



MINISTRY OF WATER, SANITATION AND IRRIGATION

Guidelines for Promotion, Development and Management of Irrigation in Kenya



2020



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Foreword

Kenya has an area of approximately 582,646 square kilometres, out of this only 17% falls within medium to high rainfall areas, which are suitable for rain-fed agriculture. The rest is arid and semi-arid lands (ASALs), which have highly variable, erratic and unreliable rainfall for sustainable agricultural production. Generally, rain-fed agricultural production is constrained by impacts of climate change and variability. Hence the need to shift focus from rain-fed to irrigated agriculture. The opportunities for economic growth through irrigation are immense, particularly in realizing food security and job creation. Irrigation is recognized as a key enabler for the transformation and growth of agriculture as envisaged under the Kenya Vision 2030 and the Big Four Agenda to achieve 100% food and nutrition security.

The Constitution of Kenya 2010 provides for the citizens the right to be free from hunger and to have adequate food of acceptable quality. It establishes distinct and interdependent National and county governments with specific, residual, concurrent functions and powers as prescribed under Article 186 and the Fourth Schedule. The two levels of government are to operate through cooperation and consultation. The Irrigation Act, 2019, empowers the Cabinet Secretary responsible for irrigation to develop general principles, guidelines and standards for promoting development, coordination and planning of irrigation. It is in this context that the Ministry has developed these Guidelines for promotion, development and management of irrigation in Kenya, hereby referred to as ‘Guidelines’.

The Guidelines takes cognizant that, the irrigation sector is facing numerous challenges, which include: low rate of irrigation infrastructure development; inadequate investment by public and private sector; unsustainable irrigation schemes; and low diversification of irrigated enterprise value chains with poorly developed marketing channels. The adoption of these Guidelines will facilitate improved coordination and participation of the sector’s stakeholders. In furtherance to the provisions of the Irrigation Act, 2019, its Regulations, and other related legal and institutional frameworks which provide an enabling environment; the Guidelines encourage investment in: irrigation infrastructural development; water harvesting and storage for irrigation; improved scheme management, water use efficiency and productivity; and improved support services in the sector.



Essentially, the Guidelines provide direction for irrigation schemes development; provision of support services; financing irrigation development and management; irrigation scheme management models; and also monitoring, evaluation and reporting to ensure sustainable development of the sector. The Ministry is optimistic that these Guidelines will contribute in enhancing the irrigation sector performance towards the country's economic development. To ensure success of the irrigation sector, these Guidelines require active participation of all the stakeholders.



Sicily K. Kariuki, (Mrs.) EGH.

CABINET SECRETARY

MINISTRY OF WATER, SANITATION AND IRRIGATION



Acknowledgement

On behalf of the Ministry of Water, Sanitation and Irrigation (MWS&I), I would like to convey profound gratitude to all who participated in the development of these Guidelines. It was a highly consultative, interactive and inclusive process. Special thanks go to the Cabinet Secretary Ministry of Water, Sanitation and Irrigation, Sicily K. Kariuki, (Mrs.) EGH; and the Chief Administrative Secretary Dr. Andrew Tuimur CBS, for the leadership and support in the development of these Guidelines.

I appreciate the Ministry of Agriculture, Livestock, Fisheries and Cooperatives; National Irrigation authority (NIA); Kenya Agricultural and Livestock Research Organization (KALRO); Water Resources Authority (WRA) for their inputs to the Guidelines. I also appreciate the University of Nairobi, Kenyatta University and Jomo Kenyatta University of Agriculture and Technology and all other organizations and institutions that participated in the regional consultative forums and national validation workshop.

Special thanks goes to the County Governments through the County Executive Committee Members responsible for irrigation; the intergovernmental Joint Agricultural Sector Consultation and Cooperation Mechanism thematic working group on policy, legislation and standards; and Commercial irrigation estates as well as irrigation farmers' organizations for their support and contribution during the development process of these Guidelines.

I thank Japan International Cooperation Agency for its support in the development of initial draft. I am indeed grateful to the German International Development Cooperation (GIZ) for providing support for the national validation workshop conference services, and the World Bank through the National Agricultural and Rural Inclusive Project (NARIGP) for facilitating the regional stakeholders' consultative meetings, the National validation workshop, task team working retreats and publication. I further recognize the Food and Agriculture Organization of the United Nations for technical inputs into the Guidelines

Finally, I express my gratitude to the efforts and diligence of the Ministerial Technical Task Team members in formulating these Guidelines under the stewardship of the Irrigation Secretary Mr. Aboud Moeva. The task team members included: Phanuel Webi (Task Team Leader), Festus Kani, Allan Abwoga, Bonventure Achonga, Esther



Musyoka, Eng. John Gaturu, Eng. John Ndungi, Eng. Jairus Serede, and Stephen Apome. I am also grateful to all those who contributed in one way or another in the development of these Guidelines who may not have been mentioned. Kindly take this acknowledgement as an expression of sincere gratitude.



Joseph W. Irungu, CBS.

PRINCIPAL SECRETARY

MINISTRY OF WATER, SANITATION AND IRRIGATION



Definition of Terminologies Used in the Guidelines

Agriculture - means cultivation of land and the use of land (whether or not covered by water) for any purpose of husbandry, aquaculture and food production and includes: cultivation of crops and horticultural practice; breeding of aquatic animals and plants in the Kenya fishery waters and sea ranching and fish farming in the sea; use of land, meadow land, market gardens or nursery grounds; fish harvesting; the use of land for agroforestry, when that use is ancillary to the use of land for agricultural purposes; transgenic and microbial formulations for use in agricultural systems (Agriculture, Fisheries and Food Authority Act, No 13 of 2013)

Community-Based Irrigation Schemes - means irrigation and drainage schemes that are initiated, developed, owned and managed by farmers through IWUAs.

County Irrigation Development Unit (CIDU) - is a State entity established by a county government to carry out irrigation matters under section 14 of the Irrigation Act, 2019

Drainage - Removal of excess water from agricultural lands for control and management of the water table for crop production

Framework for Formation and Management of Water Users' Associations Toward Sustainable Community-Based Irrigation Development - This is a framework for formation and management of water users' associations towards sustainable community-based irrigation development

Irrigation - means any process, other than by natural precipitation, which supplies water to crops or any other cultivated plants, livestock, aquaculture and desired forest trees

Irrigation Agency - An irrigation agency refers to an entity contracted to provide technical advisory services to irrigation schemes in design, construction supervision, administration, operation and maintenance under appropriate modalities, including agency contracts

Irrigation Scheme - means a systematic and orderly irrigation system covering a defined area of land regardless of the type or system of irrigation employed

Irrigation Service Fee - means the rates to be charged to irrigation water users or irrigation farmer for receiving irrigation services



Irrigation Service Plan - means the annual plan for water acquisition and distribution, scheme maintenance and repairs, other management tasks, staff and group labour mobilization, budget and irrigation service fee

Irrigation Stakeholders - means any organization, group or individual that is involved in irrigation and drainage development and management processes or activities

Irrigation Water User - means a member of an irrigation water users' association or individual irrigation farmer who uses water from an irrigation scheme for an approved purpose such as for crops, livestock, and fish farming

Irrigation Water Users' Association (IWUA) - means any association established by residents of a catchment area who are crop farmers, livestock producers, fish pond users, or small rural industry entrepreneurs or otherwise uses water for irrigation purposes from a common irrigation facility

Large Scale Irrigation Scheme - means a scheme which covers over 1,200 hectares (3,000 acres)

Medium Scale Irrigation Scheme - means a scheme which covers over 40 to 1,200 hectares (100 to 3,000 acres)

Monitoring and Evaluation - means a system of measuring, reporting and interpreting the quantity and quality of inputs provided, actions implemented, immediate outcomes achieved and ultimate impacts realized

National Irrigation Authority (NIA) - is a State Agency established under section 7 of the Irrigation Act, 2019 to: develop and improve irrigation infrastructure for national or public schemes; provide irrigation support services to private medium and smallholder schemes, in consultation and cooperation with county governments and other stakeholders; provide technical advisory services to irrigation schemes in design, construction supervision, administration, operation and maintenance under appropriate modalities, including agency contracts

National or Public Irrigation Scheme - means an area of land with irrigation infrastructure, designated or established by National/County Government for settlement or national strategic purposes



Participatory Approach - is defined as a process which stakeholders influence and share control over development initiatives, decisions and resources that affect them. In Irrigation, farmers shall be involved in various functions which include, planning, design, construction, operation and maintenance, rehabilitation, resource mobilization and dispute resolution

Private Irrigation Schemes - means an irrigation and drainage scheme developed, owned and managed by a private entity whether a firm or an individual

Small Scale Irrigation Scheme - means a scheme which in size covers less than 40 hectares (100 acres)

Smallholder Irrigation and Drainage Scheme - means an irrigation scheme that is developed, owned and managed by communities as irrigation water user groups or individual farmers

Supervising Entity - means the entity exercising a supervisory role as specified under the Irrigation (General) Regulations

Use of Water - in relation to a water resource includes, without any limitation to abstraction (obstruction, impoundment or diversion of water forming part of a water resource); and the discharge of materials or substances into a water resource (Water Act 2016)

Water Resource - means any lake, pond, swamp, marsh, stream, watercourse, estuary, aquifer, artesian basin or other body of flowing or standing water, whether above or below the -ground, and includes sea water and trans-boundary waters within the territorial jurisdiction of Kenya

Water Resource Users Association (WRUA) - This is a community-based association of water resource users at the sub-basin catchment level established for collaborative management of water resources and resolution of conflicts concerning the use of water resources in accordance with WRA Regulations

Water Right - means the right to have access to water through a water permit issued by Water Resources Authority

Acronyms

AEZs	Agro-ecological zones
AfDB	Africa Development Bank
ASALs	Arid and semi-arid lands
BWRC	Basin Water Resource Committee
CBOs	Community-Based Organizations
CIDU	County Irrigation Development Unit
ESIA	Environmental and Social Impact Assessment
FAO	Food and Agriculture Organization
FBFS	Flood based farming systems
FBOs	Faith-based organizations
FOs	Farmers organizations
GDP	Gross Domestic Product
GoK	Government of Kenya
Ha	Hectare
HCDA	Horticultural Crops Development Authority
IFAD	International Fund for Agricultural Development
IWUAs	Irrigation Water Users Associations
JICA	Japan International Cooperation Agency
KALRO	Kenya Agricultural and Livestock Research Organisation



KEWI	Kenya Water Institute
KfW	Kreditanstalt für Wiederaufbau
M&E	Monitoring and Evaluation
MALFC	Ministry of Agriculture, Livestock, Fisheries and Cooperatives
MEF	Ministry of Environment and Forestry
MFI	Micro-Finance Institutions
MOU	Memorandum of Understanding
MWS&I	Ministry of Water, Sanitation and Irrigation
NEMA	National Environmental Management Authority
NGOs	Non-governmental organizations
NIA	National Irrigation Authority
O&M	Operation and Maintenance
PRA	Participatory Rapid Appraisal
RDAs	Regional Development Authorities
SACCOs	Savings and Credit Cooperatives
SIPMK	Smallholder Irrigation Project in Mt. Kenya region
US\$	US Dollars
VMGs	Vulnerable and marginalized groups
WAB	Water Apportionment Board
WRUA	Water Resource Users association
WSPs	Water Services Providers

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Chapter 1: Introduction and Overview

1.1 Background

Kenya has a total land area of 582,646 square Km, of which, about 99,050 square Km (17%) is classified as medium to high agricultural potential, experiencing at least 700mm of rainfall per annum. The rest, 83%, is classified as arid or semi-arid lands (ASALs). The ASALs need irrigation to intensify farming. Even within the medium- and high-rainfall areas, there are areas with seasonal drainage and flooding problems that require water management interventions to enhance agricultural production and productivity.

Kenya's Vision 2030 identified agriculture sector as key to drive the economy to a projected 10% growth annually. Since 2014, Kenya is ranked by the World Bank as a lower middle income country based on its per capita gross domestic product (GDP) and consequently, development assistance to be financed through loans rather than grants. Agriculture remains the backbone of the economy, contributing one-third of GDP, providing 75 % of industrial raw materials and 60% of export earnings. About 75% of Kenya's population works in the agricultural sector, including livestock and pastoral activities. The major policy goals on agriculture aim at achieving self-sufficiency in food production, employment creation, income generation and foreign exchange earnings.

Nevertheless, over 95% of agricultural sector output is from rain-fed production systems for crops or livestock, which are susceptible to risks of climate change and unreliable rainfall patterns. In addition, legal and institutional frameworks have been inadequate. Other challenges affecting the agriculture sector include: low investment in irrigated agriculture; inadequate rural infrastructure; inadequate coordination of stakeholders; inadequate financial support services; negative impacts of climate change; low household incomes in ASALs; and low literacy levels in rural areas.

Agriculture sector transformation and growth is needed to support the rapidly increasing population, and ensure economic growth in the diminishing household land holdings in the high to medium potential areas, through use of irrigation, innovative technologies and other related value chain interventions. These interventions should give impetus to intensification of production in the high to medium potential areas. In addition, they will allow opening of new lands in the ASALs for agricultural production.

There are many constraints and challenges facing the irrigation sector, which include: Low investment levels by public and private sector actors despite the vast under-exploited irrigation potential; Low growth of infrastructure development for irrigation, drainage, and water storage; Inappropriate utilization of wastewater and storm water; Inefficient use of water in existing schemes; Inadequate irrigation support services (financial, input supplies and output markets, irrigation equipment and machinery); Inadequate private sector participation; Low levels of participation by irrigation farmers and weak governance of irrigation water users' associations and farmer groups; and Inadequate information sharing on irrigation research, science and technology.

1.2 Role of Irrigation in Agricultural Development

Irrigation accounts for about 2.0% of total land area under agriculture, but contributes 3% to the GDP and provides 18% of the value of all agricultural produce. This demonstrates the potential of irrigation in increasing agricultural production and productivity. With irrigation, agricultural production can be increased by up to 400%, and jobs created at the rate of seven to 15 persons per hectare directly and indirectly. A robust irrigation sector will guarantee food and nutrition security, raw materials for agro-industries, create employment opportunities especially for youth and women, improve security and stem the tide of rural to urban migration in search for employment opportunities.

1.3 Irrigation Potential and Development

Irrigation is an enabler for agricultural transformation for Kenya's economic growth, creating jobs for rural communities as well as food and nutrition security. The country's irrigation potential is estimated at 1.342 million hectares (3.355 million acres), based on surface, underground water resources and water harvesting and storage. By the end of the year 2019, developed irrigation schemes covered approximately 201,962 ha (504,880 acres). This is about 15% of the potential leaving about 85% of Kenya's irrigation potential untapped.



1.4 Categories of Irrigation Schemes

There are three categories of irrigation schemes based on ownership and management, namely: public and national, community-based, and private.

1.4.1 Public and National Irrigation Schemes

The country has a number of public and national irrigation schemes with a total area of 22,028 ha (55,070 acres). The size of the schemes ranges from 40 to 12,000 ha (100 to over 30,000 acres) and account for 10.9% of irrigated land area. These schemes are developed on public land, managed by National Irrigation Authority (NIA), Regional Development Authorities (RDAs), Agricultural Development Corporation, National Youth Service, the Prisons, Universities, Colleges and other State entities.

In the national irrigation schemes meant for settlement under NIA such as Mwea, Bura, Hola, Perkerra, Ahero and West Kano, permit holders carry out production activities, under shared management through Irrigation Water Users Associations (IWUAs). The Authority provides advisory and irrigation services of operation and maintenance and irrigation farmers (permit holders) pay irrigation service fees through their respective IWUAs. The RDAs have invested in estate-type irrigation schemes with nucleus and out-grower farmers' arrangement.

1.4.2 Community-Based Irrigation Schemes

The community-based irrigation schemes are owned by individual farmers sharing an irrigation facility managed through IWUAs, cooperatives or self-help groups. The Irrigation Regulations require self-help groups to transit to IWUAs. There are over 3,600 community-based irrigation schemes covering over 99,964ha (249,908 acres) constituting 49.5 % of the country's developed irrigable area. They produce the bulk of horticultural produce for domestic and export markets. Other crops grown include: grain staples and tubers. These schemes have been developed with the participation of farmers, supported by the Government, development partners and Non-Governmental Organizations (NGOs).

Some of the benefits accrued from supporting community-based irrigation schemes, include providing opportunities for economic empowerment for rural communities that have limited development opportunities. Further, such schemes have lower overhead construction and management costs with high chances of sustainability compared to the other categories. The formation of IWUAs in community-based irrigation schemes creates entry points for collaboration with other stakeholders for accelerating rural development.

1.4.3 Private Irrigation Schemes

Private irrigation schemes cover over 79,970 ha (199,925 acres) accounting for 39.6% of irrigated land. Most private schemes utilize high technology and produce high-value crops for the local and export market, especially flowers, fruits and vegetables. Examples

of large private schemes include those owned by Del Monte, Kakuzi, Finlay and Oserian among others.

1.5 Policy and Legal Basis for the Guidelines

The Guidelines are anchored on the National Irrigation Policy, the Irrigation Act, 2019 and the Irrigation Regulations. Other statutory instruments considered include the Constitution of Kenya 2010 and the Water Act 2016. These statutory instruments have provisions for the Ministry responsible for irrigation to formulate Guidelines for promotion, coordination, and management of irrigation schemes. Further, the Irrigation Act, 2019 provides for the Cabinet Secretary to determine and issue licenses for irrigation schemes; formulate and implement irrigation services strategy and guidelines; ensure irrigation research, innovation and capacity building functions are undertaken; and set quality standards for irrigation development in Kenya.

The Irrigation Act, 2019 provides for establishment of the NIA as the lead agency in irrigation development. The Act also allows for a County government to establish County Irrigation Development Unit (CIDU) to facilitate irrigation development at the county level. These institutional arrangements provide for agencies that promote access to irrigation water, including harvesting and storage; determining the return on investment when using public funds in irrigation schemes; involvement of the private sector; availability of and access to land for irrigation and way-leaves; provision of irrigation services; capacity building for irrigation actors; formation of IWUAs; dispute resolution; including performance audits, monitoring and evaluation of irrigation development and reporting.

In addition, the Act has provisions for miscellaneous offences and sanctions, which include: willful damage of irrigation infrastructure; use of harmful chemicals in irrigation schemes; and unauthorized abstraction of irrigation water.

1.6 Justification for the Guidelines

The development of irrigation schemes is part of the agriculture and rural development process, which is multi-disciplinary and involves many stakeholders. This therefore requires guidelines to coordinate and ensure uniformity of processes and harmony within the sector.

The first version of Guidelines was released in 1986, focusing on documentation of identified irrigation and drainage schemes in Kenya. However, they did not cover modalities of resource mobilization for implementation. These Guidelines were revised in 1993 to incorporate a prerequisite for cost-recovery on horticultural-based irrigation schemes. The 1993 version was revised in 2003.

The 2003 Guidelines included stakeholder analysis and also provided project cycle arrangement of developing community-based irrigation schemes. They set the stage for proper coordination and harmonization of community-based irrigation development



activities in the country. They included mechanisms for cost-sharing in scheme development based on socio-economic considerations of the target community.

The 2003 Guidelines were developed alongside two other corresponding documents i.e. the *Training Master Plan and a Framework for Formation and Management of IWUAs towards Sustainable Community-Based Smallholder Irrigation Development*. These documents were piloted through two JICA supported projects namely: Sustainable Smallholder Irrigation Development and Management (SIDEMAN) between 2005 and 2010; and Sustainable Smallholder Irrigation Development and Management in Semi-Arid Lands (SIDEMAN-SAL) project, from 2012 to 2016. The lessons and experiences gained from these projects and other irrigation projects nationwide have been incorporated in these Guidelines.

The purpose of these Guidelines is to streamline the process of developing and managing irrigation schemes, particularly outlining of stakeholder roles and coordination mechanisms at the National and County Government levels; and adopting a participatory approach involving development partners and beneficiaries in development of irrigation schemes. In addition, they highlight related critical issues such as provision of irrigation support services; financing irrigation development; the approaches that should be employed to develop and manage irrigation schemes; and sector monitoring, evaluation and reporting.

1.7 Methodology of Revision

The methodology adopted in reviewing these Guidelines included setting up of a Ministerial Task Team, which undertook initial desk study and consultations with county governments and other stakeholders. The desk study involved review of concepts and approaches in the Guidelines of previous versions coupled with comparison of the concepts, practices and actual experiences gained from SIDEMAN, SIDEMAN-SAL, Smallholder Irrigation Project in Mt. Kenya region (SIPMK) among other irrigation projects.

The zero draft Guidelines were subjected to stakeholder consultations, which included sessions with key experts in the irrigation field from different universities, ministries, and state agencies including research institutions. Later the draft Guidelines were presented to the intergovernmental joint working group on policies, regulations and standards of the Joint Agricultural Sector Consultation and Cooperation Mechanism (JASCCOM). This committee endorsed the draft Guidelines for further consultation with county governments and other stakeholders. Consultative workshops were held in four clusters in December, 2019 at Kisumu, Naivasha, Embu and Mombasa where county governments, farmers, state and non-state agencies participated.

After incorporating the inputs from the stakeholders, the draft Guidelines were further submitted to JASCCOM and presented to the national validation workshop in January, 2020. The final draft Guidelines was presented to the Ministry's top management and approved for publishing.





Chapter 2: Irrigation Stakeholders

2.1 Perspective of Irrigation

Irrigation development requires an integrated, multi-disciplinary and multi-sectoral approach because there are many components and actors involved. Irrigation involves use of an Irrigation system, which is a group of components working together to ensure water is abstracted and delivered to cultivated plants, livestock, aquaculture and desired forest trees to ensure they grow and produce optimum yields. An irrigation system therefore consists of an irrigation infrastructure component (water abstraction, distribution and supply), an agriculture component (water application, agronomy, enterprises) and a human component (management). All these components are multidisciplinary in nature.

2.2 The Need for Irrigation Stakeholders Coordination

There are several public and private sector stakeholders involved in promotion, development and management of irrigation in Kenya. The efforts of the various stakeholders need to be synchronized to ensure effective, efficient and sustainable irrigation development. This is envisaged in the Kenya Vision 2030; National Irrigation Policy 2017; Agricultural Sector Transformation and Growth Strategy (ASTGS 2019-2029); and Irrigation Act, 2019, which emphasizes the need to have a collaborative and a participatory approach for development and transformation of the irrigation sector.

2.3 Categories of Irrigation Stakeholders

The stakeholders involved in irrigation development are broadly classified as: Ministries, Departments and government agencies (MDAs) at both national and county levels; Development partners; and Private Sector actors who include: Individual farmers, farmer Organizations, Financial institutions, Marketing organizations, Input suppliers, Non-governmental organizations, and other value chain actors.

2.4 Roles of Irrigation Stakeholders

The key stakeholders involved in irrigation development and management and their respective roles are summarised in Table 2.1.

Table 2.1: Roles of Irrigation Stakeholders

Category of Irrigation Stakeholder	Role
A. Ministries, Departments and Government Agencies at both National and County levels	
Ministry of Water, Sanitation and Irrigation	• Formulate and review policies, guidelines, quality standards, strategies and regulations to promote and coordinate irrigation development • Support irrigation development and management in consultation and cooperation with other stakeholders • Capacity building and technical support to County staff and other stakeholders • Facilitate irrigation research and innovation • Oversee establishment and management of national, strategic and public schemes and irrigation water storage dams • Promote the use of efficient irrigation systems across the country • Provide resources and direction for capacity building and technical services • Develop the standards of good on-farm water management • Regulation of tariffs payable for water use on national, public and other irrigation schemes • Receive applications, determine and issue irrigation licenses for irrigation schemes • Monitor and enforce license conditions for irrigation schemes



Category of Irrigation Stakeholder	Role
Ministry of Water, Sanitation and Irrigation <i>cont'd</i>	• Prescribe fees payable by irrigation water users based on costs of operation and maintenance of the scheme • Establish national, public or strategic irrigation schemes • Maintain irrigation water storage investments to ensure availability and adequacy • Enlisting of irrigation professionals and service providers • Gather information and maintain data bases on irrigation areas, water supplies, financing, human resources governance, IWUAs and management of schemes • Carry out technical monitoring, evaluation and performance audits of irrigation schemes and reporting
National Irrigation Authority	• Develop national, public, strategic and community-based schemes • Provide irrigation support services to private and community-based schemes, in collaboration with County Irrigation Development Units (CIDUs) and other stakeholders • Provide technical advisory services in scheme development and management including agency contracts • Coordinate and plan settlement on national or public irrigation schemes as well as trans-county irrigation schemes • Facilitate formation and strengthening of IWUAs and dispute resolution committees at scheme level • Supervise irrigation scheme operations and governance of IWUAs • Provide land in national irrigation schemes for public purposes • Collaborate with counties and other stakeholders for research on fair prices, marketing and value addition of produce on national and other irrigation schemes • Provide capacity building and technical advisory services to IWUAs and irrigation farmer associations on management of schemes • Issue or revoke permits or leases for land of national irrigation scheme to such persons or settlers

Category of Irrigation Stakeholder	Role
Water Resources Authority	• Formulate and enforce standards, procedures and regulations for the management and use of water resources and flood mitigation • Regulate the management and use of water resources • Receive water permit applications, determine, issue, vary and enforce permit conditions for water abstraction, water use and recharge • Collect water permit fees and water use charges • Determine and set permit and water use fees • Provide information for formulation of policy on national water resource management, water storage and flood control strategies • Coordinate with other regional, national and international bodies for the better regulation of the management and use of water resources • Collect, analyze and disseminate information on water resources • Monitor compliance by water users with the conditions of permits • Issue permits for inter-basin water transfer • Conservation of ground water for the protection of public water or water supplies used for industry, agriculture or other private purposes • The conservation of surface water resources and ground water resources for ecological reasons

Category of Irrigation Stakeholder	Role
Basin Water Resource Committee (BWRC)	• Advise WRA and county governments, at the respective regional office, concerning: - o Conservation, use and apportionment of water resources - o The grant, adjustment, cancellation or variation of any permit - o Protection of water resources and increasing water availability and flood mitigation activities - o Annual reporting to the users of its services and the public on water issues and their performance within the basin area - o Collection of data, analyzing and managing the information system on water resources - o Facilitation of the establishment and operations of water resource user associations (WRUAs) - o Information sharing between the basin area and the Authority - o The equitable water sharing within the basin area through water allocation plans
National Water Harvesting and Storage Authority	• Development of national public water works for water resources storage and flood control • Maintain and manage national public water works infrastructure for water resources storage • Collect and provide information for the formulation of national water resources storage and flood control strategies • Develop a water harvesting policy and enforce water harvesting strategies • Undertake on behalf of the national government strategic water emergency interventions during drought • Advise the Cabinet Secretary on any matter concerning national public water works for water storage and flood control • Appoint agents for the operation, management, maintenance and safety of any storage infrastructure that it has developed

Category of Irrigation Stakeholder	Role
Water tribunal	• Arbitration on decisions and directives made by WRA, and a Water Basin Resources Committee, or other authorities on water use
Water Services Regulatory Board	• Determine and prescribe national standards for the provision of water services and asset development for water services providers (WSPs) • Evaluate and recommend water and sewerage tariffs to the county WSPs and approve such tariffs in line with consumer protection standards • Set, monitor, regulate and enforce license conditions and accredit WSPs • Develop model memorandum and articles of association for water companies applying to be licensed by Regulatory Board as WSPs • Monitor compliance with standards on the design, construction, operation and maintenance of facilities for the provision of water services by water works development bodies and WSP



Category of Irrigation Stakeholder	Role
Water Services Regulatory Board <i>cont'd</i>	• Advise on the nature, extent and conditions of financial support accorded to WSPs for providing water services • Monitor implementation of the Water Strategy • Establish a mechanism for handling complaints from consumers regarding the quality or nature of water services • Develop guidelines on the establishment of consumer groups and facilitate their establishment • Inspect water works and water services to ensure that such works and services meet the prescribed standards • Report annually to the public on issues of water supply and sewerage services and the performance of relevant sectors and publish the reports in the gazette • Make Regulations on water services and asset development for efficient and effective water services and progressive realization of the right to water • Make recommendations on provision of water services to marginalized areas
Water Resources Users Associations	• Collective management of water resources • Resolution of conflicts concerning the use of water resources.
Ministry of Agriculture, Livestock, Fisheries and Co-operatives	• Provide technical support to county extension services • Regulate and support agricultural value chains
Agriculture and Food Authority	• Regulation of the agriculture sector • Development and promotion of scheduled crops value chains.

Category of Irrigation Stakeholder	Role
Kenya Plant Health Inspectorate Services	• Provision of science based regulatory services by assuring plant health, quality of agricultural inputs and produce for food security, globally competitive agriculture and sustainable development specifically to: - o Protect plants from pests, weeds and invasive species - o Facilitate review and strengthening of the policy, legal and regulatory framework - o Contribute towards improved levels of agricultural productivity - o Support compliance to market requirements - o Enhance synergies through information and resource sharing with stakeholders and partners
Pest Control Products Board	• Regulation of the importation, exportation, manufacture, distribution and use of Pest Control Products (Pesticides)
The National Treasury	• Formulation of financial policies and ensure fiscal discipline • Resource mobilization for irrigation development • Approve bilateral and multilateral financial agreements • Guarantee loans and grants for Irrigation development • Undertake national planning and budgeting
Ministry of Lands & Physical Planning	• Development of land use policy and guidelines • Ensure compliance with the land usage rules • Facilitate acquisition of land for irrigation development

Category of Irrigation Stakeholder	Role
National Lands Commission	• Management of public land • Facilitate implementation of Land policy • Advice on a comprehensive programme on registration of land titles • Facilitate compensation of land for irrigation development
Ministry of Environment and Forestry	• Policy guidance on environmental issues • Delineation and management of catchment areas • Processing of way-leaves on gazetted forest areas
Kenya Water Towers Agency	• Coordinate and oversee the protection, rehabilitation, conservation and sustainable management of all the critical water towers
National Environment Management Authority	• Implementation of Environmental Management and Coordination Act • Regulate and approve environmental and social impact assessments • Regulate and approve environmental audits • Ensure compliance to water quality standards • Ensure adherence to environmental health matters
Department of Social Services	• Promote formation and development of farmer groups and capacity building • Registration of farmer organizations • Support conflict resolution within groups

Category of Irrigation Stakeholder	Role
Department of Public Works	• Development of rural access roads • Regulate issuance of irrigation conveyance way-leave across roads
Ministry of Devolution and ASALs	• Facilitate inter-governmental relations and coordination; and • Coordinate development of ASALs
Ministry of East African Community and Regional Development	• Coordinate regional macro-economic planning • Project formulation and development • Resource mobilization • Facilitate development and management of irrigation projects under designated regional development authorities
Kenya Bureau of Standards	• Provision of Standards, Metrology and Conformity Assessment (SMCA) services to promote standardization in industry and commerce • Make arrangements or provide facilities for the testing and calibration of precision instruments, gauges and scientific apparatus • Make arrangements or provide facilities for the examination and testing of commodities • Control the use of standardization marks and distinctive mark • Prepare, frame, modify or amend specifications and codes of practice • Assist the government or any local authority or other public body or any other person in the preparation and framing of any specifications or codes of practice
National Construction Authority	• Regulate, streamline and build capacity in the construction industry for sustainable socio-economic development • Registration of contractors and professional firms for infrastructure development

Category of Irrigation Stakeholder	Role
Research Organizations, Universities and Colleges	• Develop appropriate irrigation technologies and innovations • Manpower development • Development of appropriate production and processing technologies of irrigated produce
Office of the Attorney General and department of Justice	• Provide legal advice • Facilitate review of legislative and statutory instruments • Registration of farmer organizations and other entities • Review bilateral agreements and other legal instruments
Ministry of Health	• Provision of health services for diseases exacerbated by irrigated agriculture
Ministry of Interior and coordination of National Government	• Provision of security services, peace and national cohesion • Coordinate implementation of national projects • Facilitate community mobilization and dispute resolution • Negotiation for way leaves
County Governments	• Establish county irrigation development units (CIDU) • Formulate and implement county irrigation strategy in line with national policies, strategies and guidelines • Ensure adoption of national standards for irrigation • Establishment of county irrigation development coordination committees • Develop and maintain irrigation databases and integrate systematic monitoring and evaluation • Identify community-based irrigation schemes for implementation • Mainstream irrigation related statutory obligations for environment, water and health • Provide capacity building for farmers and support establishment of viable farmer organizations and IWUAs

Category of Irrigation Stakeholder	Role
The Parliament and County Assemblies	• Formulate legislation for irrigation development • Approve budget allocation for irrigation development and services • Provide oversight on the use of public resources
B. Development Partners and Private Sector	
International development agencies (World Bank, AfDB, etc.)	• Technical and development cooperation • Resource mobilization • Undertake studies on irrigation developments • Support capacity building of stakeholders
NGOs, FBOs, CBOs	• Provide technical and financial support • Support irrigation infrastructure development • Facilitate community empowerment • Provide humanitarian assistance
Private Sector actors	• Supply of production inputs, equipment and machinery • Provision of technical and financial services • Investment in irrigation infrastructure and scheme management • Provide market information • Assist in produce marketing, storage and establishment of cottage Industries • Train farmers and farmer organizations in production, quality control and marketing

Category of Irrigation Stakeholder	Role
Farmers	• Resource mobilization • Participate in scheme development, monitoring and evaluation • Undertake management of irrigation schemes • Form farmer organizations such as IWUAs, and Cooperatives • Carry out agricultural production, produce marketing and value addition • Compliance with statutory obligations
Financial Institutions	• Provide financial services for irrigation development, production and other value chain activities • Provide training on financial management • Support linkage and networking of farmers to markets

2.4.1 National Level

a. Joint Irrigation Intergovernmental Steering Committee

The Joint Irrigation Intergovernmental Steering Committee (JIISCO) is a consultative forum which seeks the cooperation of stakeholders so as to encourage broad support for irrigation development and management. This is formed at the national level by the Cabinet Secretary in consultation with other ministries and agencies of the National Government; the Council of Governors; County Governments; and Non-government entities. It will include national government ministries relevant to irrigation; County Ministries responsible for Irrigation; Development Partners; Private Sector; irrigation farmers' organizations; and civil society organizations amongst others as deemed necessary.

The main functions of JIISCO will be to: Coordinate irrigation development issues across the country; Communicate any changes in policy, strategic national plans and guidelines; Ensure adherence to the national strategic plans; Coordinate sector regulation and conflict management; Undertake joint monitoring of irrigation programmes and projects; and Establish a reporting mechanism on the needs and state of irrigation, development and management in the country.

The JIISCO shall be Co-Chaired by the Cabinet Secretary responsible for Irrigation and the Sector Chair responsible for irrigation at the Council of Governors. The committee shall be supported by a Secretariat with technical thematic working groups.

b. Joint Secretariat on Irrigation (JSI)

The Cabinet Secretary responsible for irrigation shall constitute a secretariat composed of six members, three from each level of government for a period not exceeding three years. The members from county governments shall be seconded to the secretariat, by the council of governors. Each level of government shall bear the cost of personal emoluments for their representatives to the secretariat. The general operations of the secretariat shall be borne by the Cabinet Secretary responsible for irrigation. One of the members from the national government shall be appointed as the coordinator deputized by one of the representatives from the county governments.

c. Thematic working groups

The technical thematic working groups shall be formed along the following themes: Policy, Legislation and Standards; Research and Capacity Building; Monitoring, Evaluation and Communication; and Resource Management and Dispute Resolution.

d. Joint Irrigation Technical Coordination Committee

The Joint Irrigation Technical Coordination Committee (JITCC) shall be spearheaded by the Principal Secretary responsible for irrigation and will comprise of representatives from the County Ministry responsible for Irrigation; CIDU; national and county institutions responsible for water and irrigation; development partners; financial institutions; private sector and civil Society irrigation related stakeholders; water and irrigation sector regulatory and judicial institutions; and technology research and training institutions.

The functions of JITCC shall be to: Collaborate and liaise with other agencies involved in irrigation development at local, regional and international levels on technical issues; Support formulation and review of sector regulations, standards and guidelines; Support formulation of national irrigation master plan, investment plan and related strategic programmes and projects; and Monitoring and evaluation of irrigation sector performance including information gathering, processing and knowledge sharing.

2.4.2 County Level

a. County Irrigation Development Coordination Committee

The County Irrigation Development Coordination Committee (CIDCC) should be established in each county to coordinate various irrigation stakeholders to promote and encourage irrigation development in a sustainable manner. The CIDCC functions will include: Receiving reports on the needs and state of irrigation development and management in the county; Monitoring and evaluation of the county irrigation strategy; Resource mobilization for irrigation development; and Recommend for approval of prioritized irrigation schemes and projects for implementation.

This committee shall be constituted by the County Executive Committee Member responsible for irrigation development in consultation with other stakeholders. The



committee shall preferably have representation from the national government, NIA, CIDU, private sector, development partners, civil society groups, farmer organizations amongst others as deemed necessary. The CIDCC shall be supported by a Secretariat with Technical thematic working groups.

b. Association of Irrigation Farmers

An association of irrigation farmers may be formed at county and national level by the irrigation water users’ associations or umbrella associations. The membership of an association of irrigation farmers at county level shall be the irrigation water users’ associations or umbrella associations where applicable, whereas the membership at the national level shall be the respective county associations.

The purposes of the association of irrigation farmers shall be limited to: Promotion of good governance and management of irrigation schemes; Capacity building of the respective irrigation water users’ associations; Participation in research, innovation and technology development; Dissemination of irrigation research information; and Participation in the formulation of irrigation standards. The association of irrigation farmers at county or national level shall prepare by-laws to guide its membership and operations, and shall be registered under the Societies Act.

IRRIGATION STAKEHOLDERS COORDINATION MECHANISM

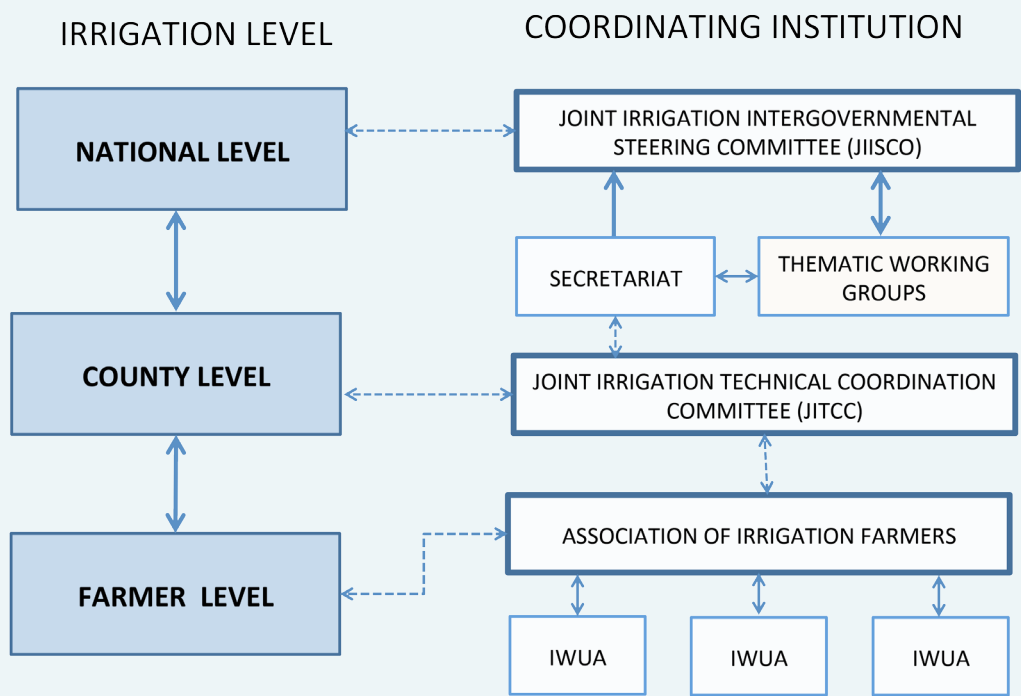


Figure 2.1: Irrigation Stakeholders Coordination Mechanism





Chapter 3: Irrigation Scheme Development

All irrigation development shall be undertaken within the context of the national irrigation master plan, county irrigation master plan and respective strategic plans to support sustainable food security and socioeconomic development of the country.

The principles adopted for the promotion of irrigation development will include: Compliance with all relevant statutory requirements; Availability and reliability of irrigation water; efficient utilization of irrigation water; Compliance to quality standards; participatory development; Gender mainstreaming and social inclusion; economic, social and environmental sustainability; integration of climate change resilience measures; and Integration of ecosystem services.

The development and management of irrigation schemes shall be supervised by a national or county agency, which shall be responsible for overseeing planning, design and implementation of irrigation infrastructure. In case of community-based irrigation schemes, the supervising entity shall also ensure formation and capacity building of IWUAs, which will spearhead scheme development and management activities.

The development and management of irrigation schemes shall be supervised as follows:

- i. Small scale, county public and county-initiated irrigation schemes shall be supervised by CIDU
- ii. Medium and large-scale irrigation schemes including small scale schemes which traverse or straddle more than one county, shall be supervised by the Authority
- iii. Schemes implemented by the Authority shall be supervised by the Cabinet Secretary responsible for irrigation

3.1 The Process of Irrigation Scheme Development

An entity or individual undertaking irrigation development shall do so in accordance with the statutory process prescribed in the Irrigation Regulations. The development of irrigation schemes shall undergo the systematic phases of initiation; planning and design; implementation; and operation and maintenance. The statutory development process is outlined in Figure 3.1.

a. Initiation phase

The initiation phase involves: conceptualization; generation of project idea, and transmission of the idea to others in the case of community-based schemes; and pre-feasibility study resulting to proposal development.

b. Planning and design

Planning and design phase entails conducting feasibility studies and preparing engineering designs. This includes: hydrological studies; soil surveys; topographical surveys; socio-economic and financial analysis; environmental and social impact assessment; institutional arrangements; agricultural and marketing plan. Subsequently, a detailed engineering design is prepared.

c. Implementation

The implementation phase involves resource mobilization, construction of the irrigation infrastructure, testing, commissioning and licensing of the scheme.

d. Operation and maintenance

Operation and maintenance (O&M) phase entails operating the irrigation facility and subsequent maintenance to ensure optimum performance for production of irrigated enterprises including related socio-economic and environmental issues.



3.2 Development of Community-based and Public Schemes

Participatory approach shall be adopted in development of irrigation schemes in order to ensure scheme sustainability. Prior to establishment of a public scheme meant for settlement, beneficiaries should be identified before the development of the scheme. In development of community-based and public schemes, the participation of farmers through irrigation water users' association is key. The participation aims at building and enhancing organizational capacity and management skills of IWUAs that would lead to efficient and effective management of schemes.

Capacity building for IWUAs in the aspects of organization, physical implementation, management and other relevant aspects forms one of the key pillars for sustainable irrigation development process. This ensures the transfer of capabilities through active involvement in decision making and implementation of the scheme.

3.2.1 General Guidelines

The following are general guidelines for the irrigation schemes development process.

- a. Adoption of low key and open-ended approach: This means that, the developed project where possible should allow for an expansion phase at minimal cost. In this approach, the following considerations should be adopted:
 - i. Allow all actors or players to assess how the development fits into the normal activities of the farmers
 - ii. Other subsequent phases should incorporate lessons learnt from the first phase

The development of an irrigation scheme should adopt the learning process approach, as in most cases irrigation involves the introduction of a new technology.

- b. Farmers' participation should be assured throughout the project development process which can be achieved through:
 - i. Selecting schemes that are demand driven by farmers for implementation; this includes schemes that have been formally requested for
 - ii. Community sensitization and mobilization to align community development needs to national development objectives
 - iii. Making use of the local knowledge and skills at all stages of scheme development
 - iv. Ensuring that IWUAs are formed for all community-based irrigation schemes at design stage before implementation
 - v. Ensuring that the scheme development process is integrated into other activities of the targeted benefiting farmers

- vi. Ensuring that farmers are sensitized on legal and statutory requirements of irrigation scheme development and subsequent management
- c. To ensure cost effectiveness in implementation of irrigation schemes:
 - i. The cost estimates for irrigation development shall be guided by prevailing market rates for materials, services and civil works. Market surveys need to be conducted from time to time to provide a guide
 - ii. Minimize capital cost by implementing properly designed schemes
 - iii. Examine alternative designs in consideration of the site, social conditions and economic viability
 - iv. Minimize costs of O&M by using where possible, self-regulating structures with minimal movable parts
 - v. Involve farmers in the development process as a strategy to learn the management aspects of their scheme
- d. Training and Development for implementing staff

Irrigation development requires various specialized fields of knowledge and skills which cover farmers' mobilization and organization, feasibility studies, planning and design, tendering, construction and O&M of the scheme.

The key implementing agencies such as NIA, CIDU and other entities should hire and equip their staff with appropriate competencies to manage irrigation development. The formulation of effective training should be based on a training needs assessment (TNA).

The specific guidelines, which cover the steps, requirements and estimated time frames in the irrigation development process, from scheme initiation to monitoring and evaluation (M & E) are described in the next sections.

3.2.2 Initiation of Irrigation Schemes

The plan for any irrigation development should be based on the felt needs of the farmers, irrigation master plan, strategic plans and food security requirements. New schemes should have clearly defined objectives and as much as possible be integrated into existing projects where possible. A comprehensive appraisal of the natural and socio-economic resources should be carried out systematically during project formulation. Participatory approaches should be employed during the formulation stage and maintained throughout the project cycle, so as to develop schemes that are acceptable, beneficial and sustainable. This approach should be maintained throughout the project cycle.



Farmers in community-based irrigation schemes and public or national schemes meant for settlement should play a leading role during the initiation stage. They should be made aware and commit to bear certain costs and obligations towards the construction and O&M of their irrigation schemes. To realize this, the government or other supporting entities should use appropriate consultative methods and techniques to effectively sensitize and capacity-build the farmers to enhance ownership.

The following steps, shall apply for implementation of public, strategic, community-based and private irrigation schemes where public funds are to be utilized.

a. Inception

The supporting entity shall identify the need to develop an irrigation scheme in consultation with the Community, and other stakeholders, in line with the government policy interventions and priorities, or internal requests from the scheme members. The scheme identification process shall ensure that felt-needs assessment is carried out on the proposed project area including data collection and preliminary studies.

The supervising entity, which may be NIA, CIDU or other agencies, shall also ensure a proposal or concept report is prepared together with a project implementation manual submitted for evaluation before implementation. In case of medium or large-scale irrigation schemes, there should also be proof that the proposed project area is designated as an irrigation area.

During this stage the outputs that should be considered include:

- i. A preliminary report on the proposed scheme
- ii. A memorandum of intention to cooperate from all the farmers involved
- iii. A request letter for support from the farmers accompanied by minutes of resolution
- iv. Proof of land ownership (a signed lease agreement for leased land or an allotment letter for public or community land, title deed)

b. Feasibility Studies

In this stage, the supporting entity shall engage a team to oversee the feasibility study, which may involve consultancy services to carry out the feasibility study as per the procurement procedures. The study report shall include review of previous studies (if any) for the proposed irrigation project; analysis of raw data collected; soil survey; water resource assessment; agricultural development plan; a marketing plan; and social impact report prepared; preliminary design; cost estimates for the project; and detailed design if viable, or terminated if not viable. The team shall ensure community and stakeholders'

sensitization and mobilization meetings are held to discuss findings of the feasibility studies and progress.

This stage should be completed within a period of six months upon which a Pre-Feasibility Report shall be prepared and submitted to the supervising entity. This report should include:

- i. Preliminary scheme Plan
- ii. Preliminary scheme Design
- iii. Indication Farmers' Participation
 - Indication of farmers' organizational capability to stand on their own (or IWUA Organizational Performance Evaluation Report)
 - Farmers'/IWUA Contribution - Farmers shall assist in preliminary data collection on: water resources (water availability and sustainability), socioeconomic issues, soil suitability, gender issues, environmental issues, land issues, and technological aspects that are available or may be required
- iv. Preliminary cost estimates on technical works
- v. Estimate on the requirement for support

3.2.3 Planning and Design Stage

a. General Considerations

Scheme supporting entities shall ensure the prospects for scheme sustainability by ascertaining: adequacy and reliability of water resources in connection with other parameters; attainment of substantial benefits through appropriate agricultural and agro-technical measures; appropriate O&M measures and strategies; and measures for effective and efficient participation of the beneficiaries in the implementation and management. The supporting entities shall ensure a detailed survey of the project is undertaken including; topographical, cadastral, soil, hydrological, water resource and geotechnical studies and preparation of agricultural development plans.

The supporting entities shall also ensure design of the scheme layouts including irrigation and drainage infrastructure is carried out based on the detailed feasibility studies together with bill of quantities, resettlement action plan and the engineers' cost estimates are prepared as per irrigation stakeholders' engagement procedure before preparation of tender documents.

b. Issues Considered During Planning and Design Stage

The success of irrigation schemes depends not only on the soundness of the developed infrastructure but also on the following natural resources and socio-economic issues:



environmental issues; gender issues; soil; topography; water (adequacy, reliability and suitability) issues; land issues; marketing issues; financial resources; human resource availability; rural infrastructure; social and economic issues (ownership, culture, conflicts, benefits amongst others).

i. Environmental issues

The main focus for these concerns in irrigation and drainage schemes are; health, natural resources and social economic factors. These factors are highlighted in the guidelines found in the Environmental Management and Coordination Act (EMCA, 2015), which sets out aspects to be considered during an Environmental and Social Impact Assessment (ESIA) exercise. In this assessment, issues relevant to irrigation development are as follows:

- **Environment Health and Safety** - These include occurrence of water borne diseases; pollution caused by waste disposal and farm inputs; noise and dust; workman safety; and flooding and drainage hazards
- **Natural and socio-economic issues** - These include encroachment into forests, swamps and wetlands; loss of dry-season grazing lands and over-grazing; land-use conflicts including restrictions on the movement of wildlife and livestock; soil erosion due to bush clearing and land preparation; flooding and drainage hazards; disruptive effects on migrating fish; destruction of crops by livestock and wildlife; crop damage by pests such as swarming birds; and insufficient supply of wood-fuel

All irrigation and drainage schemes should be implemented only after having addressed the above environmental issues as stipulated in the Environmental and Social Impact Assessment (ESIA) Regulations 2016. Results of the assessment study of these factors should be included in the design report as a part of the feasibility study.

ii. Gender issues

Gender concerns are important for the sustainability of a community-based irrigation scheme. The gender issues to be addressed should include:

- **Profile of the group** - in order to determine the gender composition (males and females) and also the dominant gender grouping for effective planning. Attempts should be made to include the disadvantaged and active groups in the decision-making process especially women and youth
- **Cultural norms**
- **Irrigation technologies** - Those adopted should be gender friendly and in addition address needs of the physically challenged persons

Women and youth play a dominant role in irrigated agricultural production. Therefore, a project might fail if women and youth are not willing or capable of carrying out the

additional tasks an irrigation scheme entails. If they are excluded from their share of the benefits, women and youth might well lack the motivation to contribute the extra effort or care.

Thus, women and youth should be encouraged to take an active role in all the participatory mechanisms; in all the decisive farmers meetings such as the submission of a request for support, the drawing up of a memorandum of intention to cooperate, and all implementation preparation meetings. They should make up at least 30% of those present and be well represented at all levels of the farmers' organization including the IWUA.

iii. Soils

Soil investigations to determine its properties are necessary in order to make informed decisions on crop choice and irrigation technology. Observation of the crops grown or the natural vegetation may give indications on any limitations in the area. A soil analysis and mapping will provide the information on the soil fertility and suitability for irrigation, type of irrigation system or technology, crop suitability and the kind of soil management techniques needed to ensure sustainable schemes. The services of professionals and advice of KALRO (Kenya Soil Survey) or other recognized institutions should be sought.

iv. Topography

Knowledge about the terrain is indispensable in irrigation technology selection. A limited-scope topographic survey of the scheme area will be necessary. This will establish the average slopes in the scheme area, the alignment of the conveyance route and a suitable intake site. The intake site should be located at a point that will provide the head needed to convey water from the source to the highest point of the scheme. The conveyance route selected should avoid probable obstructions that would increase project costs.

v. Water Issues

- **Scheme water requirement** - The irrigation scheme water requirement should be determined appropriately for the target irrigable area and other uses. The scheme water requirement will be used by farmers or IWUAs to apply for authorization to construct abstraction works and later a water permit from WRA, without which an irrigation scheme should not be implemented
- **Hydrological study** - The sustainability of schemes depends on the reliability, quality and adequacy of available irrigation water. There is need to establish water adequacy and reliability prior to pursuing any irrigation development. Adequacy means the availability of the required water volume, while reliability means the timing of the availability. Quality refers to the suitability of the water for irrigation in terms of physical, chemical and biological properties.

The factors related to water help in determining the extent of the area that could be efficiently and effectively served by an irrigation system; and the appropriate irrigation technology, cropping system and operating procedures. The process of hydrological



studies should follow the requirements stipulated by WRA, which demands that such studies should be carried out by registered hydrologists. Testing for water quality to ascertain standards for irrigation should be undertaken to ensure compliance to those stipulated in the NEMA regulations.

vi. Recycled Water

Wastewater may be used for irrigation subject to meeting the approved quality standards. In such instance, environmental, safety and health requirements must be taken into account. Some basic components to be considered include crop selection, irrigation method, adoption of appropriate management practices and blending of treated effluents. Water drained from irrigation schemes may be mixed with fresh water and the mixture used rotationally with fresh water for irrigation. Essentially, wastewater should be tested to ascertain its quality before being used.

vii. Water Harvesting and Storage

Water harvesting is a technique of harnessing surface water resources that can be used to provide water for irrigation. It is often undertaken to either augment existing water supplies or to provide water where other sources are either not available or would entail prohibitive developmental costs. The aim is to provide water in sufficient quantity and of a suitable quality for irrigation. Water harvesting interventions may include: surface runoffs, dams, ponds, water pans, shallow wells, boreholes, springs, roof catchments and, rock catchments.

It is advisable that in the development of irrigation scheme where water availability and reliability is not guaranteed water harvesting and storage measures should be undertaken to meet at least three months' water demand where practical. This takes into account the fact that water use rights permits issued by WRA, provides for the requirement to harvest and store water for irrigation in case of scarcity.

In Design of water harvesting and storage structures reference should be made to *Practice manual for small dams, pans and other water conservation structures in Kenya* and related water harvesting and storage regulations. Considerations should be done to ensure efficiency, safety and ease of abstracting stored water. Where an agency or county government is using public funds to support individual household or community-based water harvesting and storage for irrigation, the following factors should be considered:

- 1.Submission of a formal request by the farmer or IWUA
- 2.Willingness of the farmer or IWUA to commit land for development
- 3.Farmer's or IWUA willingness to take responsibility of utilizing the water for irrigation and implement safety measures
- 4.Farmers with demonstrable records of engagement in productive farming
- 5.Farmer or IWUA should meet any other conditions as may be guided by the supporting agency

To ensure the success of the water harvesting and storage interventions, the processes and structures should be done by qualified professionals in the aspects of identification, feasibility studies, design, implementation, capacity building, monitoring, operation and maintenance.

viii. Land Issues

- **Land use** - A general description should be provided on how the proposed scheme area is used at present (agriculture, grazing or forestry) in order to avoid conflict in land use. In case of community-based schemes, it will also be important to give indications that land needed for the irrigation and drainage infrastructure may not be compensated. Negotiations for way leave should be done. Compensation might be necessary if Project Affected Persons (PAPs) have to be moved to pave way for irrigation structures. Appropriate measures should be taken to minimize human-wildlife conflicts.
- **Land tenure** - It is important to identify the land tenure system and describe who the land owners are, and indicate whether there are any present users who might suffer as a consequence of developing the scheme. It should be noted that if some of the farmers are leaseholders, the organization and subsequent participation in the IWUA activities could be challenging. In schemes that have leaseholders as active farmers, the roles of the land owners and lessees should be clearly defined. Land tenure rights should be clearly specified.

ix. Marketing Issues

Availability of marketing channels and arrangements for irrigated produce determines the eventual sustainability of irrigation and drainage schemes. Individual farmers or IWUAs are encouraged to form marketing groups and enter into binding contracts with buyers to maximize on their returns. A market survey and crop prioritization should be done by the farmers or IWUAs. Viable value chains and relevant actors should be identified during this process.

x. Availability of Funds

To ensure success during execution of the scheme development stages, sufficient funds should be made available for the following key activities:

1. Pre-feasibility studies
2. Community mobilization where applicable
3. Feasibility studies
4. Statutory requirements e.g. WRA, NEMA and irrigation licenses
5. Detailed investigation and design production
6. Tendering process (Production of tender documents, advertising etc.)
7. Supervision of construction



8. Construction of the irrigation infrastructure
9. O & M at testing stage

xi. Human Resource Availability

To ensure sound design and implementation of sustainable irrigation schemes, the supporting entities must put in place a multidisciplinary team. The following personnel are key: Irrigation Engineer; Agronomist; Engineering surveyor; Sociologist; Socio-economist; Environmental Specialist and Hydrologist. In addition, the capability of the farmers or IWUA to provide the required labor with proper skills for construction and operations should be assessed.

xii. Rural Infrastructure

For sustainable irrigation development, the schemes should be accessible by ensuring rural roads are in good condition. Good roads and other rural infrastructure such as markets, electricity, water, produce stores, cold stores and cottage industries are also key enabling factors for marketing of the farm produce and for development of various rural enterprises. Collaborative mechanisms should be adopted to develop and improve such infrastructure.

xiii. Social and Economic Issues

In the case of community-based schemes, ownership needs to be assured in order to ensure sustainable irrigation development. This should be promoted by ensuring a participatory approach in the planning, design, construction and O & M of the scheme.

To achieve this, the following principles amongst others should be considered:

1. The irrigation development should address a felt need within the community
2. Participatory selection and design of the irrigation system
3. Selection of appropriate irrigation technology as much as possible based on the existing knowledge and capacity of the farmers
4. Phasing of the scheme development to encourage a learning process for the farmers
5. Adopt cost sharing in the development of the scheme
6. Use of local labour, skills and materials where possible
7. Farmers should be responsible for O & M of the irrigation scheme

In addition, progressive cultural norms should, as much as possible, be incorporated in the formulation of the project to promote acceptance.

c. Innovation and Micro Irrigation Projects

This category includes emerging irrigation techniques and initiatives that are used for agricultural production on a smaller scale. The techniques may include greenhouses, shade nets, aquaponics and integration with aquaculture. Farmers involved in this type of irrigation may also require financial and extension support. The provision of extension and technical support services shall be undertaken by a supporting agency in collaboration with CIDU or NIA. The farmers undertaking or wishing to undertake micro-irrigation may make a formal request for extension services through County department responsible for irrigation. The extension services may include guidance on appropriate design, implementation and best on-farm water management practices.

3.2.4 Scheme Implementation

This stage involves construction of irrigation facilities such as abstraction or intake works, conveyance system, distribution and in-field structures. Generally, farmers or IWUAs should play a major role during this stage by providing the necessary support as agreed upon. The individual farmers or IWUAs and the supporting institution should collaborate in the planning, problem solving and in the decision-making processes throughout the implementation stage, which include supervision of construction works and expenditures. The Steps in scheme implementation are as follows:



Step 1: Preparation and signing of Memorandum of Understanding

This involves a series of dialogues between and among the Government agencies at national or county level, supporting institutions and the individual farmers or IWUAs concerned before implementation. The Memorandum of Understanding (MoU) shown in Annex I addresses issues which include: roles and responsibilities of all major stakeholders; rules and regulations during implementation; and commitment of resource availability.



Step 2: Preparation of tender documents, advertising and awarding of Contracts

The relevant procurement guidelines on these aspects shall be adopted in irrigation development.



Step 3. Construction of the irrigation infrastructure

The Supervising entity shall appoint a Management Team to oversee supervision of the construction works as per the contract requirements, design and specifications and submit progress.



a. Supervision, Monitoring and Evaluation

The overall responsibility of supervision during construction is vested on the Implementing Institution. At least two representatives of the farmers or IWUA shall be part of the supervision team. The Implementing Institution and the contractor shall likewise convene regular assessment sessions (site meetings) to evaluate progress of work.

b. Training and development for Individual Farmers and IWUAs

The Construction stage shall serve as a platform for training farmers and IWUAs in scheme development and management. This shall be complemented with constant reflection and re-planning sessions with farmers and or IWUAs on specific tasks assigned. The implementing entity shall organize trainings which could include the following modules among others:

- i. IWUA organization and management** - IWUA formation, constitution and bylaws, Leadership, and organization for O&M
- ii. Operation and maintenance** - Assessment, Evaluation and planning of O & M activities including cropping calendars, basic water distribution plan, conflict management plan, personnel duties and responsibilities plan and farm level facilities development plan
- iii. Irrigation water management** - Irrigation scheduling, Application depths, etc
- iv. Irrigation agronomy** - Choice of crops, cropping pattern and intensity and good agronomical practices
- v. Financial management and record keeping** - Budgeting, Book keeping, Purchasing, etc.
- vi. Value chain development** - Marketing, value addition etc.



Step 4: Testing of Implementation Works

The Implementing Institution, the individual farmer or IWUA, and the representative of the Authority or CIDU shall test performance of the irrigation scheme infrastructure within the defects liability period. A certificate of scheme completion shall be issued upon the satisfaction of all parties, and shall serve as supporting document for the commissioning before handover of the scheme to the farmer or IWUA for operation and maintenance as per the Operation and Maintenance manual as applicable.



Step 5: Inventory of Completed Structures and Facilities

Based on actual inventory, which should be done during testing of works, the parties (Implementing institution, contractor, farmer or IWUA and CIDU or Authority), shall prepare a list of completed facilities and structures, as compared to what was planned.



Step 6: Supplemental works

In cases where works have not been completed by the Contractor, or where some negligence on their part requires additional works, during the defects liability period, the individual farmer or IWUA may file a complaint with the supervising entity furnishing a copy to the Implementing Institution and the contractor.



Step 7: Planning for O & M

The Implementing Institution shall assist individual farmers and IWUAs in preparation of O&M manuals and plans. A series of meetings in the last few months prior to completion shall consider directions for O&M and measures for sustainability.



Step 8: Evaluation of Individual Farmers and IWUAs

The Supervising entity shall conduct with the Implementing Institution an evaluation of the farmer's or IWUA's competencies for scheme management in accordance with the appropriate evaluation criteria as stipulated in national government guidelines and regulations prior to commissioning.



Step 9: Commissioning of the Irrigation Scheme

Implementing Institution shall commission the scheme. The individual farmer or IWUA will therefore take over responsibility for management of the scheme. The commissioning exercise shall be expressed in a document, which should contain an inventory of structures and facilities (as built drawings), master list of members, O&M Manual and a map/layout showing completed works.

From the design stage up to scheme commissioning, the supporting institution holds major responsibility for scheme implementation while the supervising entity holds overall responsibility for monitoring of compliance with guidelines.

During commissioning of the irrigation scheme, the documents and records required to confirm effective implementation of an irrigation scheme, some of which will be submitted for application of an irrigation license include: Inception

Report; Project Implementation Manual; Preliminary and Final Feasibility Reports; Preliminary Design Report; Draft Final Design Report; Final Design Report and Tender Documents; Authorizations for construction; Water abstraction and Use Permits; The Contract Document; Site Instructions; Measurement Sheets; Progress Reports; Minutes of the Technical Progress/Site Meetings; Interim and Final Payment Certificates where applicable; Inspection and Acceptance Reports; Commencement notice; Test Reports (for workmanship and quality assurance); Completion Certificates; Handing/Taking over Reports; As built drawings; and Operation and Maintenance Manuals



Step 10: Application for and Issuance of an Irrigation License

After the contractor issues a completion certificate, the farmer or IWUA should apply for an irrigation license as per the Irrigation Regulations.

3.2.5 Scheme Management Stage

Generally, scheme management stage starts upon completion of the implementation of the irrigation scheme infrastructure, commissioning and issuance of requisite licenses and permits. The activities undertaken at this stage entail: adoption of the scheme's O&M plan and continuous provision of training and technical assistance.

a. Adoption of Scheme O&M Plan

The individual farmer or IWUA shall adopt the irrigation service plan comprising the following:

- i. Operation and maintenance schedule for the scheme
- ii. Detailed Production plans and planting schedules
- iii. Marketing plans for the scheme produce
- iv. IWUA constitution and By-laws
- v. Environmental and social management plan

Supporting entity shall concentrate on monitoring and evaluation during this stage while the farmers will be expected to undertake some of the key activities which shall include: development of O&M schedule; collection and utilization of funds for O&M; carrying out O&M activities of the scheme; and allocation of funds for repair of major works.

b. Provision of Technical Assistance

The supervising entity, other relevant agencies and private sector service providers shall provide technical advice and assistance to farmers and IWUAs as the need arises. The provision of technical and other irrigation services may involve consultations and

coordination amongst the stakeholders to ensure effective performance and sustainability of the irrigation schemes.

3.3 Monitoring and Evaluation During Irrigation Scheme Development Process

The monitoring and evaluation of irrigation schemes development is the responsibility of the implementing entities. In order to ensure attainment of the irrigation development objectives, the entities shall carry out thorough M&E of all irrigation development activities, results and impacts. The items listed hereunder represent the major outputs and proofs of the completion in every development stage and should be used as the basis for formulating the detailed M&E procedures.

3.3.1 Impact and Benefit Monitoring

The Cabinet Secretary responsible for irrigation shall in consultation with other national government ministries and agencies, and county government undertake periodic monitoring of the impact, benefits and performance of all irrigation schemes. The attributes measured during the different stages of irrigation scheme development is as follows:

a. Monitoring and Evaluation at Initiation Stage

During this stage the outputs that should be considered include: A preliminary report; A memorandum of intention to cooperate; A request letter for support from the farmers; and Proof of land ownership (signed lease, for leased land or an allotment letter for public/community land, title deed).

b. Monitoring and Evaluation at Planning and Design Stage

During this stage, the outputs that should be considered include: A feasibility report covering technical, financial, Socio-Economic studies and environmental assessment reports; A formal application for a water permit; Proof of way leave, where applicable; and Other statutory certifications (NEMA license, WRA permit, irrigation license). At this stage, evidence for IWUA formation and registration should also be considered.

c. Monitoring and Evaluation at Implementation Stage

During this stage, the outputs that should be considered include: the irrigation/drainage infrastructure; and capacity building of the farmers and IWUAs. Among the supporting documents evaluated are: Implementation agreement between farmers and supporting entities; Tender documents and awarded contracts; Minutes of meetings with farmers-project assessment meetings; Minutes of site meetings; In case of contracted labour - Certificates of inspection/completion and payments; Certificate of completion of works; Evaluation of implementation process report; Capacity building reports; and Other statutory certifications (NEMA license, WRA permit, irrigation license).

d. Monitoring and Evaluation at Scheme Management Stage

During this stage, the outputs that should be considered include: Sustainable operational schemes, owned, managed and operated by farmers/IWUAs; and functional, cohesive



and viable IWUAs. Among the supporting documents evaluated are: Operation and maintenance plan; Farm input acquisition plan; Cropping calendar and Production plans; Marketing plans; Capacity building plan; and Environmental and socio-economic management plan (ESMP).

Environmental and Social Impact Assessments post project Audits should be conducted annually in order to address environmental and social issues for sustainable management and also inform future similar schemes. During the annual ESIA audits, the outputs that should be considered include: Implementation of ESMP; ESIA license; and Approved ESIA audit report.

Community participation should be verified at all stages of the scheme development.

3.4 Development of Drainage schemes

Development of a drainage scheme in irrigation is considered when environmental conditions require the removal of excess water from agricultural land to permit optimal growth of plants and other farm operations. In drainage schemes, the development process is similar to irrigation schemes in all phases from initiation through to operation and maintenance. Minor differences are only at initiation stage, where there shall be inclusion of collection of data on drainage feasibility, soil suitability and profile.

3.5 Flood-Based Farming Systems and Spate Irrigation

Flood based farming systems (FBFS), including spate irrigation, is an irrigation practice that uses the floodwaters of ephemeral or seasonal streams and canals guided to areas where cropping takes place. The floodwater is diverted from its river bed and channeled to irrigable fields to grow crops, serve forest and grazing land and recharge local aquifers. It is often practiced in water stressed regions that experience regular floods such as arid and semi-arid lands (ASALs) to cope with the aridity of their climate. Variety of crops are grown from one or more flood events using residual moisture stored in the deep alluvial soils formed from the sediments deposited in previous floods.

Types of flood-based farming systems

There are six types of flood-based farming systems. These include:

- i. Floodplain agriculture or recession agriculture, where either receding or rising floodwaters provide water for crop cultivation
- ii. Spate irrigation, in which floodwater from mountain catchments is diverted from normally dry riverbeds and spread over large areas for irrigation, improvement of grazing areas, filling of drinking water ponds and groundwater recharge
- iii. Inundation canals, which are situated next to rivers or floodplains and are fed by water when rivers rise. The canals are then used to divert the water to nearby farmland

- iv. Depression agriculture, in which shallow depressions are filled when the groundwater level rises on a seasonal basis. They can provide enough moisture to support grazing in the dry season and crops grown without irrigation
- v. Flood spreading, where floods flowing on a land surface are diverted and distributed in the fields
- vi. Roads for water where, flood waters are harvested from road surface and directed to nearby reservoirs (ponds) or directly into farms to support agricultural systems including pastures

Considerations for flood-based farming systems

FBFS is different from conventional irrigation in many ways and therefore needs special skills and approaches for practitioners. FBFS and spate irrigation is characterized by the:

- Uncertainty related to floods (unpredictable numbers, timing and volumes of floods)
- Hydraulic challenge of guiding flood flows
- Heavy sediment loads
- Exceptional nature of the water rights, which are community-based
- High inputs of labour to maintain intakes, canals and field systems
- Management and maintenance models that are specific to spate irrigation

Flood based farming systems should be developed, with properly designed and constructed diversions and canals to provide high water diversion efficiency and a fair measure of equity between upstream and downstream water users.

However, with introduction of irrigation from groundwater or other perennial water resource into spate-irrigated areas, one should follow the stipulated irrigation scheme development process. Any individual or other entities promoting transition from FBS or spate irrigation process shall comply with the applicable statutory laws and obligations of irrigation scheme development.

3.6 Private Irrigation Schemes

Any individual intending to develop an irrigation scheme shall follow the basic principles and steps as stipulated in these Guidelines. The small-scale irrigation farmers or firms shall work in consultation and may seek technical assistance from the CIDU or other supervising entities in their respective areas of jurisdiction. The medium scale and large scale shall work in consultation and may seek technical assistance from the Authority or other respective supervising agency.



The private irrigation schemes development process shall be in accordance to the statutory steps as illustrated in Figure 3.1 as per the phases of irrigation development. The project proponent or scheme owner shall be responsible for the following activities as detailed in the irrigation regulations:

- a. Scheme initiation through development of concepts and proposal
- b. Prefeasibility and feasibility studies with the requisite approvals
- c. Scheme design using certified and registered professionals
- d. Seeking approval of the designs and authority to construct
- e. Construction of scheme infrastructure and its attendant supervision responsibilities
- f. Preparation of O&M manuals and submission of project completion report to the supervising entity
- g. Application for issuance of an irrigation license to facilitate commencement of scheme operations

The management and operation of private irrigation schemes shall be subject to license conditions and regulations including mandatory monitoring, evaluation and performance audits by the supervising entity and or the Cabinet Secretary.

3.7 Strategic Irrigation Schemes

Strategic irrigation schemes shall be established by the Cabinet Secretary to fulfil a specific national purpose. In establishing a strategic scheme, the following criteria shall be considered:

- a. Suitable irrigable land of strategic national importance
- b. Irrigation for food security; industrial crop production for agro-industries
- c. Provision of livelihood for poor and vulnerable persons and groups
- d. Provision of security for investments in land improvements for irrigation
- e. Foreign exchange generation or import substitution
- f. Regional development and employment generation

The development process of a strategic irrigation scheme shall vary depending on the management model envisaged, either public, Public Private Partnership or community-based. Nevertheless, the development of a strategic irrigation scheme shall be done in accordance with the statutory process as outlined in Figure 3.1. Where the establishment of a scheme under this category relates to a public scheme meant for settlement, the beneficiaries shall be identified before establishment in consultation with the relevant government agencies.

IRRIGATION DEVELOPMENT PROCESS

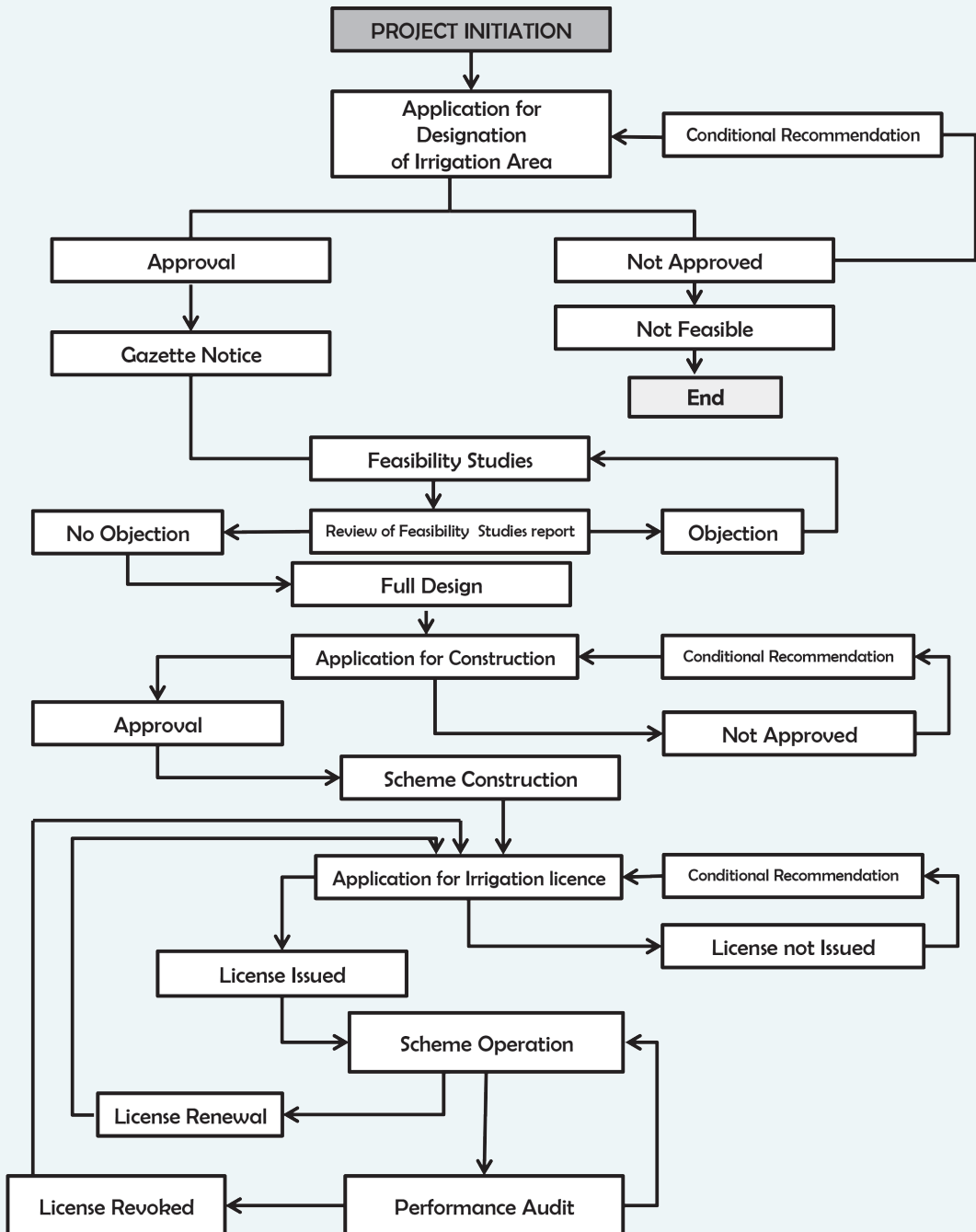


Figure 3.1: Flow Chart of the Statutory Process of Irrigation Scheme Development



Chapter 4: Support Services for Irrigation Development and Management

Sustainability of developed irrigation schemes is determined to a large extent by the availability and access to appropriate support services needed for scheme development and management, which were identified at the initiation and the planning stages. The absence of any of these services will affect the satisfactory development, management and performance of the schemes in terms of the actual outputs and benefits. These supporting services are outlined below.

4.1 Financial Services

The current practice of financing the development of irrigation varies depending on ownership and management. Individual farmers are encouraged to source funds for investment and production from own resources and existing financial institutions. Further, a community can form an IWUA, which can prepare a proposal for development of an irrigation scheme. The IWUA can then mobilise resources from target farmers and also seek financial support through NIA or CIDU, and other agencies including development partners.

4.2 Farm Inputs and Production Services

Farm inputs supply and field operations are critical support services for sustainable production and viability of irrigation schemes. Creating favorable conditions for input dealers will encourage availability of farm inputs and production services within the environs of irrigation schemes through:

- a. Use of farmer associations for bulk purchase of inputs and acquisition of farm operation services to benefit from economies of scale
- b. Collaboration with the relevant government agencies at national and county levels to provide information on input supply service and farm operation services to irrigation schemes. At County level, the offices responsible for irrigation and Agriculture should provide information on these services

Production support services may be on-farm, such as planting, harvesting and water application; or off-farm, such as storing, processing and marketing. The effective provision of farm services, usually increase the irrigated enterprise production and productivity and consequently improve the viability of the irrigation scheme. The provision of the farm services can be integral to or separate from O&M services of the irrigation scheme. An individual irrigation farmer or IWUA may engage a service provider to offer the farm level services at such terms as stipulated in the service agreement.

4.3 Value Addition and Marketing

Sustainability of irrigation schemes can be attained if farmers benefit from their investments in the irrigated enterprises. Farmers have to market their produce at a profit to be able to pay back loans, undertake O&M and save towards future project development. To ensure returns on investment, market outlets for the various produce from the schemes should be identified and an appropriate agricultural production plan prepared during the planning stage. This should be done in collaboration with national, county governments and other stakeholders. Market survey and crop prioritization should be done followed by contract farming arrangements where applicable. In addition, the following issues should be considered to enhance profitability:

- a. **Preservation** - Where cooling facilities already exist, farmers are encouraged to utilize them or develop the same
- b. **Value addition** - Cottage industries, where possible, are recommended to increase the value of the produce
- c. **Formation of marketing groups** - Producers are encouraged to form marketing groups to facilitate aggregation of produce, enhance bargaining power and enjoy economies of scale



4.4 Training and Extension Services

Extension services are essential for farmers to access appropriate technologies needed to maximize yields and profits from irrigated enterprises. The County departments responsible for irrigation and Agriculture in collaboration with NIA or other agencies and other stakeholders should work closely with the farmers throughout the scheme development and management cycle to identify gaps for capacity building. Further, the following aspects should be considered:

- a. Subject Matter specialists (SMS) in irrigation management and engineering should be available at Ward and Sub-county levels to provide backstopping services to frontline extension officers on demand and also to supervise them
- b. Extension officers should be retrained on scheme development, management and irrigated agriculture to support production and irrigation scheme management

4.5 Infrastructure and Communication

The availability and adequacy of infrastructure and communication facilities in rural areas e.g. market sheds, produce cooling facilities, warehouses, schools, health amenities, security, access roads etc. are key to irrigation development. Therefore, coordination and collaboration amongst key stakeholders to invest in the mentioned areas should be considered while planning irrigation development.

4.6 Research, Innovations and Appropriate Technology

Adoption of science and technology is essential for efficient and sustainable irrigation development. Therefore, stakeholders in irrigation development should collaborate with Kenya Agricultural and Livestock Research Organization (KALRO), and other research institutions to ensure improvements in irrigated agriculture research and innovation. At the irrigation scheme level, research, innovations and technology testing fields or sites should be designated by the individual farmers or IWUAs to facilitate adoption of appropriate enterprises and production practices. It is imperative that challenges encountered in irrigation are communicated to research institutions for investigation.

Introduction and promotion of technologies and innovations in irrigation for mass consumption shall take into consideration the provisions of the Irrigation Act in force and its attendant regulations.

4.7 Operation and Maintenance Services

Operation and maintenance (O&M) services are important for proper functioning of the irrigation infrastructure. The O&M service will entail maintenance of primary and secondary infrastructure in irrigation schemes. In public schemes the O&M services may be provided by the supporting agency at an agreed fee or contracted out to a private service provider. In community-based schemes the O&M services shall be the responsibility of the beneficiaries and may contract a service provider where necessary.





Chapter 5: Financing Irrigation Development and Management

In a bid to promote sustainable irrigation schemes, there is need to have proper financing arrangements that take into consideration the interests of the farmers on one hand, and on the other hand give a varied range of financiers the confidence to invest in irrigation.

A favourable enabling environment that increases the sustainability of the irrigation schemes also attracts enhanced investments to the irrigation sector. Key factors for success of investments in the irrigation sector include: Appropriate institutional, legal and regulatory frameworks; Proper coordination mechanisms; Access to land and land tenure systems; and Farmers' ability and willingness to pay for water use and other irrigation services.

- a. **Institutional, Legal and Regulatory Arrangements:** There needs to be well defined institutional arrangements to provide an enabling environment and accountability
- b. **Coordination Mechanisms:** There should be appropriate mechanisms that bring together various players with diverse synergies for effective irrigation development and build confidence for private sector investment and participation

- c. Land access rights:** There should be a clear land tenure rights and related contractual arrangement that secures access to land and security of the investments in irrigation development

5.1 General Concepts on Financing

The financing for development and management of the public and strategic irrigation schemes shall be through grants, loans, and public private partnership (PPP). The source of funds may be public funds, external sources and or private investors.

The funding for development and management of community-based irrigation schemes shall be through own-funds, grants, loans, cost-sharing or cost-recovery arrangements. This is in line with the concept of participatory approach to development. Cost-sharing is particularly recommended, even when offering grants, in irrigation development because of the need to enlist participation of the farmers in all stages of the irrigation or drainage project cycle. This enhances effective scheme management upon implementation of the irrigation infrastructure by communities which would lead to sustainability.

The use of both grants and loans should be accommodated in a cost-sharing arrangement. It is however recommended that where farmers are able to acquire loans for scheme development, they should do so. This will help accelerate irrigation development throughout the country. Before committing to financing irrigation infrastructure development from public funds, consideration shall be given to assessment of technical, social, economic and financial viability.

Where financing of an irrigation scheme is through public funds, the investment should be guided by clear development plans (master plans, strategies and strategic plans, County Integrated Development Plans) and equity in allocation. The scheme should be implemented to a level where it is operational either in part or full and the financing should be in accordance with public finance management provisions and the irrigation regulations.

5.2 Economic Viability Assessment in Irrigation Development

The economic viability assessment shall be done as part of the feasibility studies so as to ensure sustainability and viable returns on investment. This shall form the basis for investment decision making. The economic and financial analysis of the proposed investments shall preferably be done using internal rate of return and cost-benefit analysis. In addition, other appropriate tools may be used where applicable. During this analysis, a scheme life span of at least twenty years should be considered. However, special considerations may be made where public funds are used to develop schemes to support individual farmers or communities on social equity basis.



a. Internal Rate of Return

The Internal rate of return (IRR) is a measure used to determine the profitability of an investment. It is used to estimate a project's breakeven discount rate or rate of return, which indicates the project's potential for profitability. IRR is used to evaluate projects or investments. Based on IRR, an investor shall decide on whether to accept or reject a project. If the IRR of a new project exceeds an investor's estimated rate of return, the project is viable. In calculating IRR, the net present value (NPV) should be greater than zero to justify the investment. Essentially, the expected future benefits should be greater than the cost of investment.

b. Benefit Cost Ratio

The benefit cost ratio (BCR) is an indicator that summarizes the overall value for money of a scheme. It is a ratio of the benefits of a scheme expressed in monetary terms relative to its costs also expressed in monetary terms. The BCR takes into account the amount of monetary gains realized from developing a scheme versus the amount it costs to develop the scheme. It is often agreed, that the higher the BCR, the better the investment. The general rule is that if the benefit is higher than the cost, the scheme is a good investment. A scheme with a benefit-cost ratio greater than one (1.0) has greater benefits than costs; hence has positive net benefits

5.3 Financing of Irrigation Infrastructure Development

5.3.1 Financing Community-based Schemes

Financing of irrigation infrastructure development for community-based schemes may come from beneficiary contribution or external sources.

a. Beneficiary Contribution

Cost-sharing in development of community-based irrigation schemes should take the form of beneficiaries offsetting part of the total project cost. This could be through provision of locally available construction materials, cash and/or labor. Contribution by the beneficiaries' will enhance their participation for project sustainability. It should be borne in mind that the farmers' contribution is a prerequisite to scheme implementation. The minimum farmers' contribution shall not be less than 5% of the infrastructure development cost. However, special considerations shall be made when supporting the vulnerable and marginalized groups (VMG).

b. External Contribution

This involves the financing of irrigation development by an entity external to the scheme beneficiaries such as the national government, county government, NGOs, development partners or any other stakeholder. The external financing may be in the form of grants (funds not paid back by the benefiting group) or loans. Whereas grants are likely to come from national or county governments, development partners and NGOs; commercial

banks and micro-financing institutions (MFIs) usually provide loans to community-based irrigation schemes. It should be noted that the provision of finance to irrigation schemes by the private investors shall be undertaken in accordance with the requirements of the Irrigation Regulations.

c. Conditions for using public funds for Community-based Irrigation Schemes

For a scheme to be considered for public financing, farmers should submit a written proposal with request for funding to NIA, CIDU or any other supporting entity. The proposal requesting funding to carry out detailed design and feasibility studies should be accompanied by a preliminary report. The proposal to request funding for implementation should be accompanied by: A scheme design documents; mandatory approvals, permits and/or licenses from the relevant authorities; and the approval to construct from the supervising entity.

The funds provided should cover the entire scheme implementation and or in a phased development arrangement, be adequate to cover the entire abstraction and conveyance infrastructure and at least one irrigation unit to an operational level. Where applicable, the support shall be provided as works or in kind. The IWUA should work closely with the supporting agency to supervise, inspect and confirm delivery of the agreed support. The release of funds shall be done as per the agreed contract documents, agreements and work plan.

The flow of funds from the implementing entity to the beneficiaries' targeted works shall be based on a signed Memorandum of Understanding between the parties. Mainstreaming cost-sharing arrangements with beneficiaries' in the implementation of community-based irrigation schemes should be emphasized.

For schemes developed through loans, beneficiaries must ensure that funds for infrastructure construction are secured by the end of the planning and design stage.

5.3.2 Financing Irrigation Infrastructure Development for Public and Strategic Schemes

Financing for irrigation infrastructure development for public and strategic Schemes may come from public funds, loans or grants from external sources. Public agencies may enter into partnerships with private investors to finance irrigation infrastructure development in accordance with provisions of public finance management and the irrigation regulations.

5.3.3 Financing Individuals and Special Groups

Public funds may be used for capital investment in irrigation development to support livelihoods and household food security for vulnerable individuals and marginalized groups. Where public funds are expended for these purposes ensure value for money, and a fair and transparent system in identification of beneficiaries.



5.4 Specific Guidelines on Financing Irrigation Development and Management

5.4.1 Financing through Grants

It is recommended that where irrigation development for communities is undertaken through grants, this should be carried out under cost-sharing arrangements. The supporting entities and the beneficiaries shall jointly meet the costs of scheme implementation. The national and county governments, and development partners shall provide the grants. The grants portion should cover the cost of planning, scheme design and capacity building of the beneficiaries amongst other activities.

The stakeholders involved in cost-sharing arrangements may undertake different designated roles during irrigation scheme development and management, which are described as follows:

a. National and County Governments and Development Partners

The national and county governments and development partners shall provide grant funds for:

- i. Preliminary and detailed feasibility studies
- ii. Detailed scheme design
- iii. Development of irrigation infrastructure
- iv. Farmers capacity building
- v. Irrigation extension services where appropriate
- vi. Operation and maintenance of national and public irrigation schemes (where applicable)

The national and county governments may provide guarantees for financing by development partners and banks with concurrence of the National Treasury.

b. Banks and Micro-Financing Institutions

NIA, CIDU or other agency may capacity build IWUAs and farmers and facilitate arrangements with Commercial banks and Micro-Finance Institutions (MFIs) to provide seasonal loans for farm inputs and other production services. This will ensure effective utilization of irrigation schemes developed through this financing arrangement.

c. Beneficiaries

The individual beneficiaries or through their IWUAs shall:

- i. Meet expenses of statutory fees for licenses and permits (authorization for construction and Water use permit from WRA, NEMA license, Irrigation license, way leaves, etc.)

- ii. Contribute towards implementation by providing labour, and locally available materials where possible
- iii. Provide funds for scheme development and management in accordance with the cost-sharing funding conditions

Notwithstanding the above-mentioned factors, the beneficiaries' contributions in the case of community-based irrigation schemes may be enhanced by:

- Ensuring that the cost of O&M of a developed scheme is the full responsibility of the farmers
- Adopting appropriate strategies in the ASALs where irrigated farming is not always a priority. e.g. food-for-work. The same should apply in famine prone areas. In such areas, the design of irrigation structures should be appropriate and adaptable to minimize costs borne by farmers at O&M phase

5.4.2 Funding Through Loans

There are various financial institutions and other stakeholders willing to fund irrigation development and management through provision of loans to firms, individual farmers and farmer associations for communities. Considerations for issuing loans to develop irrigation schemes include the following:

- a. The beneficiaries should have a clearly defined business plan covering the irrigation scheme and related enterprise value chain. Any loan taken for production purposes should be based on a viable enterprise plan, and preferably accompanied by an insurance cover where possible
- b. Any security needed by the loaning institution should be agreed between the involved parties. Where irrigation development funds are available on loan basis to community-based irrigation schemes, it is recommended that group guarantee be employed as a form of collateral
- c. The beneficiaries should study and understand the credit conditions before entering into any form of loan agreement. Additionally, it is important that the terms of the loan be well within the servicing capacity of the beneficiaries. Individual farmers or IWUAs should take a leading role in seeking loans, which are commensurate with their irrigation scheme requirement. The loan repayment by the beneficiaries should start after the agreed grace period and or according to the structure of the financing agreement between the farmer/farmers organization and the financier"
- d. It is recommended that loans acquired for irrigation schemes by the farmers or IWUAs be for irrigation infrastructural development and where possible, farm inputs and production services
- e. In case of community-based irrigation schemes, the supporting entities should provide funds for activities such as preliminary investigations, training for IWUAs and farmers



Commercial financial institutions should consider the following aspects while supporting irrigation development and management:

- a. They should provide both short term and medium-term loans
- b. The short-term loans should be for farm inputs and production services and the repayment periods should be based on the crop production cycle
- c. The medium-term loans should be used for irrigation and drainage infrastructure development
- d. Loans may be guaranteed by government (where appropriate) in order to create financial institutions' confidence in investing in community-based irrigation schemes
- e. Loan repayment for the irrigation infrastructure development should have a grace period of at least two cropping seasons or as may be agreed between the farmers and the financing institution

Any stakeholder willing to finance irrigation development through cost-recovery should do so through partnership with local financial institutions in accordance with the prevailing regulations under the Irrigation Act. Any scheme developed through cost-recovery under bilateral agreement shall have the loan amortized for a period not less than five (5) years.

5.4.3 Co-financing

The co-financing model usually involves an irrigation scheme development financed by two or more funding agencies. The funding may be through a grant or loan or both. In this case there should be an agreement defining funding modalities between the financiers and the beneficiaries.

5.4.4 Funding through Public Private Partnerships

Public Private Partnerships (PPP) is an arrangement between a contracting authority and a private party. The contracting authority means a state department, agency, state corporation or county government, which intends to have a function undertaken by it, performed by a private party. A private party refers to a party that enters into an agreement with a contracting authority and is responsible for undertaking a project on behalf of the contracting authority. In this arrangement, the private party:

- a. Undertake to perform a public function or provide a service on behalf of the contracting authority
- b. Receive a benefit for performing a public function by way of:
 - i. Compensation from a public fund
 - ii. Charges or fees collected by the private party from users or consumers of a service provided to them
 - iii. A combination of such compensation and such charges or fees

- c. Is generally liable for risks arising from the performance of the function in accordance with the terms of the agreement

Financing irrigation development and management can be undertaken through PPP, towards realizing the country's irrigation potential and the envisaged benefits. PPP models may cover financing infrastructure development, irrigation management and services. The participation of private sector in financing irrigation initiatives should be undertaken in line with the prevailing laws on Public Private Partnership, public finance management, irrigation Regulations and any other government policies and guidelines.

5.4.5 Public Private Partnership Models for Irrigation Development and Management

The procedures for initiation and implementation of a public private partnership are guided by the principal law on public private partnership. The following PPP models and others that may be adopted from time to time will be applicable in irrigation development and management.

a. Management Contract

In irrigation, this arrangement may be applicable in a public scheme management, operation and maintenance. The private party is responsible for the management and execution of specified obligations, within well-defined specifications for a defined period of time not exceeding ten years. The contracting authority retains ownership and control of all facilities, capital assets and properties.

b. Lease

Under lease arrangement, the private party pays the contracting authority rent and manages, operates and maintains the developed irrigation facility or utilises the leased facility for the purposes of production. The private party receives benefits from the sale of produce for specified period of time not exceeding thirty years.

c. Concession

This arrangement may be applicable in public irrigation schemes or bulk irrigation water storage facilities. The contracting authority may issue a contractual licence to a private party to operate, maintain, rehabilitate or upgrade an infrastructure facility and to charge a user fee while paying a concession fee to the contracting authority.

d. Build-Own-Operate-Transfer Scheme

This may be applicable where the private party designs, finances, constructs, operates and maintains an irrigation infrastructure facility on public land and subsequently owned by the private party for a specified time period not exceeding thirty years, or such longer period as may be agreed, after which the private party transfers the facility to the contracting authority.



e. Build-Operate-and-Transfer scheme

The build-operate-and-transfer scheme model may be applicable where the private party finances, constructs, operates and maintains an irrigation infrastructure facility and transfers the facility to the contracting authority at the end of a specified term which shall not exceed thirty years.

f. Build-Lease-and-Transfer

This is where the contracting authority authorizes the private party to finance and construct an irrigation infrastructure or develop an irrigation scheme and upon its completion lease it to the contracting authority for a specified period and upon the expiry of which the ownership of the facility automatically transfers from the private party to the contracting authority.

g. Build-Transfer-and-Operate

This is where the private party constructs an irrigation infrastructure facility and assumes the costs and risks associated with the construction of the facility and upon completion, transfers the ownership of the facility to the contracting authority and continues to operate the facility on behalf of the contracting authority.

h. Rehabilitate-Operate-and-Transfer

Rehabilitate-operate-and-transfer model is where the private party refurbishes, operates and maintains for a specified period, an existing public irrigation facility and at the expiry of which the private party transfers the facility to the contracting authority.

i. Land Swap

This is where a contracting authority transfers existing public land or an asset to the private party in consideration of an irrigation or water storage asset or facility that has been developed by that private party.





Chapter 6: Irrigation Scheme Management

6.1 General Concepts of Scheme Management

The management of irrigation schemes should be undertaken in accordance with the provisions set out in the Irrigation Act, Irrigation Regulations and other statutory obligations. The irrigation farmer or IWUA should also adopt best practices in planning, coordination and financing of operations. Management also involves judicial governance and accounting mechanisms including periodic monitoring, and evaluation measures.

Scheme management involves social and physical aspects for water acquisition, conveyance and distribution, scheme maintenance and repairs, staff and group labour mobilization, budgeting and other management tasks ensuring effective, efficient and sustainable irrigation services.

Governance refers to a set of social relations that manage the social, economic and administrative aspects of irrigation. The mode of governance depends on the ownership and type of irrigation scheme. In the case of community-based schemes, this is done by the IWUAs.

Internal monitoring and evaluation is an important aspect of scheme management. It helps to identify successes and any shortcomings for remedial actions, which are incorporated in subsequent planning cycles.

6.2 Models of Scheme Management

The models of irrigation scheme management shall be based on ownership and type of the system. The different management models are by:

- a. An agency management for public irrigation schemes
- b. IWUAs for community-based irrigation schemes
- c. IWUAs through an irrigation water service provider for large community-based irrigation schemes. This may also apply for public irrigation schemes meant for settlement where irrigation management transfer (IMT) has been effected
- d. The scheme owner for individual or private irrigation schemes

6.2.1 Management of Public Irrigation Schemes by an Agency

Agency management is applicable in institutional public irrigation schemes or public schemes which have shared responsibilities with leaseholders or farmers with permits. The farmers who are permit holders or leaseholders normally pay irrigation service fee to the responsible agency for O&M activities. The farmers or leaseholders carry out irrigated enterprise production operations in their respective allotted fields.

In public irrigation schemes meant for settlement, the agency management may be undertaken by NIA, CIDU or other agency. In such circumstance, a scheme management committee may be established by the Cabinet Secretary or Governor as the case may be, to provide oversight in management of the public irrigation scheme under consideration.

Other functions of the scheme management committee include:

- a. Land administration
- b. Facilitating access rights to land for all irrigation farmers on the respective scheme
- c. Facilitating scheme administration and management of scheme by the Authority or County Irrigation Development Unit
- d. Promoting the production, marketing, safe storage and processing of crops, animal and fish products grown or produced on national or county public irrigation schemes in consultation with the Authority or CIDU and other stakeholders



- e. Undertaking dispute resolution at the scheme level involving various actors
- f. Promoting good governance and efficient management of the scheme

Where public schemes meant for settlement straddle two or more counties, a scheme management committee shall be constituted from each county which will then form a joint scheme management committee. The joint scheme management committee shall consist of a representative of the Authority and four other members each from the individual county scheme management committees, of which one member shall be a farmer. The County Commissioners of the respective Counties shall be co-chairs.

The scheme management committee composition, powers and modalities of operations for national public and county public scheme shall be as outlined in the Irrigation Act and related irrigation regulations.

The committee may set up special purpose sub-committees to handle issues such as land administration and dispute resolution amongst others.

6.2.2 Irrigation Management Transfer to IWUAs

Irrigation management transfer (IMT) is the transfer of part or all of the management responsibilities of an irrigation scheme to an IWUA upon gaining the requisite capacity to sustainably manage the irrigation scheme. The permit holders in a public irrigation scheme meant for settlement shall participate in scheme management through an IWUA. The agency responsible for management of a public scheme such as NIA, CIDU or other entity are required to capacity built the designated IWUA to progressively assume full responsibility for management of the entire or part of a targeted irrigation service area under appropriate IMT agreements with the national or county governments, as the case may be.

IMT shall be effected through an agreement between the agency and the IWUAs. The IMT agreement for a public irrigation system shall contain the: description of the condition of irrigation system to be transferred; and rights, roles and responsibilities of the parties to the agreement in terms of the maintenance of the infrastructure.

The IMT process may involve service agreements under specified terms and conditions. The process and any attendant service agreement shall be undertaken in accordance with the prescribed provisions in the Irrigation Regulations.

6.2.3 Management of Community-based Irrigation Schemes by IWUAs

The irrigation scheme management model by IWUAs applies to community-based schemes and public irrigation schemes meant for settlement. An IWUA should be formed and registered as a society during the scheme conceptualization and initiation phase after detailed design and feasibility studies. The IWUA should be capacity built by the

implementing agency such as NIA, CIDU or other entity to enhance self-determination, cohesion and sustainability of their operations in the scheme management.

In community-based irrigation schemes, IWUAs are the main entities responsible for development and management of the entire irrigation or drainage system. They may seek some technical advice and occasional assistance from a national or county government agency or other stakeholders.

The IWUA members are responsible for installing, operating, maintaining and managing the irrigation system. At catchment level, the IWUA is a member of a Water Resource Users' Association (WRUA) and participate in water resource management issues.

The establishment of an IWUA, its composition, powers and modalities shall be carried out as prescribed in the Irrigation Act and related Irrigation Regulations.

a. Role and Responsibilities of IWUA in Development & Management of Irrigation Schemes

The role of the IWUA includes all activities pertaining to the scheme implementation process in line with prevailing policies, regulations, guidelines and procedures. These may include:

- i. Acting as a linkage between the IWUA members and NIA, CIDU as well as other stakeholders
- ii. Participating in all stages of scheme development
- iii. Operation, maintenance and management of the irrigation scheme
- iv. Ensuring collective community responsibility of setting and collection of irrigation service fees (water use fee etc.) from all the members
- v. Ensuring equitable distribution and efficient use of water for irrigation among the members
- vi. Mobilizing internal and external resources for the benefit of the members
- vii. Formulation and enforcement of the constitution and by-laws
- viii. Ensure adherence to statutory obligations
- ix. Conflict management

For IWUAs to play their roles effectively and ensure sustainable irrigation development and management, they should be cohesive, functional and viable.

b. IWUA Formation Process

The supporting entities or agencies facilitating the IWUA formation activities should follow a systematic participatory approach which is linked to the scheme development stages. The proposed time frame for IWUA formation might vary depending on the farmers' experience in communal projects. Essentially, the process involves participatory approach in awareness creation; organization; capacity building; and networking.



It is important to note that IWUAs should be legal entities registered under the relevant legal provisions. The process of IWUA formation entails the following:

- i. Core group formation
- ii. IWUA formation and legalization
- iii. Training and capacity development of IWUA officials and members
- iv. Operationalizing governance and management mechanisms.

Detailed information on the IWUA formation process is shown in Table 6.1.

Table 6.1: Irrigation Water Users Association Formation Process

Phases	Objectives	Roles in Irrigation Scheme Development activities	Time frame
1. Core group formation	Initial group mobilized for organizing activities (Interim IWUA Officials)	Project initiation stage: • Prepare Community action & participation plan • Participate in feasibility study /design activities for proposed project	First 3 months
2. IWUA formation and legalization	IWUA formed based on scheme design and mobilized for governance and other activities • Constitution and By-laws formulated • Officials formally elected • IWUA formal registration	Implementation stage: • Apply for authorization to construct abstraction works and water permit from WRA, NEMA licence and other permits or way leaves • Appraise project document, prepare MOUs and implement participation plan • Participate in project implementation and M&E • Assign construction committee, labour, manpower, etc. • Participate in project assessment sessions • Conduct project evaluation meetings • Conduct other trainings as may be necessary	First 4 months

Phases	Objectives	Roles in Irrigation Scheme Development activities	Time frame
3. Training & development	Develop governance and management capability of IWUA	Formal, informal, guided practice and on-job trainings sessions to enhance knowledge and skills development for irrigation, production, financial, leadership, etc.	First 5 months
4. IWUA operation	IWUA exists as a functional and viable institution	• Total assumption of scheme management responsibilities • Internal scheme performance evaluation & feedback • Implementation of sustainability measures	First 3 years

c. IWUA Organization and Governance Structure

The IWUA constitution and by-laws shall provide for governance structure, which ensure that the organization is able to carry out its roles effectively. The IWUA governance structure includes general assembly, executive committee, association management committee, sub- committees or special task committees, irrigation unit or block leaders, and irrigation scheme members.

i. General Assembly

This comprises the general membership of the scheme. It is the supreme authority for all decisions on matters affecting the scheme management and the general membership. The overall decision-making and policy determination is vested in the General Assembly.

ii. Executive Committee

These are the elected officials who are responsible for the overall leadership and management of the scheme. It comprises the Scheme chairman, Vice Chairman, Secretary, Vice Secretary and Treasurer.

iii. Association Management Committee

This comprises the Executive Committee and other elected leaders, usually representing the interest of the blocks and /or special task committees. The association management committee through elected leaders carries specific functions directed towards scheme operation, enforcing rules and regulations and monitoring and evaluating the implementation of the scheme activities.



iv. Sub-committees or Special Task Committees

The sub committees act as advisors for the scheme committee. These are leaders that are elected to the scheme committee but assigned specific IWUA tasks for the purpose of distributing responsibilities and to facilitate participation of more members. Each IWUA should have sub- committees. These include dispute resolution, O&M, training, Audit, Safety, Health & Environmental and M & E committees. The number of special task committees will depend on the size and complexity of the scheme.

v. Irrigation Unit or Block Leaders

The block leaders, where applicable are responsible for enforcing agreements, rules and regulations within the irrigation groups. These are elected individuals that represent the various blocks of an irrigation scheme e.g. farmers served by a sub-main or lateral. The number of irrigation unit or block committees will depend on the size, irrigation scheme infrastructure complexity and number of irrigation farmers.

vi. Irrigation Scheme Members

These comprise of all the farmers within a given area who are served by the same irrigation facility. A typical IWUA organizational structure is as illustrated in Figure 6.1.

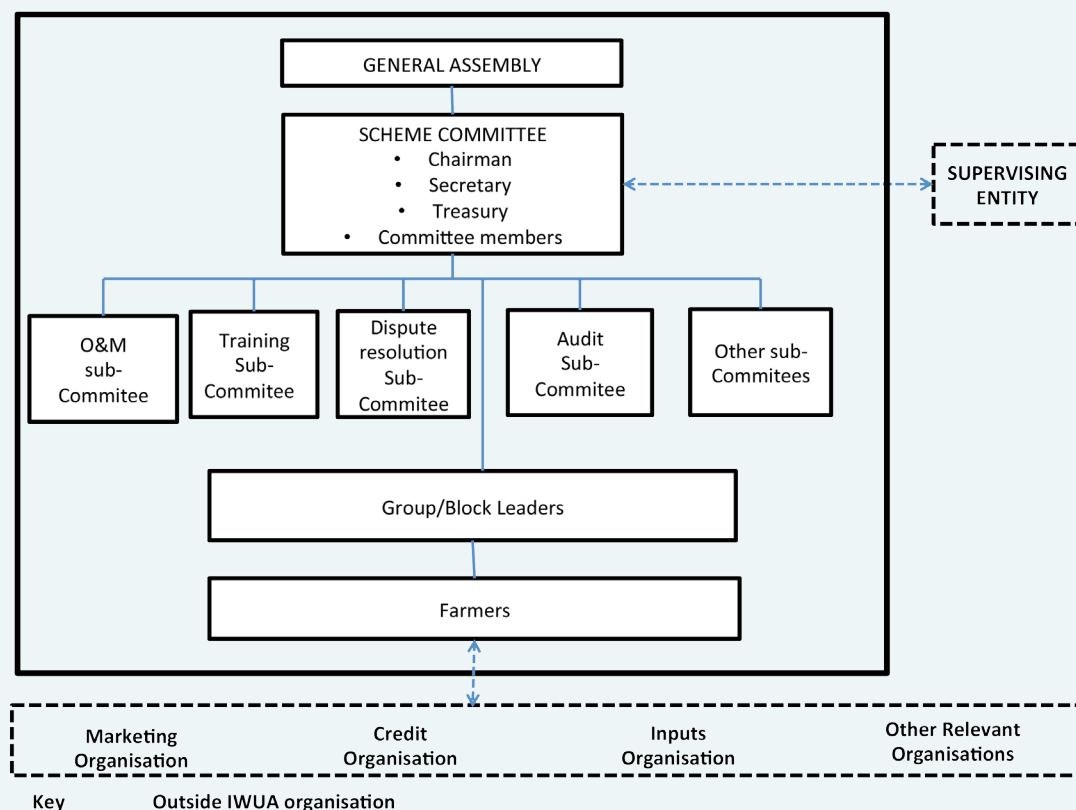


Figure 6.1: IWUA Organizational Structure

d. Conflict Management Within IWUAs

The IWUA constitution and by-laws shall provide for establishment of conflict management at the scheme level. There are many potential causes of disputes in public irrigation schemes meant for settlement and community-based irrigation scheme which shall be resolved within the IWUA or at irrigation scheme level wherever possible. The disputes may be related to irrigation infrastructure development, management, water allocations and delivery, financing, operation and maintenance and other matters.

Disputes arising among IWUA members within a service area of an irrigation scheme should be resolved at the irrigation unit or block level in the first instance. Unresolved disputes from the unit level shall be referred to the dispute resolution committee which comprises of at least three elected members, and other co-opted members as need arise to consider and determine the matter. Where the dispute resolution committee is unable to resolve a dispute, the same shall be referred to a Court of law.

6.2.4 Management of Schemes through an Irrigation Water Service Provider

This model may apply where the responsible management agency of public scheme or community-based scheme subcontracts an irrigation water service provider (IWSP) to carry out O&M activities. An IWSP refers to an entity contracted by the IWUA to operate and maintain major irrigation or drainage infrastructure on their behalf at a fee. Engagement of IWSP is recommended for large scale public, community-based or private irrigation schemes with structures that need specialized management under the circumstances when the scheme owner or authorized management has inadequate organizational capability to efficiently manage or is unable to handle the necessary irrigation system O&M activities.

The conditions, agreements and modalities for provision of services by IWSPs to irrigation schemes shall be undertaken as prescribed in the Irrigation Regulations.

6.2.4 Management of Private Irrigation Schemes

This management model is carried out by the individual farmer or private firm that owns the small scale, medium scale or large-scale irrigation scheme. The owner is responsible for the overall management and may employ technicians, skilled or semi-skilled workers to assist in the irrigation infrastructure operation and maintenance.

6.3 General Practices in Irrigation Scheme Management

6.3.1 On-farm Water Management

The individual farmer or IWUA or other entity managing an irrigation scheme should ensure good on-farm water management under sustainable economic and environmentally sound conditions as prescribed in the Irrigation Act, its related irrigation regulations and other relevant laws. Good on-farm water management entails the use of irrigation



water in a way that provides crops and animals the amount of water they need, enhances productivity and conserves natural resources for the benefit of downstream users and ecosystem services.

Among the best practices considered for good on-farm water management include:

- a. Optimizing water use efficiency based on: Optimizing water use efficiency that is based on: wise use of available good quality water resources; optimal water use and soil moisture conserving technologies; and available capacity for water harvesting and storage
- b. Appropriate enterprise plans and crop calendars that are socio-economically viable for effective and efficient management of the irrigation scheme
- c. Protection of water quality by minimizing pollution from soil erosion and livestock or other enterprise operations
- d. Minimization of conflicts with other water resource users

6.3.2 Irrigation Water Scheduling

The irrigation scheme management should adopt appropriate irrigation water scheduling. This entails determining the correct frequency and duration of watering. Before adopting any irrigation schedule, an assessment of the relevant factors shall be carried out before commissioning of the irrigation scheme or upon change of crop type. The preparation of appropriate irrigation schedules should take into consideration: crop type and stage of growth; soil requirements, soil types, and drainage; prevailing climatic conditions, integrated enterprises and other factors to ensure the irrigation system is operated as designed.

6.3.3 Operation and Maintenance of Irrigation Infrastructure

The irrigation schemes infrastructure should be managed to ensure effective and efficient delivery of irrigation water as per design for optimal production. The scheme management should carry out periodic O&M activities of the irrigation infrastructure particularly the water storage structures, water abstraction from source, conveyance, distribution and on-farm application and drainage components.

The O&M for drainage-based schemes will involve removal of excess water or its retention as the case may be. The irrigation system components for in-field water application shall be continuously assessed to ensure irrigation uniformity and where applicable, carry out routine check for optimum performance.

Scheme Maintenance constitutes a set of activities that are carried out to ensure that the irrigation or drainage system functions optimally as per the design and operation requirements. These maintenance tasks need to be properly planned and executed in accordance to provisions of the O&M manual to avoid any malfunction of the systems. The irrigation scheme management should maintain and upgrade infrastructure to improve

the performance of in-field application systems. In addition, operation and maintenance activities may include periodic review of water use and conducting of water-use inventory to manage and optimize water use.

6.3.4 Use of agro and non-agrochemicals in irrigation schemes

The scheme management shall ensure water users adopt good agricultural practices that include: the use of agro-chemicals permitted under the relevant laws of Kenya; handling and managing agro-chemicals in a way not to contaminate irrigation water, soil or related environment; and storage and disposal non-agrochemicals in a manner to avoid any risks to humans, food safety and the environment.

6.3.5 Capacity building

The scheme management should ensure that farmers and employees are trained on continuous basis to obtain, improve and retain skills and knowledge needed to perform their tasks competently. Specific areas of training should cover the following aspects amongst others:

- a. On-farm water management and irrigation scheduling
- b. Operation and maintenance of irrigation facility and related components
- c. Irrigation agronomy
- d. Statutory requirements in the operation and management of irrigation schemes
- e. Irrigated enterprise planning and resource mobilization
- f. Financial management

6.3.6 Dispute Resolution on Water Resources between Irrigation Scheme Owners

Conflicts arising among irrigation scheme owners and other water users on water resource allocations by WRA and any other justifiable cause shall be lodged at the WRUA level in the first instance. If the issue is not resolved conclusively, the matter may be referred to the relevant Basin Water Resource Committee (BWRC). An appeal may be submitted to the Water Tribunal by unsatisfied parties. The provisions of the Water Act, Water Resources Regulations and other relevant statutes on water resources shall apply in handling conflicts among water users.





Chapter 7: Monitoring, Evaluation and Reporting

The Kenya Constitution (2010) provides the basis for monitoring and evaluation (M&E) to ensure transparency, accountability, and results-based management of programmes, projects and policies. The national and county governments including other state agencies should demonstrate the commitment towards mainstreaming of an effective and efficient M&E system during the implementation of irrigation sector plans, programmes and projects. The purpose of M&E will be to assess what has been achieved, suggest ways to overcome difficulties if any and lay the basis for improved implementation.

Periodic monitoring, evaluation and performance audits in all irrigation schemes shall be carried out for the purposes of: ensuring compliance to the provisions of the Irrigation Act, Irrigation Regulations and other relevant laws; determining and issuing irrigation license and other relevant certifications; ensuring efficient irrigation schemes with good on-farm water management; and encouraging sustained economic productivity through promotion of marketing for irrigated produce.

NIA, County governments, CIDU and any other authorized agency shall carry out periodic monitoring, evaluation and performance audits in all irrigation schemes under its jurisdiction and submit reports to the Cabinet Secretary semi-annually or as may be required.

7.1 Data Collection, Analysis and Reporting

As part of the M&E system, the state department responsible for irrigation will develop and maintain an irrigation and drainage management information system (IDMIS) to support the functions of monitoring and reporting in the irrigation sector. The data collection and analysis at the state department will be rationalized, with specific responsibilities for collection, aggregation, analysis and reporting at both levels of government.

NIA and CIDU will collect and collate data and information in their mandated jurisdictions, which shall be aggregated at the National level using the IDMIS system. The IDMIS system shall serve the following purposes:

- a. Establishment of data and information needs for irrigation sector
- b. Establishment of formats and protocols for geo-referenced data capture, processing and sharing disaggregated data up to the county level
- c. Capture of accurate, reliable, timely and verifiable data and information for the sector
- d. Capture of data on inputs, immediate outcomes and impacts in irrigation development activities
- e. Organize the irrigation and drainage data and information in a structured manner to facilitate accessibility and sharing amongst stakeholders for effective and efficient planning, coordination, monitoring and evaluation and reporting for the sector
- f. Establishment of a decision support platform for policy, management and investment decisions

The State department responsible for Irrigation shall play a key role in coordinating M&E, data collection, analysis and reporting; and coordinate participatory monitoring in a manner that ensures ownership of the M&E reports.

7.2 Data Collection Responsibilities

M&E data collection shall be carried out at three levels; at the national, county and the farmers' levels.



7.2.1 Farmer level

Farmers through their respective IWUAs or individually in the case of private schemes shall have the responsibility to prepare annual reports in the format provided in the Irrigation Regulations and reviewed from time to time. These reports shall be submitted to the respective supervising entity.

7.2.2 County Level

The County shall be responsible for collection and collation of irrigation data for all areas which it is the supervising entity including sub-counties and wards. CIDU shall maintain project databases and regularly update and analyze the information in the domain to provide guidance for management and policy interventions. CIDU shall also be responsible for data entry into the IDMIS system.

7.2.3 National Level

The State department responsible for Irrigation will establish a Monitoring and Evaluation Unit that shall be mandated to coordinate M&E country wide. The key deliverables under the M&E Framework shall include: quantitative and qualitative data collection and storage; indicator development; results analysis and reporting; and dissemination, capacity development and policy coordination.

The Monitoring and Evaluation Unit shall in collaboration with the various supervising entities develop a monitoring and evaluation framework for the irrigation sector. This shall include development and use of selected performance indicators in M&E. The unit shall also be responsible for the administration of the IDMIS. It shall carry out data analysis and reporting on quarterly basis of each fiscal year and produce biannual and annual reports.

7.3 Performance Evaluation

The various supervising entities shall carry out performance evaluation of irrigation schemes as stipulated in the principal regulation. The purpose of performance evaluation of irrigation schemes is to determine the functionality of irrigation schemes and provide critical information for remedial action.

7.4 Monitoring and Evaluation Tools

There are several monitoring and evaluation tools stipulated in the Irrigation Regulations. These include but not limited to:

- a. M&E framework
- b. Register of professionals
- c. Register of irrigation contractors

- d. Register of irrigation water users' association and umbrella associations
- e. Inventory of irrigation areas
- f. Register of water harvesting and storage structures
- g. Scheme performance assessment criteria
- h. Register of irrigation service providers
- i. Register of complaints on irrigation service providers
- j. Scheme annual reports
- k. Sector annual reports
- l. Sector investments register

7.5 Sector Reporting

Each supervising entity in the irrigation development and management will be responsible for preparation of an annual report covering the irrigation areas for which it is the supervising entity. The reporting format shall be in accordance with the monitoring and evaluation framework.

The Monitoring and evaluation unit at the national level shall be responsible for the aggregation of the various reports to form the National Irrigation sector report that shall be presented to the Cabinet secretary who shall in turn present it to Parliament.

7.6 Irrigation and Drainage Management Information System (IDMIS)

The IDMIS system shall be the principal information system for the irrigation sector. The Cabinet Secretary responsible for irrigation shall establish and maintain IDMIS. The system shall incorporate a decision support system to inform sector management and investment decisions, and shall be web based with access by the supervising entities and limited access by other stakeholders. The system shall also have a public platform with aggregated sector reports with free access.



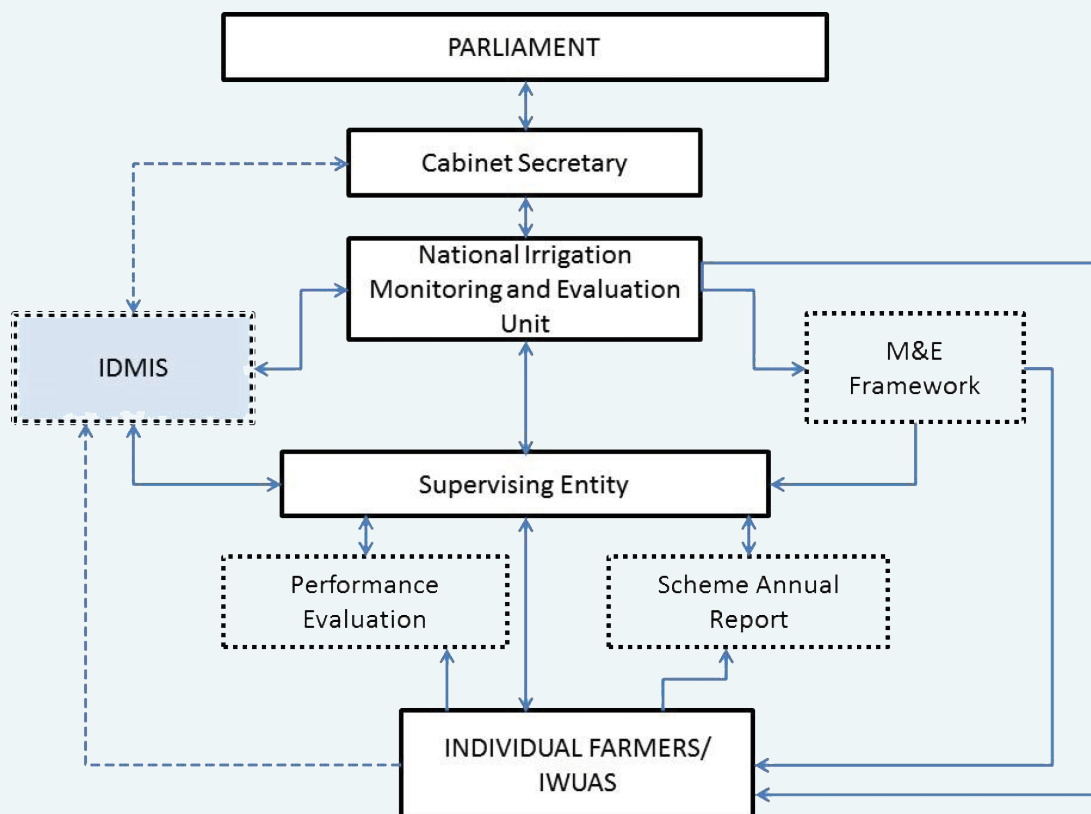


Figure 6.3: Monitoring, Evaluation and Reporting Flow Chart

Annex I: Contents of An Implementation Agreement for Community Based Irrigation Schemes

In the preparation of the agreement the following should be addressed:

1.0 Role of implementation agreement

The implementation agreement is meant to emphasize and inform all the parties concerned on their areas of responsibility in order to have successful irrigation schemes.

The agreement highlights the importance of participatory approach in the implementation and management of irrigation and drainage schemes if their full benefits are to be realized.

2.0 The parties involved

The agreement should specify in detail all the parties involved in the agreement and their physical addresses. It should indicate the principal parties and the witnesses.

3.0 The purpose of the proposed development

The agreement should clearly indicate the objectives of the development and the type of development (new irrigation/drainage or rehabilitation etc).

4.0 The roles of each party

Of most importance in this agreement are the roles each party is to undertake at each point of scheme development. The roles of each party should be as complementary as possible to avoid delays in the development process.

5.0 The commitments of each party

The commitments, in terms of types and extent of the contributions of each party involved should be clearly stipulated in the agreements. The agreement should also identify how non-compliance with the pledged commitment can be sorted out to avoid delay in development.

A sample MoU is attached hereinafter as ANNEX II.



Annex II: Sample Memorandum of Understanding (Agreement) for Community Based Irrigation Scheme Construction

This agreement is made on the _____ day of _____ 20____, between the Project Name here in after referred to as the “**project**” of the first part and Name of IWUA an irrigation farmers association on the second part.

WHEREAS, the purposes of this agreement are to provide for:

1. Construction of Name of Irrigation Scheme which is a small holder community based irrigation scheme for crop production
2. The participation of all the parties to the agreement in the design and implementation of the irrigation scheme
3. Strengthening of the farmers organization for effective operation and maintenance (O&M) of the scheme
4. The strengthening of extension, training and support services to the irrigation scheme

Now it is agreed as follows:

a. The project agrees, on terms of this agreement to:

- i. Arrange for surveys, investigations and design of the scheme as agreed with the farmers
- ii. Purchase the locally unavailable materials necessary for construction of the main conveyance system
- iii. Supervise the construction of the irrigation works to ensure that they adhere to the design specifications and standards
- iv. Prepare an operation and maintenance manual for the irrigation system and train farmers on its use.
- v. Contract out the construction of irrigation infrastructure as detailed in an Annex to this agreement

b. The farmers through their scheme/IWUA, agree, on terms of this agreement to:

- i. Provide all necessary labour, locally available materials and undertake to do all earth works for the main canal conveyance, group feeders and drainage
- ii. Settle disputes over land and allow each other the right of way for water to their plots
- iii. Apply, pay for water permit and other water charges
- iv. Provide storage facilities for materials supplied for construction of the scheme and guard them
- v. Provide leeway on land or working space for required works free. Compensation, if necessary, will be agreed upon and paid by the farmers themselves
- vi. Establish and maintain farmers groups and scheme committee rules and regulations (by-laws) specifying the requirements and the discipline to be observed by all members for the success of the irrigation scheme
- vii. Organize proper water distribution within the irrigation scheme
- viii. Clean, repair and maintain irrigation and drainage systems as required
- ix. Raise funds for hiring local mason to assist in construction under supervision of the project staff
- x. Agree to cost sharing for training and tours
- xi. Make arrangements for storage of scheme equipment and spares

IN WITNESS WHEREOF, the parties hereto, acting through their representatives there unto duly authorized, have caused this agreement to be signed in the respective names, as of the date first above written.

SIGNED BY:

SUB COUNTY IRRIGATION OFFICER _____

SIGNATURE _____



DULY AUTHORIZED FOR AND ON BEHALF OF Name of Supporting Institute

IN THE PRESENCE OF (Address) _____

NAME _____

SIGNATURE _____

SIGNED BY THE CHAIRMAN

NAME _____

SIGNATURE _____

SECRETARY NAME _____

SIGNATURE _____

TREASURER NAME _____

SIGNATURE _____

Duly authorized for and on behalf of the IWUA

Annex III: Standardized Way Leave Agreement

WAYLEAVE FORM

This Agreement dated: _____ is made between

1. PARTIES:

1.1 _____ Irrigation Water Users Association, Registered
No. _____

AND

1.2 _____ the **Owner** means [COMPLETE
NAME AND ADDRESS details]

being the freehold owner of the Land/Premises, Title No. _____

Tel. No. _____

I have no objection for the passage of the Water Pipe/ Furrow through my land for the
implementation and operation of _____ Irrigation Scheme

Under _____ project both now and in the future.

Ward: _____ Sub County _____

County _____

SIGNED by the OWNER OF LAND _____

Dated _____

In the presence of (WITNESS) _____
(Witness Signature)

Name of Witness _____ (BLOCK CAPITALS)

Address _____

SIGNED for Irrigation Water Users Association

Dated _____

In the presence of (WITNESS) _____
(Witness Signature)

Name of Witness _____ (BLOCK CAPITALS)

Address _____





FOR ANY ENQUIRIES CONTACT

The Principal Secretary
Ministry of Water, Sanitation and Irrigation
P.O. Box 49720-0100
NAIROBI