of objectives and qualities of leaders Election of interim committee
		CIGs formed	Performance evaluation Plan evaluation
		Firm up list of members	Reconnaissance of probable command areas & beneficiaries Community discussions Issue membership certificates
2. WUA formation	Vision, Mission, objectives, Organisation & mgt Structure established By-law formulation	To establish internal governance mechanism Role definition	Define the offices, committees etc Formal election Meetings
3. WUA legalisation	Registration	Preparation of documents To formalise the WUA	Formal application for registration & payment of fee
4. Training & development	Financial mgt trainings Leadership trainings Pre-project trainings	Install capability in organisational and financial mgt	Informal training sessions for leaders On- the job trainings Guided practice Project orientation sessions Participation planning Skills development planning for irrigation, production etc
5. WUA operation	Operationalise the organisation	To deliver services to members	Explain roles & mandate
	Implementation of O&M, production plans	Test, improve & M&E WUA Mgt capability	Plan implementation by WUA Performance evaluation & feedback
	Implementation of sustainability measures Total assumption of O&M and Mgt responsibilities	Install WUA capability for sustenance Evaluate sustainability	Plan implementation by WUA Performance evaluation & feedback Test- run Guided O&M Performance evaluation Mgt trainings

b) **Storming Phase**

(i) Characterised by intra-group conflict and lack of unity

(ii) Preliminary ground rules on purpose, leadership and behaviour are disregarded

(iii) Individuals can become hostile toward each other and express their individuality by pursuing or revealing personal agenda

(iv) Friction increases, rules are broken, arguments can happen
(v) If successfully handled, this stage leads to new and more realistic setting of objectives, procedures and norms.

c) Norming Phase

(i) Characterised by overcoming tensions and by developing group cohesion in which norms and practices are established
(ii) Group members accept the group and accept each other's idiosyncrasies
(iii) Group allegiance develops and group strives to maintain it
(iv) Development of group spirit, harmony becomes important

d) Performing

(i) Characterised by full maturity and maximum productivity
(ii) Members take on roles to fulfil the group activities since they can relate to one another.
(iii) Roles become flexible and functional
(iv) Group energy channelled into identified tasks
(v) New insights and solutions begin to emerge

Although Credit, Marketing and Inputs supply are non-core WUA functions, they are critical support services for performance and sustainability of WUAs. As WUAs gain more experience in O&M and management, they may consider to gradually take up more of these functions.

4.3 WUA Composition and Structure

WUA members

These are all the farmers within a given area and are served by the same irrigation/drainage facility and are bound together for a common purpose.

Group/Block Leaders

These are farmers that represent the various blocks of an irrigation/drainage scheme e.g. farmers served by a sub-main or lateral. The number of group/block committees will depend on the size of scheme and number of farmers.

Special-tasks committees

These are leaders that are elected and assigned specific WUA tasks for the purpose of distributing responsibilities and to facilitate participation of more members of WUAs. These may include O&M, Training, Audit, Conflict management, Safety, Health & Environmental committees etc. The number of special task committees will depend on the size and complexity of the scheme.

Committee Members

These are elected leaders, usually representing the interests of the sub-groups and/or special-task committees in the main scheme committee.

Executive committee

These are the elected officials of the WUA who are responsible for the overall leadership of the WUA, that is, they are vested with the overall decision/policy making responsibilities.

General Assembly

This constitutes the general membership convening for a purpose and is the scheme authority for major/critical decisions on matters affecting the general membership (Figure 4.1).

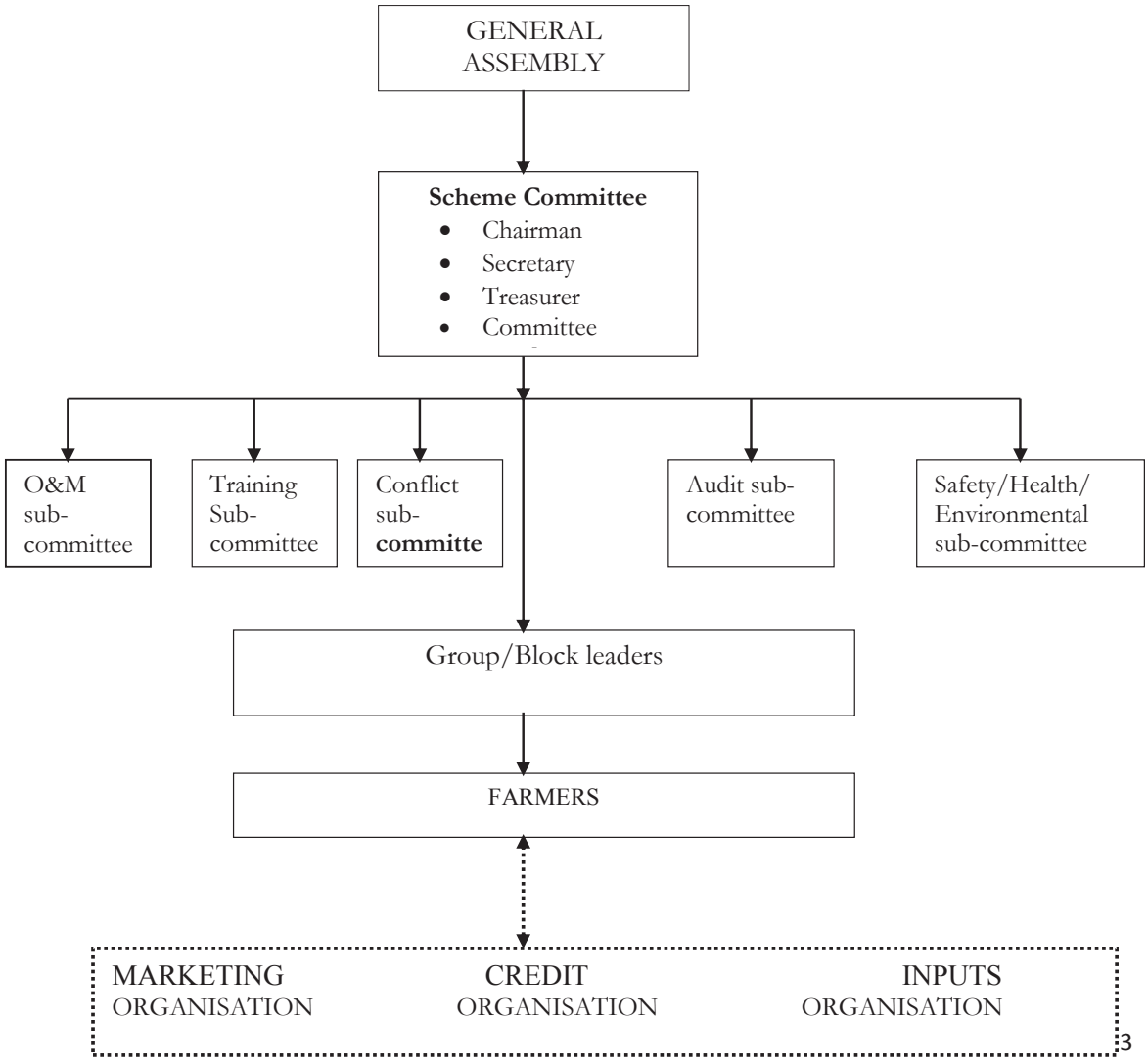

Fig. 4.2: Organisational structure of a typical water users association

4.4 Legal and Administrative structure

4.5 WUA By-laws

The operation of the WUA is guided by its by laws. This is a set of rules and regulations that are formulated and mutually agreed by all members to guide, regulate and govern the members in their activities and relationships to ensure smooth operations of the WUA and to facilitate attainment of their objectives. To be effective this must be well accepted by the community and apparently promote equal treatment.

A WUA's By-laws comprise a set of rules and regulations that are formulated and mutually agreed upon by all members of a WUA to guide, regulate and govern the members in their activities and relationships to ensure smooth operations of their organisation and to facilitate attainment of objectives. By-Laws need to be written in a language understandable to all members. If need be the by-laws should be translated into local languages. By laws must be availed to all members

Purpose of by-laws

- To define group objectives and hence set the WUA direction and commitments to a purpose,
- To describe the basic procedures for organisation management and decision-making.
- Clearly set out the duties of the officials and the members
- Regulate behaviour and create order towards group cohesion and operation
- Give financial regulations /penalties and sanctions
- Provide guidance on WUA operation.

Content of by-laws

Members should agree in a general meeting the contents of their by-laws. The content of by-laws can be summarized into the following categories (for sample of WUA By-laws see annex 1).

a) WUA identity i.e. name, Address and physical location
b) Mission statement and functions of the WUA
c) A description of membership criteria
d) Scheme Leadership, election criteria and length of term in office.
e) Rules governing internal relationships, roles and functions of members and leaders
f) Appropriation and auditing procedures for WUA resources
g) Mode of water distribution
h) Procedures for liquidation of a WUA and liquidation of assets

i) Election procedures
j) Water fee collection procedures
k) Types and number of meetings
l) Procedure for settling disputes .
m) Procedures for enforcement of By-laws and types of penalties
n) Procedure for reviewing of By-laws.

4.6 Beneficiaries of WUAs

The ultimate beneficiaries of the existence of a WUA are the members, mostly farmers. Others who derive direct or indirect benefits include (i) Project implementers, (ii) service providers, (iii) marketing outlets, (iv) consumers of produce, and neighbourhood communities e.g. through availability of labour. In order to ensure WUA sustainability the stakeholders should consider the following Interests and concerns:

- An affordable system
- Reliable water supply
- Market availability
- Access to investment funds
- Labour availability
- Availability of extension services
- Security
- Quality of inputs
- Conducive land policy
- Benefit on their investments

4.7 Desirable qualities of a sustainable WUA

The desired qualities in a WUA are those which make it functional (able to perform its roles and function: viable (able to sustain its own operation organisationally and financially) and self sustaining (can generate resources from within and without). These can be characterised by the following qualities:

- Effective committee with good leadership
- Transparency
- Effective communication
- Delegation of duties to sub committees
- Written records
- Clear role delineation
- Should understand O&M and do it properly
- Able to source information
- Able to develop work plans and budgets
- Able to mobilise internal and external resources for its purposes.

5. COMMUNITY MOBILISATION

5.1 What is community mobilisation?

Community mobilisation is a facilitative process of strengthening the organisational and management capacities of people in such a way that they become self reliant in solving their own problems, and charting their own development path. It connotes the organised action of the people towards the resolution of issues or acquisition of what they desire and what may benefit them. This, then, requires that people, as a group, must have proper ownership of actions and highly organised causes of action. However, community mobilisation takes a long period for the community to attain self -organising status. This is a spiral process that poses more challenges as the group advances from one stage to another because of change of vision and objective. During community mobilisation process, the beneficiaries gain self confidence to undertake their projects independent of outsiders, discover how to organise their group well and how to make their decisions and plans.

5.2 Advantages of community mobilisation

Community mobilisation is a key element in smallholder irrigation development, and has the following advantages:

- Empowering rural people /communities so that they can have control over their own destiny based on collective self-reliant efforts
- Enables the development agent to assess the socio economic status of the group whether they fall in the target group of the poor and up to what extent they need assistance
- Provides a framework for thinking so that people bring their knowledge together, build on contributions of other beneficiaries and encourages them to reflect and act.
- Enables community prioritise their development needs in relation to available resources & their capacities
- Helps WUAs to recognise their latent potentials and stimulate, inspire and motivate the community to undertake development activities
- Assists WUAs to clearly identify and appreciate their problems, causes and means of solving them
- Enables WUAs appreciate that they have roles to play in their development process and own them
- To accelerate development
- For community to gain self confidence and self reliance to undertake their projects independent of outsiders.

5.3 Community mobilisation approaches

The community mobilisation process can be carried out either through "settle-in" or "reach out" approaches particularly in first stage.

"Settle-in" means that the community organisation worker (CW) lives in the target community and works with the people on a daily basis through a certain period of time to accomplish the task.

"Reach out" approach, means that the community organisation workers stay outside the community and visit the people occasionally as the situation demands.

The selection of either approach is determined by the concerned development agency and taking into consideration of a community situation, peoples' capability level, types of projects to be introduced and their experience and organisational convenience. The community worker in the whole is just to facilitate a community acquire the necessary skills, attitude and knowledge for their self-reliant efforts.

In smallholder irrigation the settle in approach is recommended for sustainable project development because the community worker becomes integrated and part and parcel of the community. This enhances easier integration and acceptance of the community organisation worker by the community.

5.4 Implementing community mobilisation

Community mobilisation is best operationalised through iterative strategies such as ground working, planning, action-reflection and core-group work committee systems. Planning and action reflection – the organiser must assist in identifying scientific methods of attending to issues. Likewise, it is based on assessment of their capabilities and other internal and external factors. In the cause of implementation the organiser should observe performance and conduct reflection session after every mobilisation (implementation of plan). Reflection should focus on what transpired versus plan, strengths and weaknesses, recommendations and how to proceed (re-planning) in succeeding similar situations. People must feel the necessity of their action and must never feel that they are merely being "pushed" to act or decide.

Ground working is the process of raising consciousness among the people. This is carried out effectively with the thorough knowledge of issues and people's behaviour and socio-economic background from which the right entry point could be identified and utilised. These lead to:

(i) Raising of awareness on situations affecting them, facilitating situation analysis in terms of SWOT (Strengths, Weaknesses, Opportunities, Threats), facilitating identification of specific measures and instilling in them the desire to act on issues (ownership of actions),
(ii) Optimisation of resources through assignment of specific tasks and effective implementation of plans, and
(iii) Group action towards the resolution of issues. Core group work (committee system) – people identified as capable of doing tasks should be assigned in groups of 3 to 5 persons to implement activities. The strategy of planning and action reflection should be applied.

5.4.1 Participatory community mobilisation process

The process of community mobilisation and WUA formation is composed of the following five stages: (i) Core group formation, (ii) WUA formation, (iii) Training & development, iv) WUA legalisation, and (v) WUA operation. The community organiser (CO) should take the community through a participatory process and assist them in seeing their consequences and plans. The people should be encouraged to make their decisions, and to own the project and as a result take full responsibility. If their decision was wrong or a conflict or a failure arose from it, this becomes a learning experience through which a stronger group could emerge.

The personnel responsible for community-based irrigation and drainage development need exposure and proper guidance to community mobilisation and development activities to be effective in their work. The following are the strategies that could be be adopted:

- Multi-skilling – involves training of the irrigation personnel currently in place in community organisation work.This is a short-term measure to facilitate improvement on what is currently being done.
- Recruitment and deployment of community organisers as a medium and long-term measure.

5.4.2 Areas of community participation

In project development, five areas of community participation can be categorised as follows:

a) **Project identification**

Farmers should identify irrigation or drainage development as a felt need. Then they make a

request for assistance. After which a nneeds assessment, is done and objective analysis and prioritisation of interventions made.

b) **Project preparation**

The following activities are implemented

(i) Feasibility studies
(ii) Planning and design meetings
(iii) Organising farmers into WUAs
(iv) Conducting elections and formulating by-laws
(v) Identifying the resources required and the potential sources
(vi) Drawing of a memorandum of understanding between farmers and stakeholders specifying commitments and responsibilities of all parties

c) **Project appraisal**

(i) Checking compatibility of project with the WUA needs.
(ii) Strategy for sustaining farmers' participation.
(iii) Sharing experience with stakeholders involved in similar projects to make improvements and any other changes
(iv) All contentious issues must be discussed and agreed upon.

d) **Project implementation**

(i) Participation in administration of tendering process
(ii) Translation of plans and designs into tangible components on the ground.
(iii) Honouring commitments on contributions as agreed in the MOU e.g. provision of finances, labour, land for structures, building materials etc.
(iv) Monitoring progress of implementation according to programme of work

e) **Project evaluation**

(i) Checking the achievements against the objectives set at the onset of the project.
(ii) Farmers, as project beneficiaries, should carry out internal evaluation

5.4.3 Roles and functions of the community organiser

A Community Mobiliser (CO) has several tasks, such as:

- To facilitate community situation analysis to identify community needs, aspirations and the appropriate entry point for the organiser.
- Assist farmers to organise themselves into functional, viable and sustainable WUAs
- To coordinate other staff and stakeholders in the locality to facilitate effective farmers participation in smallholder irrigation and drainage
- Facilitate the capacity development process of the leaders and WUA
- Monitor and evaluate performance of leaders and WUAs
- Provide assistance and advice to WUAs in terms of information, directions etc
- Document the processes of community organisation and WUA formation and prepare reports.

5.4.4 Qualities of a good community mobiliser

Community organisation is a professional field that requires qualified personnel to do it effectively. Besides professional training the following qualities are necessary.

- Attitude: to maintain amicable relationships with people, Modesty, strong will, objective judgment, fairness, impartiality, flexibility and courage.
- Skills: to effectively carry out the tasks with the local people. These skills include:
  - Communication skills, Dialogue and facilitation skills

- General skills in agriculture, irrigation etc
- Professional skills in community development.
- Preferably Proficiency in local language.

- Knowledge: to correctly understand, appreciate and internalise people's situations, needs and aspirations
  - Basic knowledge of local situation in terms of politics, economics, social, cultural and environmental issues.
  - Sufficient knowledge on the inter-relationships between national and local issues e.g. development policies.
  - Background and experience –hands-on experience in community development issues. At least two years continuos rural community development work involving farmers belonging to same tribe as the target area of deployment. Rural community development work includes farmers organisation work,PRAs and other research work field.

5.5 Environmental issues in WUAs

For sustainability, WUAs should address environmental issues because the development of projects and subsequent activities of WUAs impact positively or negatively on the environment. Any development project is required to conduct an Environmental Impact Assessment (EIA). Regardless of project size, environmental impacts have far reaching consequences for the success and sustainability of a project. Since irrigation introduces communal use of a particular water resource, it is possible to end up with mismanagement and over exploitation of water with effects being felt far beyond the irrigation scheme, e.g. salinisation of irrigated lands. There is always a need to maintain the delicate balance within the ecosystem.

5.5.1 Environmental impacts of concern to WUAs

The main environmental issues to be addressed by WUAs during planning and implementation of irrigation include:

- Soil erosion.
- Disposal of Agricultural chemicals/safe use
- Groundwater and fresh water pollution.
- Drying of water bodies e.g. swamps and rivers
- Interference with water catchments
- Human/wildlife conflict-Displacement/killing etc
- Water-borne diseases, and
- Salinisation of the soil profile.

5.5.2 Approaches to Environmental management

WUAs in collaboration with planners and other experts should familiarise themselves with the national laws and guidelines on E.I.A requirements. Where possible, WUAs in collaboration with stakeholders, should conduct E.I.A and submit report to the responsible authority in that country. Other interest groups, e.g. financiers of the project and government departments should participate in the EIA, as the project development is pegged on the outcomes. Once an irrigation scheme is in operation, regular environmental monitoring is necessary to check for new impacts. Post project environmental audits to assess the accuracy and value of EIA with aim of improving future EIAs of similar projects.

5.6 Gender mainstreaming in WUAs

5.6.1 Relevance of gender issues

The term gender refers to the socially and culturally constructed difference between men and

women. Gender concerns the socially constructed roles and the resulting relationships between women and men, girls and boys etc in terms of their rights, obligations and opportunities in a specified group.

The relevance of gender concerns in irrigated agriculture emanates from the fact that in many socio-economic settings, gender has been observed to constrain increased productivity. Although resource endowment and other social factors may have a greater influence on agricultural production than gender, it is also true that within a given social and economic group, gender roles dictate the response to change and can therefore reinforce the constraints on women and men.

5.6.2 Gender analysis

This is the in-depth study of people in a given society for the purpose of clarification. In WUAs it presents data to clarify; (i) the roles played by various sub-groups, (ii) ownership of resources, (iii) pattern of resource control, (iv) decision-making, (v) benefits to various sub-groups, and (vi) power relationships among women, men and youth. The information generated from gender analysis is useful in aiding planning of development interventions and hence proper targeting with respect to allocation of responsibilities and distribution of benefits.

5.6.3 Strategies to ensure effective gender participation

(i) Gender analysis should be integrated in all stages of an irrigation project i.e. from identification, design, implementation, consolidation, operation and maintenance
(ii) All WUA members should be sensitised on the need to have all relevant gender groups accessing and controlling resources.
(iii) Consideration should be given on the extent to which different gender groups are interested in new irrigation technologies
(iv) Promote equality in accessing resources and services, while taking into account women's, youth's and men's priorities
(v) Ensure reasonable levels of representation of all gender groups in management, water control and decision-making.
(vi) Ensure, through affirmative action, election of women and youth representatives in key positions in WUAs. This affirmative action should be spelt out in the by-laws.
(vii) Ensure flexibility in project and scheme design as well as fair distribution of workload to various gender groups
(viii) Facilitate effective participation of all gender groups in WUA meetings. It may be necessary to meet the special gender groups in their places of work to fully understand and appreciate the prevailing social norms ascribed to the various gender groups
(ix) Empowerment of disadvantaged gender groups to effectively participate in production e.g. credit schemes
(x) Ensuring gender-sensitive extension methods like tours and demonstrations are used to bridge the gender gap.

6. CAPACITY BUILDING FOR WUAs

6.1 What is capacity building?

In general, capacity building refers to long-term investment in people and their institutions to enable them to effectively and efficiently carry out specific activities to achieve specific development objectives. It is much more than the narrow perspective of training which merely concerns impartation of knowledge, skills and attitude change. With respect to WUAs, due to the many roles and functions expected of them, the concept of capacity building takes a broader context to encompass the following aspects:

(i) Building of social capital
(ii) Improved access to production resources (capital)
(iii) Strengthening WUAs' capacity to determine their own values and priorities
(iv) Strengthening WUAs' capacity for decision making
(v) Attitude change
(vi) Enhanced access to information and services

6.2 Purpose of capacity building

Capacity building is an essential input towards people-centred and sustainable development. This concept is based on the recognition of the importance of social structures and institutions (like WUAs) in development work. Capacity building in WUAs is necessary because the trend in policy orientation in smallholder Irrigation and Drainage development is devolution of responsibilities for planning, implementation, operation & Management to the farmers. WUAs operate in a dynamic, social, economic, political and technological environments hence the need to update their capacities in response to these changes.

6.3 Areas of capacity building

Local community members have various capacities that should be identified and built upon when implementing capacity building programmes. These include the following:

6.3.1 Access to information and services

To facilitate informed decision making by WUAs, the following information and services should be availed:

- Technical information through extension services, farmer field schools
- Information on policy issues
- Marketing information
- Meteorological information and early warning systems.

6.3.2 Financial Empowerment

This includes the mobilisation of the WUA's own financial resources e.g. through Group savings. It may also entail improving access to credit and other financial services e.g. through micro-finance institutions, loans and guarantees. Improved financial management through financial management training of office bearers.

6.3.3 Networking with interest groups

WUAs should explore new horizons by finding out how other groups operate. They should also be familiar with other institutions that bear impact on their activities including production, sales, legal and regulatory institutions. It is therefore necessary for WUAs to know the physical addresses,

activities and resources of institutions that impact on their performance. These institution include:

(i) Input suppliers
(ii) Extension service providers
(iii) Marketing organisations
(iv) Other WUAs (Basin/ Catchment, Regional etc.)
(v) Government Institutions
(vi) Financiers
(vii) NGOs, and
(viii) Consumers, transporters and all on the value chain.

6.3.4 Legalisation

This involves creation of an enabling legal environment for official recognition and effective execution of WUAs' mandate. Legalisation of the Framework is effected through registration of the WUA as per national laws and policies. It may also entail holding of elections for office bearers and keeping books of records and accounts.

6.4 Basic Training Programmes for WUAs

Training is aimed at imparting knowledge and skills for effective planning, implementation, operation, maintenance, monitoring and evaluation. Training can be implemented in a classroom setting or through seminars, workshops, exposure visits, or video conferencing. The main topics relevant to WUAs in irrigation schemes include the following:

6.4.1 Introduction to participatory development

(i) Irrigation stakeholders and their roles
(ii) Project Cycle and community roles in each phases of the cycle
(iii) Community participation
(iv) Gender issues in smallholder irrigation

6.4.2 Scheme Leadership and management

(i) Roles of scheme leaders
(ii) Management and leadership styles
(iii) Resource mobilisation
(iv) Management of scheme meetings
(v) Decision-making methods
(vi) Networking/information sourcing
(vii) Scheme Reports
(viii) Sharing of responsibilities.

6.4.3 Scheme operation, maintenance and water management

(i) Irrigation schedules and water allocation/distribution
(ii) Irrigation/water application methods and determining factors
(iii) Irrigation efficiencies and water conservation techniques
(iv) Watering depth and frequencies
(v) Drainage requirements
(vi) System maintenance
(vii) Irrigation equipments and Maintenance

6.4.4 Financial Management

(i) Farm records
(ii) Budgeting/financial plans
(iii) Credit sourcing and management
(iv) Fundraising
(v) Organising for repayment of loans

6.4.5 Monitoring & Evaluation skills

(i) Selection of capacity & performance indicators
(ii) Record keeping and observations
(iii) Progress Reporting.

Each WUA should put in place a monitoring and evaluation system to facilitate assessment of the impacts of the various capacity building interventions on the realisation of the WUA objectives.

6.5 Team building

This refers to the process of establishing and developing a greater sense of collaboration and trust between team members. This is done through interactive exercises, team assessments and group discussions. There are two main sets of skills that a group/team must acquire managerial skills and interpersonal skills. A team is a self-managing unit. As a self-managing unit a group has to undertake most of the functions of a group leader, collectively.

6.5.1 Team Effectiveness

An effective team displays the following characteristics

- High level of interdependence among team members
- Team leader has good people skills and is committed to team approach
- Each team member is willing to contribute
- Team develops a relaxed climate for communication
- Team members develop a mutual trust
- Team and individuals are prepared to take risks
- Team is clear about goals and establishes targets
- Team member roles are defined
- Team members know how to examine team and individual errors without personal attacks.
- Team has capacity to create new ideas
- Each team member knows he can influence the team agenda

7. CONFLICT MANAGEMENT IN WUAs

7.1 What is conflict management?

A conflict is a situation that arises when two or more individuals within a given physical or socio-economic and cultural setting fail to agree on how best to pursue their individual interests without undermining those of other individuals or those of a group. A conflict can also be described as a disagreement resulting from individuals or groups that differ in attitudes, beliefs, values or needs. It can also originate from part rivalries and personality differences. This ***Conflict resolution*** is the art of solving or settling a problem, dispute. **Conflict management** are the interventions implemented to hinder conflict from occurring or from escalating to become destructive and this may include aspects of conflict resolution.

Conflicts prompt an extensive and intensive search for facts in an effort by either party to eliminate the problem or resolve it. In conflicts, various management strategies are used and once decisions are made to resolve a conflict, they (decisions) are usually long lasting and the parties concerned are usually committed to them. Conflicts may create the need for a deeper analysis of issues at hand.

Community-based smallholder Irrigation schemes are communal entities involving different kinds of people with varying temperaments, opinions, interests, views, values and motivations, hence pose great potential for conflicts. In managing WUAs, the diverse interests of members should be moderated to accommodate those that are common to enable members to effectively work together with as few conflicts as possible.

7.2 Types of conflicts

a) **Interpersonal**

This form of conflict results from personality variables like distrust and prejudices among WUA members. This causes WUA members to be preoccupied with activities aimed at gaining advantage over other members rather than with task performance.

b) **Inter-group**

This form of conflict is found between groups or sub-groups within a larger organisation such as sub-groups served by different laterals in a scheme. The same type of conflict occurs among WUAs sharing the same water source.

7.3 Causes of conflicts in WUAs

Conflicts occur when some members pursue their individual interests regardless of whether these antagonise those of the entire WUA. The conflicts are more pronounced in situations where the WUAs are weak and lack necessary mechanisms to prevent, arbitrate and resolve them.

In most community-based smallholder irrigation schemes, conflicts in WUAs are caused by factors related to water allocation, system operation, system maintenance, utilisation and management of WUA resources and partiality in enforcement of by-laws.

a) **Competition for limited water resource**

It is a common problem for conflicts related to access to irrigation water. This usually happens when either due to drought, the water demand out-strips supply. Sometimes there is inadequate system capacity due to various reasons, e.g. seepage from canals or low pump capacity. Some members irrigate more than the designed area, the system may be poorly designed and

implemented and hence does not deliver the water as required, unplanned changing of cropping patterns, excessive conveyance and application losses, inadequate river discharge etc. These conflicts take the following forms: (i) Conflict between sub-groups within a WUA, (ii) Different WUAs sharing the same water source, and (iii) upstream and downstream members of a WUA.

b) Real or perceived conflicting goals

When groups in an organisation perform different functions, they develop their own goals and norms resulting in inter-group conflict when the reward system is pegged on group performance rather than overall organisational (WUA) performance. In such WUAs the various sub-groups compete against each other and often endeavour to undermine each other. These include: (i) Conflicts between WUA management committee and an Audit committee, and (ii) Conflicts between two sub-groups

c) Overlap in roles

This occurs when individual members' or sub-group roles are not clearly defined and delineated resulting in overlaps.

d) Sequential task interdependence

This occurs where two or more sub-groups within a WUA are dependent on one another for the achievement of their individual tasks. For example performance of a WUA audit committee is dependent on the prior performance of the WUA finance and budget committee. In such cases when one committee is unable to meet expectations, conflicts occur.

e) Differences in resource endowment

Members who are economically disadvantaged are often unable to meet their financial obligations to the WUA e.g. monthly contributions, payment of service fees etc. When certain WUA activities or operations are delayed or abandoned conflicts arise due to the misunderstandings created.

f) Lack of transparency in utilisation and management of WUA resources

Conflicts can result in a lack of transparency in utilisation and management of WUA resources. Yet WUA members voluntarily contribute their resources like finances, materials, equipment and tools etc towards WUA activities for the common good of all the members. Their expectation is that those charged with the management of the resources will do so prudently and be accountable to the members. When this expectation is betrayed or appears to be betrayed either deliberately or otherwise, a conflict situation is created.

g) Other causes of conflicts

(i) Cultural and Religious differences

- Poor leadership and leadershipwrangles
- Inadequate attention to gender concerns
- Politics and external interferences
- Communication breakdown
- Cultural differences e.g. cultivators versus pastoralists

(ii) Scheme by laws

- Incomprehensive
- Biased enforcement
- Imposed

(iii) WUA membership criteria

- Members recruited outside irrigation command area
- Absentee farmers

(iv) Land issues

- Tenancy system
- Way leave
- Land use conflict

(v) Technical issues

- Poor design
- Inadequate knowledge and skills
- Failure to respect irrigation schedules

(vi) Lack of team spirit, and
(vii) Environmental issues.

7.4 Effects of conflicts on WUAs

In many cases conflicts are responsible for non-performance and eventual collapse of schemes. The effects of conflicts in WUAS include:

(i) Threatening harmony, unity and cohesiveness among members leading to gradual disintegration of the WUA
(ii) Causing discontent and frustration among members
(iii) Precipitates antagonism among individual members and sub-groups
(iv) Impairs communication among individual members and between members and officials
(v) Slows down progress in implementation of planned activities

7.5 Methods of managing conflicts

Conflict management in WUAs is the responsibility of the Conflict sub-committee. Any efforts to develop sustainable community-based smallholder irrigation should put in place in-built mechanisms to deal with the conflicts.

a) Genuine involvement of members in decision-making process

Genuine involvement of WUA members in decision-making process promotes the sense of ownership and belonging that motivates members to act and work for the good of the WUA.

b) Participatory scheme design

It is necessary that a group-based irrigation system be designed in such a way that it provides reliable water supply to members. Participatory design that accommodates members' views, simple structures for ease of operation and maintenance has a big potential for minimising conflicts.

c) Fairness in application of By-laws

WUA by-laws should be drawn in a participatory manner and be impartially implemented and enforced to ensure that the due process earns the allegiance of members.

d) Mechanism for Water Allocation

Equitable and timely allocation of irrigation water to all members can minimise internal conflicts since access to water determines to a large extent harmony in a scheme.

e) Establishment of a Conflict Management Committee

Disputes and conflicts in WUAs cannot be impartially mediated and adjudicated by the regular WUA management committee. It is therefore necessary to incorporate in the WUA management structure a disputes committee ("water Court") that can effectively arbitrate on the interests of both members and WUA officials.

f) Establishment of a procedure for resolving conflicts

There should be a clear written procedure in by-laws on how disputes will be handled if and when they occur.

g) Other Methods

- Meetings
- Establishment of catchment -based associations
- Involvement of local leaders
- Clear role definition and delineation for individual members and sub-groups
- Bringing on an Arbitrator
- Taking the problem to a higher authority, e.g. to the courts.

8. PARTICIPATORY MONITORING AND EVALUATION

8.1 What is participatory monitoring and evaluation?

Participatory monitoring and evaluation (PM&E) is the process of community self-assessment whereby local people are involved in programme planning, implementation, monitoring and evaluation as the main actors. The process utilises three principles of (i) Participation, (ii) negotiation and (iii) learning.

Monitoring is a systematic and continuous collection and analysis of information about the progress of a piece of work over time, to identify strengths and weaknesses and for providing the WUAs with sufficient information to make the decisions at the right time to improve its quality.

Evaluation, on the other hand, is a systematic process which objectively determines the relevance, effectiveness, efficiency, sustainability and impact of activities in the light of specified objectives in the project-planning matrix. Evaluations are usually based on general questions such as:

- What activities took place?
- Did the activities achieve objectives?
- How can future efforts be improved?

When the WUAs are fully involved in the project monitoring and evaluation they are able to chart there way forward and be responsible for their success. It is important for WUAs to have an inbuilt system for monitoring and evaluation where all the members are involved. This provides feedback regularly to all stakeholders.

8.2 Importance of PM&E

Participatory monitoring and evaluation creates ownership of the whole process. Monitoring and evaluation are improved through participation in the following ways:

(i) Achieves a more rounded perspective
(ii) Derives support from a broader base of Knowledge, expertise and resources
(iii) Validity is enhanced through its multiple sources
(iv) Accommodates the diverse interest of those involved
(v) Becomes ethically sound since it involves those affected by its outcomes
(vi) Supports and extends participatory models of development initiatives
(vii) Empowers communities, organisations and individuals to analyse and solve their own problems
(viii) Values the knowledge and experience of local communities
(ix) Promotes reflection and critical analysis by all stakeholders
(x) Promotes ownership by stakeholders (mainly beneficiaries)
(xi) Improving the quality of the current project through proper operation and management
(xii) Improves the quality of the other projects by utilisation of the experience gained in ongoing projects by drawing lessons from them.
(xiii) Improves transparency through clarification of the outcome of fund injection to fund providers and supporters such as taxpayers and members of the funding organisations and contributions.

8.3 Steps in participatory monitoring and evaluation

A sound monitoring system has to be established prior to project implementation, taking the following into account:

(i) Information to be collected (compare plan of operations and project design matrix)

(ii) Information collectors, times of collection and collection methods, e.g. through questionnaires, interviews or observations.
(iii) Information aggregator, times of aggregation and aggregation methods
(iv) Decision maker and times of decision making
(v) Methods and times of decision notification and feedback

8.4 Steps in Monitoring

The following are the procedures that should be used:

(i) Identify all stakeholders that are to participate
(ii) Draw terms of reference and discuss criteria to be used
(iii) Formulate indicators
(iv) Formulate data collection sheets
(v) Collect data
(vi) Analyse and aggregate data
(vii) Participate in report writing
(viii) Give feed back to all stakeholders

8.5 Steps in evaluation

The following are the steps in planning and conducting an evaluation.

(i) Prepare PDM (E) and narrative summary for evaluation
(ii) Design evaluation questionnaire, select data collection methods etc
(iii) Collect and sort results
(iv) Draw conclusions and lessons learnt from evaluation
(v) Give feed back to stakeholders

8.6 Progress towards self-reliance

This is an indication of a group's progress toward self-reliance with respect to performance of their activities as a measure of the degree of independence from external institutions. A successful WUA exhibits the following traits:

- Sound leadership
- Functional bylaws/constitution
- Proper record keeping
- Sharing of benefits and losses
- Accountability and transparency
- Timely achievement of set goals.

9. SELECTED REFERENCES

Baiya, F. M. 2000. *Focal Area Extension Planning. Field Guide Notes*. National Agricultural and Livestock Extension Programme. Ministry of Agriculture and Rural Development, Nairobi.

Chambers R, Pacey A, Thrupp LA (eds), 1989. Farmer First: Farmer Innovation and Agricultural Research. Intermediate Technology: London; Collaborative Programme Partners: IWMI, Pretoria.

FAO, 1982. Rapid assessment study: Towards integrated planning of irrigation and drainage. FAO, Rome.

FAO, 1986. Organisation, operation and maintenance of irrigation schemes - FAO irrigation and drainage paper 40. FAO, Rome

FAO, 1989. Guidelines for designing and evaluating surface irrigation systems. Food and Agriculture Organisation Of The United Nations. Rome.

FAO, 1999. Transfer of irrigation management services. Guidelines. FAO Irrigation and Drainage Paper 58.

Field, W.P. and Collier, F.W. 1998. Checklist to assist preparation of small-scale irrigation projects in sub-Saharan Africa. International Commission on Irrigation and Drainage and DFID. UK.

Lele, U. 1999. *Aid to African Agriculture; Lessons from two decades of donor experience*. World Bank Report. Baltimore, MD. The John Hopkins Univ. Press.

Mati, B. M. 2005. *Overview of water and soil nutrient management under smallholder rain-fed agriculture in East Africa*. Working Paper 105. Colombo, Sri Lanka: International Water Management Institute (IWMI). www.iwmi.cgiar.org/pubs/working/WOR105.pdf.

Mati, B.M, Mwepa, G. and Temu, R. 2008. Farmer Initiatives in managing water for agriculture in Eastern and Southern Africa. A booklet of farmer innovations in agricultural water management in Eastern and Southern Africa. IMAWESA Working Paper 15. Nairobi.

Mati, B.M. 2008. Capacity development for smallholder irrigation in Kenya. Irrigation and Drainage. IRD 57(3): 332-340. Wiley InterScience.

MKEPP, 2011. Operation & maintenance manual for community managed piped gravity fed irrigation schemes. Mount Kenya Pilot Project for Natural Resources Management (MKEPP), Ministry of Water and Irrigation, Embu.

Molle, F. and Berkoff, J. 2007. Water Pricing in Irrigation: The Lifetime of an Idea. Chapter 1. In: F Molle, and J Berkoff. Irrigation Water pricing Policy in Context: Exploring the Gap between Theory and Practice. Comprehensive Assessment of Water Management in Agriculture Series. CABI book shop, 360 p

MoWRM&D 2003. Framework for formation and management of water users' associations toward sustainable community-based smallholder irrigation and drainage development. Ministry of Water Resources Management and Development (Kenya) and JICA, Nairobi.

Muchangi, P., Sijali, I., Wendot, H. and Lempere, P. 2005. Improving the performance of irrigation in Africa. GoK, NIB, KARI and IWMI training handbook on irrigation.

Muya, E.M., Gitau, K., Obanyi, S., Ngutu, M., Kuria, S., Sharfi, H., Dub, D.G., Bulle, H., Miano, D.M., Mureithi, J., Keya, G., Sjali, I.V., Mamo, S., Maingi, P.M. and Okoti, M. 2009. Characterizing sites for the design and development of integrated and sustainable irrigation scheme, Kalacha. EAFRO Journal (in press).

MWI, 2008. Farmers training manual for Irrigation Water Users Associations: Modules 1-7. Ministry of Water and Irrigation, Republic of Kenya, Nairobi.

Nace, G.W. 1971. Global water distribution. APH, USA.

NIA, 1990. Financial System Management Handbook, National Irrigation Administration, Quezon City, Philippines, 1990.

Norman DW, Siebert JD, Modiakogotla E, Worman FD. 1994. Farming systems research approach: a primer for eastern and southern Africa. FS Programme, UNDP, Gaborone, Botswana.

Reij, C.; A. Waters-Bayer. 2001. Entering Research and Development in Land Husbandry Through Farmer Innovation. In *Farmer Innovation in Africa. A Source of Inspiration for Agricultural Development*, eds. C. Reij; A.Waters-Bayer. London, U.K.: Earthscan. 3-22.

Scarborough, V.; Killough, S.; Johnson, D.A.; Farrington, J., eds. 1997. *Farmer–led extension, concepts and practices*, Intermediate Technology Publication Ltd. London, U.K.: Intermediate Technology Publication Ltd.

Sherington, M. A. 1997. Participatory research method – implementation, effectiveness and institutional context. *Agricultural Systems (Special Issue)* 55 (2):196-216.

World Bank, 2006. *Reengaging in Agricultural Water Management. Challenges, Opportunities and Trade-offs.* Water for Food Team. Agriculture and Rural Development Department (ARD). The World Bank. Washington DC.146pp.

ANNEX 1: SAMPLE WUA PROTOTYPE BY-LAWS

(*Source:* MoWRM&D 2003. *Framework for formation and management of water users' associations toward sustainable community-based smallholder irrigation and drainage development.* Ministry of Water Resources Management and Development (Kenya) and JICA, Nairobi.)

The Preface

This prototype By-laws/Constitution is for guidance only. However, whatever By-laws / Constitution the smallholder irrigation scheme may adopt, should in principle provide sufficient for the equity of rights and responsibilities among members, accountability and transparency in its operation.

Declaration

We are members of _____ clearly declare followings

- Egalitarianism: Equity of rights and responsibilities among the members is our management principle.
- We have agreed that we come together to make our community as a land with milk and honey for all the members can enjoy their life
- We have agreed that we remove off our petty selfishness to make our community prospers for the sake of our descendants
- We have agreed that our community has to be developed by ourselves by any means, because it is our own community
- We have agreed that we learn anything we need in order to develop our community
- A member is for whole members, whole members for one member
- We have agreed that all the members of the _____are important persons for the community
- We have agreed that dialog is the most important means to solve any problems among members
- We have agreed that we create following By-Laws/Constitution to make us one
- We have agreed that we pay all our effort to follow the By-Laws
- We have agreed that we transfer some of the rights and powers to the committee and executive committee to follow and to prosecute the By-Laws

By-Laws

1-0 PART 1 - NAME

1-1 Article I - Name of the Organisation

The name of the Organisation; _____

Address; _____
The area the Organisation is operating;_____

2-0 PART II - OBJECTIVES

2-1 Article II - Main Objectives

The main purpose of the Organisation is to implement the irrigation system and to operate, maintain and manage the system for the betterment for the members of the Organisation.

2-2 Article III - Specific Objectives

The Organisation should have the following principal objects:

(a) To raise, mobilise and disburse funds and other resources for the promotion of the objects of the Organisation;

(b) To implement the irrigation system

c) To rehabilitate the irrigation system

(d) To upgrade the irrigation system

(e) To operate the irrigation system

(f) To maintain the irrigation system

(g) To determine and collect the water fee for OMM of the irrigation system

(h) To determine and collect the charge for operation, maintenance and management of the irrigation system when it needs

(i) To authorise the fair water distribution

(j) To authorise the area to be irrigated and the kind of crops

(k) To inspect of the irrigation and drainage system to establish a water distribution process to ensure prevention of wastage, misuse or unauthorised use of water

Maintenance will include:
- Silt clearance
- Weed clearance
- Repairs to structures
- Environmental protection

3-0 PART III - MEMBERSHIP

3-1 Article IV - Membership
- Land owners in the group operating area
- Tenancy rights holders
- Who pays membership fee
- Who pays water fee
- Full-time basis in farming

3-2 Article V - Duties of the member
- To pay the membership fee
- To pay the water fee
- To pay the water charge
- To have a idea that water is a life line
- To use the irrigation water efficiently

- To join the maintenance work and repair work of the irrigation and drainage system when requested by Management Committee

3-3 Article VI - Right of the members
- To have a right to get a equal water allocation
- To have a right to vote in General Meeting

- To have a right to stand the election for Management Committee

3-4 Article VII - Disqualification of the Membership

- Any member who defaults on his/her water fee or charge payment for a certain period should cease to be a member of the Organisation. However, the membership may be re-stored on payment of all the standing fees and an additional re- enrolment fee.
- Any member who misuse the water or unauthorised water use after two times recorded warning within two years period since the date of the first recorded warning shall be lost the membership for decided period by the Organisation.
- Any member who harm or break or destroy the irrigation and drainage system or water quality intentionally shall be disqualified immediately.
- If any member of the group sells his/her land, his/her membership will be automatically cancelled, and new owner will be eligible for the group membership.

4-0 PART IV - FUNCTION AND POWER OF THE ORGANISATION

4-1 Article VI - Function

- Implementation, operation, maintenance and management of the irrigation and drainage system.
- Demonstration and practice of farm water management methods for improving field application efficiency in the individual farmer's field
- Utilise natural rain and ground water in the best way possible
- Ensure responsible use of water among the members
- Coordinate with various relevant Government Departments
- Ensure collective and community responsibility of collection of water fee and charge from all the members.

4-2 Article VII - Power

- The Organisation has a right to raise, mobilise and disburse funds and other resources for the promotion of the objects of the Organisation
- The Organisation has the right to decide the water fee and charge payable by members.
- The Organisation has a right to collect the water fee and charge.
- The Organisation will resolve disputes among members in respect of water distribution and allied matters.
- The Organisation has the right to decide the fine or disqualification of the membership against the violation of misuse of water or unauthorized use of water or harming, breaking or destroying the irrigation and drainage system and water quality.

5-0 PART V - GOVERNANCE OF THE ORGANISATION

5-1 Article VIII - The Management Structure

General Body

- The general body of the Organisation will consist of all registered members whose due payments are up date.

Management Committee

The Management Committee will consist of the following members:

- One Chairperson
- One Vice-chairperson
- One Secretary
- One Treasurer

- Committee members

5-2 Article IX - Function and Power of the Management Committee

The management committee shall govern the day-to-day affairs of the Organisation.
The Management Committee shall have the powers and duties necessary for the administration of the Organisation and ensuring that the Organisation's By-Laws are not violated. The following are some of their duties:

Decide the cropping pattern and area to be irrigated under each crop within the Organisation area of operation.

- Decide the irrigation schedule and water distribution.
- Take care, upkeep and surveillance of the irrigation system in the area of operation of the Organisation.
- Designate, employ on remuneration and dismiss personnel necessary for the operation, maintenance and repairs of irrigation and drainage system.
- Collect water fee and other contributions from the members.
- Collect charges from the members for operation, maintenance and repairs of irrigation and drainage system
- Raise/obtain funds from various sources for the smooth functioning of the Organisation.
- Ensure that the cashbook is well written and duly signed by the treasurer
- Facilitate a smooth system for bookkeeping and auditing the Organisation accounts.
- Inspect irrigation and drainage system, distribution of water and ensure prevention of wastage, misuse or unauthorized use of water.
- Take any necessary action to ensure and help fulfil the objectives of the Organisation. In case of default in fee payment, the may suspend supply of water to the defaulting member and resume it on fulfilment of the terms and conditions.

5-3 Article X - Duties of the Members of the Management Committee

Chairperson

- The Chairperson shall be the Chief Executive Officer of the Organisation.
- He/she shall have the general powers and duties which are vested in the office of the Chairperson of Organisation including but not limited to the powers to appoint various committee and sub-committee from among the members of the Organisation from time to time as he/she may in his discretion decide to be appropriate to assist in the day to day affairs of the Organisation.
- He/she shall preside over the meetings of the General Body and Management Committee and all other meetings of the Organisation and conduct the proceedings.
- In case of any legal dispute, the Chairperson will handle such cases on behalf of the Organisation.

Vice-Chairperson

- The Vice-Chairperson shall take the place of the Chairperson and perform his/her duties wherever the Chairperson is absent or unable to act under valid grounds.
- If neither the Chairperson nor the Vice-Chairperson is able to act, then the Management Committee shall appoint some other member of the Management Committee to act on an interim basis.
- The Vice-Chairperson shall also perform other duties as shall from time to General Body/ Management Committee entrusts time to him/her.

Secretary

- He/she shall keep the daily of the Organisation, in which events, happenings and com-

plaints in the area of operation are recorded.

- He/she shall convene all meetings of the Organisation and shall maintain the minutes of all meetings. He/she shall issue general circulars and notices and carry on all correspondences on behalf of the Organisation.
- He/she shall remain in charge of such books and papers as the General Body/Management Committee may direct and shall in general perform all duties incidental to the office of Secretary, i.e. execution of orders and resolutions of Management Committee.
- All suits and matters instituted by or on behalf of the Organisation shall be instituted in the name of the Secretary and all pleadings, warrants, power of attorney, petitions statements etc. shall be signed by the Secretary and likewise in all and matters against the Organisation, the Secretary shall represent the Organisation.

Treasurer

- The Treasurer shall be responsible for receipt of all subscriptions, fees, charges, donations, grants and money, etc. from the various sources as provided in the By-Laws and issue receipts for the same.

- He/she shall receive, disburse and maintain daily accounts and shall at the end of the financial year get the same audited by the authorized Auditor and furnishes an audited statement of all receipts and expenditures to the Management Committee.

6-0 PART VI - BUSINESS TRANSACTION

6-1 Article XI

Through the mandate by the General Body, the Management Committee by means of resolutions passed at duly convened meetings shall transact the business of the Organisation.

7-0 PART VII - ELECTION AND TENURE OF MANAGEMENT COMMITTEE MEMBERS

7-1 Article XII - Election

In case the Organisation has a several branches of irrigation and drainage system;
The Committee Member/Members will be elected by the members of the respective branch to represent the branch.

Option One

- The Chairperson, Vice-Chairperson, Secretary, Treasurer and Committee Members will be elected by the members of the Organisation.

Option Two

Step 1

- The Committee Members will be elected by the members of the Organisation.

Step 2

- The Chairperson, Vice-Chairperson, Secretary and Treasurer will be elected among the Committee Members by the Committee Members.

The posts will not carry any remuneration.
The members shall decide the tenure of the office of the elected Management Committee.

The Management Committee will consist of the following members:

- Chairperson
- Vice-chairperson
- Secretary
- Treasurer
- Committee members

FUNCTIONS AND POWERS OF THE MANAGEMENT COMMITTEE

The Management Committee shall have the powers and duties necessary for the administration of the Organisation and ensuring that the By-Laws is not violated. The following are some of their duties:

- Decide the irrigation schedule and water distribution.
- Take care, upkeep and surveillance of the irrigation system in the area of operation of the Organisation.
- Designate, employ on remuneration and dismiss personnel necessary for the operation, maintenance and repairs of irrigation and drainage system.
- Levy charges from the members for operation, maintenance and repairs of irrigation and drainage system.
- Collect water fee and other contributions from the members.
- Raise/obtain funds from various sources for the smooth functioning of the Organisation.
- Ensure that the cashbook is well written and duly signed by the treasurer
- Facilitate a smooth system for bookkeeping and auditing the Organisation accounts.
- Inspect irrigation and drainage system, distribution of water and ensure prevention of wastage, misuse or unauthorized use of water.
- Scrutinize accounts kept by Secretary and/or Treasurer and ensure the registers and account books are well kept and take steps for the recovery of all sums due to the WUA.
- Prepare annual budget and get approval from the General Body.
- Listen and deal with complaints of the members and resolve disputes.
- Liaise with Relevant Government Departments.
- Utilise natural rain and ground water in the best way possible together with irrigation water
- Educate farmers in cropping pattern, water management, optimal and efficient use of water and inputs for increasing agricultural production, yields and their profits.
- Take any necessary action to ensure and help fulfil the objectives of the Organisation. In case of default in fee payment, the Organisation may suspend supply of water to the defaulting member and resume it on fulfilment of the terms and conditions.

DUTIES OF MEMBERS OF THE MANAGEMENT COMMITTEE

CHAIRPERSON

- The Chairperson shall be the Chief Executive Officer of the Organisation.
- He/she shall have the general powers and duties which are vested in the office of the Chairperson of Organisation including but not limited to the powers to appoint various committee and sub-committee from among the members of the Organisation from time to time as he/she may in his discretion decide to be appropriate to assist in the day to day affairs of the Organisation.
- He/she shall preside over the meetings of the General Body and Management Committee and all other meetings of the Organisation and conduct the proceedings.
- In case of any legal dispute, the Chairperson will handle such cases on behalf of the WUA.

VICE-CHAIRPERSON

- The Vice-Chairperson shall take the place of the Chairperson and perform his/her duties wherever the Chairperson is absent or unable to act under valid grounds.
- If neither the Chairperson nor the Vice-Chairperson is able to act, then the Management Committee shall appoint some other member of the Management Committee to act on an

interim basis.

- The Vice-Chairperson shall also perform other duties as shall from time to General Body/ Management Committee entrusts time to him/her.

SECRETARY

He/she shall convene all meetings of the WUA and shall maintain the minutes of all meetings. He/she shall issue general circulars and notices and carry on all correspondences on behalf of the WUA. E/she shall remain in charge of such books and papers as the General Body/Management Committee may direct and shall in general perform all duties incidental to the office of Secretary, i.e. execution of orders and resolutions of Management Committee.
All suits and matters instituted by or on behalf of the WUA shall be instituted in the name of the Secretary and all pleadings, warrants, power of attorney, petitions statements etc. shall be signed by the Secretary and likewise in all and matters against the WUA, the Secretary shall represent the Organisation.

TREASURER

The Treasurer shall be responsible for receipt of all subscriptions, fees, charges, donations, grants and money, etc. from the various sources as provided in the by-laws and issue receipts for the same. E/she shall receive, disburse and maintain daily accounts and shall at the end of the financial year get the same audited by the authorized Auditor and furnishes an audited statement of all receipts and expenditures to the Management Committee.

BUSINESS TRANSACTIONS

Through the mandate by the General Body, the Management Committee by means of resolutions passed at duly convened meetings shall transact the business of the Organisation.

VACANCIES

- Any of the Management Committee members may at any time by notification in writing to the Management Committee retire from office.
- Any Management Committee member, who fails to attend three consecutive meetings of the Management Committee without sufficient reason given in writing to the Management Committee, will automatically cease to be a member of the Management Committee.
- The members of the Management Committee shall be eligible for reappointment.

REMOVAL OF OFFICE BEARERS:

- Upon an affirmative vote by a majority of more than 50% of members of the General Body of the Organisation any of the office bearers may be removed with cause and his/her successor elected as per procedure laid down.

DUTIES OF OFFICE BEARERS:

MEETINGS:

- Meetings of the Management Committee of the Organisation shall be held in the office of the Organisation or at any other suitable place convenient to the members from time to time, but at least once in a month during the irrigation season. The first meeting of the newly constituted Management Committee shall be held within ten days of election of office bearers.
- The Organisation General Body annual meeting will be held in the month of June every year. The elected Management Committee members shall be present at such meetings in accordance with the by-laws. The General Body will decide on policy matters and allocate funds for operation and maintenance. The members may also transact such other business of the Organisation as may deemed necessary. The will also approve the annual Budget and contribution from members. The audited accounts of the annual report will be read out in the meeting.

- Special meetings of the Organisation shall be called by the Chairperson as decided by the Management Committee or upon a petition signed by at least ten percent of members having been presented to the Secretary. The notice of any special meeting shall state the time and place of such meeting and the purpose/agenda thereof.
- The minutes of the meetings shall be recorded, prepared and kept by the Secretary and shall be signed by the person presiding over the meetings. The minutes shall be read out and confirmed at the respective subsequent meetings.

NOTICE OF MEETINGS

- It shall be the duty of the Secretary to inform or send notice of each General/Special meetings stating the purpose/agenda thereof as well as the time and venue of meetings to each member at least seven days prior to such meetings.

ADJOURNED MEETINGS

- A meeting may be adjourned for lack of quorum or any other unavoidable reason by the members present to a time not less than 24 hours from the time of the original meeting was called.

ORDERS OF BUSINESS MEETINGS

The orders of Business at all meetings of the WUA shall be as follows:

- Name and signature/thumb impression of all members present.
- Proof of notice of meeting.
- Reading out the minutes of the preceding meeting and ratification thereof.
- Report, if any, of committee set up. Unfinished business, if any.
- New business as per agenda and passing resolution.
- Vote of thanks.

QUORUM

For a meeting to take off, one third of the total members shall make a quorum for the transaction of business. A meeting that falls short of quorum shall be adjourned from time to time and at any such adjourned meeting any business which might have been transacted as originally called may be transacted without further notice, provided there is a quorum present.

VOTE

Every member shall have the right to vote and shall have only one vote. The Chairperson shall have a casting vote in case of a tie.

RIGHT OF ENTRY

Every member shall get the right of entry to the Chairperson, the Vice-Chairperson, the Secretary, the Treasurer and Members of the Management Committee or to any other person authorized by the Management Committee for inspection, supervision or for any inquiry in respect of disputes regarding sharing of water, maintenance and repairs of the irrigation and drainage networks.

FUNDS

An Operation and Maintenance Fund by the WUA in all or any of the following ways will be raised:

- by shares.
- by contribution from members
- by donations from the members, other institutions, Government or any
- other Donors

by receiving subsidies, grant-in-aid from the Government or other Donors

ACCOUNTS

The accounting years will be from 1st July to 30th June of the next year. The WUA shall on or before 31st December in each year publish and audit annual financial statements containing the following accounts:

The profit and loss accounts
The receipts and expenditure of the previous year
A summary of the property and assets and liabilities giving such particulars as will disclose the general nature of the liabilities and assets and how the value of fixed assets has been arrived at.
The following registers are to be maintained and presented to the members of the WUA.

- Members register
- Irrigation schedule
- Daily cash transaction account
- Receipt book
- Monthly cash transaction amount
- Permanent term deposit account
- Assets account
- Minutes book
- Complaint register
- Visitors' book

The Accounts for maintenance and repair of irrigation and drainage network should be kept.

PUBLICATION OF ACCOUNTS AND REPORTS

Copies of the following should be kept in a conspicuous place in the office of the WUA:

- The last financial statement
- The Auditor's report

Receipt and expenditure accounts, balance sheet, together with a report shall be placed before the General Meeting after the expiration of each financial year.

APPOINTMENT OF AUDITORS

At a general meeting, the WUA shall appoint an auditor. The auditor's duties are:

- to audit the WUA accounts prepared by the management committee
- to examine the annual returns and verify the same with the related accounts
- Write a special report to the WUA on the accounts indicating whether they are correct and in case they are incorrect, report in what respect he finds the reports incorrect or not in accordance to the law.

POWER OF AUDITOR

The Auditor has the right tocall for an examination of any papers or documents belonging to the WUA and shall make a special report to the WUA upon any matter connected with the accounts which appears necessary for such reporting.

SUITS AND LEGAL PROCEEDINGS

The WUA shall sue and shall be sued in the name of the Secretary of the WUA.

AMENDMENTS OF THE BY-LAWS

The by-laws may be amended by the WUA in a meeting duly called for such purpose. No amendment can be effected unless approved by two thirds of the WUA`s members.

LIQUIDATION/DISSOLUTION

The WUA may be dissolved by a special resolution passed by two thirds of the members and shall be confirmed in writing.

Nile Equatorial Lakes Subsidiary Action Program
Regional Agricultural Trade and Productivity Project
5th Floor Kigali City Tower, Avenue Du Commerce, Kigali-Rwanda
P.O Box 6759; Tel: +250788307334
Fax: +250252580100; Url: www.nilebasin.org/nelsap