



**STRENGTHENING PRIVATE SECTOR ENGAGEMENTS IN THE
MANAGEMENT OF IRRIGATION SCHEMES IN UGANDA AND
INTRODUCING THE COST RECOVERY MECHANISM**

Dr. Gamal Elkassar

Assistant Professor; WMRI, National Water Research Center NWRC- MWRI-Egypt

Water Management and Irrigation Advisor; Ministry of Water and Environment MWE-Uganda

ABSTRACT

Prior to the 1990s, all the irrigation schemes in Uganda were managed by Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). With the policy reform and restructuring of MAAIF 1998 in which schemes and government farms were de-linked from MAAIF to the Ministry of Water and Environment MWE. MAAIF continued to provide support to the farmers by assigning core technical staff to the schemes and this remains the current set-up. Farmers were encouraged to form cooperatives/associations as a pillar for day-to-day management of the irrigation schemes. The current management system presents governance challenges to achieving an effective and functional organization structure/system for the irrigation schemes. There are challenges of cost recovery for operation and maintenance with lack of clarity on institutional functions/ roles/ relationships with respect to regulation of the water resource.

In various countries, the new approach based on economic incentives and participatory decision making is being used to the people who need them. This technical research describes some of these promising initiatives and examines the general principles that underlie them in the context of water/irrigation projects in Uganda. This research looks at the guidance of the World Bank and other agencies can encourage efforts to meet the challenge of providing environmentally sustainable water services.

The overall objective is to support the Ministry of Water and Environment (MWE) establish the institutional structures and systems available at the irrigation schemes and support the implementation of the proposed institutional structures through participatory farmer based organizations in order to foster commercially viable irrigation services for sustainable management and regulation of the schemes. The overall purpose of this technical approach is to

provide the broad direction and guidance to the entire target Capacity Development CD process, and ensuring the implementation of the new approach of private sector participation and enforcement of Public-Private-Partnership PPP system, in the meantime, introducing the proposed Cost-Recovery Mechanism and related by-law guidelines. This idea is to pursue the achievement of the successful transformation for the three commissioned Irrigation Schemes of Agoro, Mubuku and Doho. These are focusing on: institutional, policy and projects' frameworks and strategy operationalization; as well as the implementation and management of the CD Strategy itself.

This assessment study is to provide affordable and sustainable low cost methods of water use by applying the designed irrigation scheduling, operation and maintenance and scheme management. The provided mechanism within this technical study will ensure securing the required Capacity Development for the sustainability of the established irrigation schemes.

Such data is expected to make commitment to promoting the economic activities of many elderly people in a way of preventing the fall accident as well as ensuring safe and comfortable walking.

Key Words: Irrigation schemes management, capacity building, private sector, cost-recovery, water economic.

1. Introduction

Background

It is well known that effective community mobilization is important to ensure adequate and effective participation of the beneficiaries in the development of the irrigation schemes, and proper legally constituted organization is essential for beneficiary operation and management of the schemes. Stakeholder's participation is mandatory and capacity building of beneficiary's organizations is an essential element to prepare the beneficiaries for self-operation and management of the schemes to ensure successful cost-recovery performance and scheme's sustainability.

It is in this context that the government should re-define/re-structure and establish effective organizational structures and systems which will ensure efficient irrigation water use and management, operation & maintenance of scheme facilities, financial management and cost recovery enforcement. Furthermore measures for supervision, monitoring and regulation of water resource use, rights, allocation and conflict management should be defined and instituted water service regulation mechanism. It is also important that such structures differentiate the functions, roles, responsibilities and interests of the various stakeholders/institutions for better and improved agriculture productivity and sustainable, equitable water resource management. Social and Institutional Dimensions of Irrigation Schemes: Irrigation literature shows that projects that pay equal attention to infrastructure (hard components) as well as the social and institutional systems (soft components) of water user organization and agricultural production have yielded better outcomes, Neeraj N.J (1998).

General

The provision of water services is a key to the achievement of the United Nations Millennium Development Goals (MDGs). Quick intervention is therefore necessary to register substantial progress in the water sub-sector in Uganda. The Ministry of Water and Environment (MWE) should workout modalities of finance water provision under Public Private Partnership (PPP) arrangement. Although water scarcity is growing in different parts in the world, water is not treated as an economic good, resulting in no incentive to conserve or safe guard its quality, leading to over use or degradation. The following approaches should be considered:

- Water has an economic value in all its competing uses and should be recognized as an economic good.
- Water development and management should be based on a participatory approach involving users, planners, and policy makers at all levels, with decisions taken at the lowest appropriate level.

The overall objective is to develop an institutional environment suitable for implementation of a National Water Resources Plan based on an integrated water management approach. In this context more specific objectives is to create a participatory approach in development and management of the water resources, based on stakeholder's participation, decentralization and privatization.

Forms of private-Sector Engagements

Participatory Irrigation Management (PIM): Participatory irrigation management involves irrigation users in all aspects and at all levels of irrigation management (Abu-Zalmeh, 1999). These aspects include planning, design, construction, operation and maintenance, financing, decision rules and the monitoring and evaluation of the irrigation system. The levels include the primary, secondary and tertiary. PIM usually refers to the level, mode, or intensity of user participation that would increase farmer responsibility and authority in management process. PIM processes build two forms of capital: productive capital (better maintained irrigation infrastructure) and social capital (Groenfeldt (2003) and emphasizes participation in organization and management (O&M) particularly in the recovery service fees on behalf of the irrigation agency (Abu-Zalmeh, 1999). Water User Associations are one form of PIM.

Cooperative Model: This is the used model nowadays in Uganda; this is where the members join an association on voluntary basis with the objective of creating wealth on a voluntary basis. It is essentially run as a business. Water charges are on a cost recovery basis allowing the farmers to make a profit on the farm. The disadvantages of a cooperative/community structure, is that the structure is unattractive to outside investors, limiting the ability of the scheme to raise

capital for future development. In addition, community irrigation schemes are sometimes criticized for having a lack of governance and management, or governance and management not of the same quality that would exist if there were private investors (Goodman 2015).

Public-Private Partnerships (PPP) Model: This involves finding a viable ‘third party’ between farmers and governments. It could be a contracting firm or WUA turned into a private corporation, a farmers’ company, or a nongovernment. PPPs could also be useful in mobilizing financing, implementing investment programs, and improving the water delivery service. In the private sector, such arrangements include extension services such as technology transfer and advisory work on farming and irrigation best practices. Whatever the model, it is important to note that;

- Irrigation schemes offer a mixture of opportunities and interests, both socio-political i.e. public interest and commercial-profit interests which are largely private to individuals or groups of individuals and this calls for consideration of public and private interests, Elkassar (2015).

Considering the need for sustainable management of structures and systems, necessitates a business model as this ensures delivery benefits/rewards to the most efficient members and allocate costs depending on quantified inputs used by those members, while maintenance of common infrastructure for access to water for production is guaranteed

- The basic tenet that sustainable institutional and management structures have arrangements that are acceptable, offer potential opportunity to all members to participate, and deliver benefits to the members that subscribe to the arrangement, Elkassar (2015).

The following capacity areas should be conducted;

- Stakeholder engagement and communication
- Technical capacity needs (irrigation water management, operations and maintenance, rice value chain management skills, Utilization of the provided CBM/FFS extension model,
- Financial management (business planning, budgeting for the scheme,
- Marketing and Conflict management skills
- Operations of the cooperative, support supervision and coordination skills
- Monitoring, evaluation and knowledge management and Reporting.
 - This research should guide to develop a participatory monitoring and evaluation system that brings on board water users and other stakeholders to monitor the governance performance of the irrigation scheme. Given that the project has stakeholders at different levels and activity implementation at different levels
- Clear stakeholder participation provisions and accountability mechanisms
- Particularly the legal assessment will focus on;
 - Analyzing the legality of the cooperatives;
 - The existence and adequacy and inadequacy of the constitution and any other by- laws
 - Assessing the understanding of the constitution and the by-laws of the cooperative
 - Assessing the appropriateness of the enforcement of the constitution and the by-laws.

Adaptation of laws

Measures that do not rely on institutional or legal changes are preferred on the short term.

This is based on the idea that certain institutional and legal changes can take a lot of time before they can come into force. By taking effective short term actions some time is available to work on the process of legal changes that are required to make the identified measures possible. The present laws and regulations are not developed with the proposed mix of measures in mind.

The present policy requires a law that stimulates improvements and enables the relevant ministries to manage the process. The change of laws is therefore an essential ingredient of the institutional measures related to the National Water Master Plan. In such a changing institutional environment the role and functions of the organizations at different levels should be clearly described. This includes the creation of effective co-ordination mechanisms between the different agencies and the development of financial structures that enable these agencies to perform their task efficiently.

2. Research Statement

The current irrigation schemes in Uganda are established, overseen and managed under a broad range of policies, laws, regulations and agencies. The main problem that faces the operation of such small, medium and large scale irrigating schemes is the lack of its operation and management responsibilities that ensure its sustainability.

Economic instruments:

Using economic instruments is a powerful tool for proper utilization of water resources.

Some implemented and suggested economic instruments include:

1. Encouraging private sector participation of in the environmental management through financial packages for industrial compliance.
2. Adopting the polluter pay principle.
3. Introducing incentives and tax exemption for promoting the adoption of clean technologies.

To support the socio-economic development of Uganda on the basis of sustainable resource use, while protecting and restoring the natural environment; the supply of water for irrigation based on a participatory approach and cost-recovery of operation and maintenance. One of the principles adopted by the government is that water is a common good and that it cannot be owned by anybody. The basic human and ecological needs should always be satisfied.

The main tasks of the Technical Advisor TA-MWE (The Researcher) were to build mechanism that insure a sustainability benefits in these irrigation schemes; there is a need to ensure

schemes management strategy to the users and agree for the needed transition period for this purpose.

3. Water Management and Participatory Approach

General

Water use for irrigation is among the technical options for enhancement of Water for Production in Uganda as set out in the Water Sector Strategic Investment Plan (WSSIP) 2009-2035. However, there has been limited utilization of this option. The supplementary irrigation activities is a recent intervention practices in Uganda, so many constraints could be expected when running such activities in the country. This new strategy will efficiently and effectively supply water to meet the competing demands all year round, World Bank (2007).

Various reference documents indicate that Water for Production WfP refers to development and utilization of water resources for productive use in crop irrigation, livestock, aquaculture, rural industries, wildlife, recreation, hydropower generation, transport, commercial uses, and security. The planned irrigation activities are a shared responsibility between the MWE and other relevant line ministries. The MWE is responsible for “off farm” activities whilst the MAAIF is responsible for “on-farm” activities in respect of irrigation, livestock and aquaculture.

The need for water distribution scheduling under Contentious Flow Theory

The MWE should introduce the required water management mechanism in the three commissioned irrigation schemes; one of the main outputs of this research is to present these results and findings after testing with the operational communities in each scheme. Good irrigation water management practice requires that the water be supplied in timely, equitable and efficient manner. To achieve this, water must be distributed equitably proportional to the land area. The water stream size should be optimum for easy handling by farmers and to minimize losses. Water delivery to the field should be in fixed time, and distribution should be easy without much control by gates. It is proposed that the design of canal system will be based on a rotational water supply. The basic concept of the system is a simple operation considering efficient utilization of water resources, and economic in the system through standardization of the irrigation layout and structures.

Irrigation time can be round the clock, day time only and a combination of day time and part of the night time. Day time irrigation is convenient and more efficient. However, lack of regulation on the water resources makes this option good for development of limited area. Thus depending on the water requirement, night storage is required to develop more area. However, large space it takes and problems in aggravating the potential water logging and cost are the constraints with night storages.

4. Rational for the Paper

The target institutional model is designed taking into consideration some pillars; inline with the *over arching guiding principles*. The main target is to ensure efficient and sustainable

management of the irrigation schemes. The expected outputs of the given operational strategy can be presented in the following issues; they are essential for a successful and sustainable irrigation schemes:

- Sustaining water management to improve water use efficiency and project's economic components.
- Proper engagement of private sector and private water organizations in the required System Management Transfer SMT and the proposed Operation and Maintenance mechanism ;
- Introduce the target Cost-recovery Mechanism to ensure that water is an economic good for the sustainability of the irrigation and other water facilities' (the proposed by-laws were drafted with coordination with all stakeholders and decision makers in MWE).
- Provide support to farmers' organization for mobilizing their participation in implementation, monitoring and evaluating progress.
- Provide technical support and training to the members and leaders of Cooperative Societies to take over the responsibility of future operation& maintenance and management of their schemes using the introduced irrigation scheduling techniques;
- Establish system for water conflict resolutions.

5. Methodology and Logical Framework

Following an extensive literature review, data was collected through Focus Group Discussions (FGDs), and general meetings. The final event in each scheme was the strategy workshop attended by all key sector stakeholders, where the outcomes from the research process (mainly the designed irrigation scheduling) was presented to validate the findings as well as to solicit additional input/clarification. Inputs from the workshops have been incorporated in the final research findings.

Anticipated Challenges

Challenges	Mitigation
1. Un certainty of full ownership and sustainability of the scheme	Increased engagement with the beneficiaries by the Ministry, District and sub county leadership to assure the farmer that irrigation schemes are a public good and rehabilitations are intended to fully benefit the farmers.
2. Large differences in the size of landholdings may reduce cooperation in managing the scheme.	Possibility of inducing water user fees based on land size holding
3. Introducing FFS purely for irrigation management without introducing rice value	More concrete recommendation will be developed after the situational analysis and

chain learning may hamper sustaining interest among farmers to participate in Farmers Field Schools FFS or the Water Society Cooperation WSC.

understanding the operation of FFS/WSC in irrigation schemes

Factors to be recovered in the introduced study:

1. The weak legal waterfront and regulatory framework of institutional and management organizational structures is a negative factors for compliance and accountable governance.
2. There is unclear ownership arrangements for land, hydraulic works and irrigation infrastructure
3. Absence of water resource regulation, cost recovery mechanism, private sector participation, water protection and conflict management measures.
4. The schemes do not have clear and appropriate institutional management structures whether participatory community-based, commercial oriented approach, private or public sector management driven or combinations of any of these. This has led to low effectiveness, unclear linkages, inadequate accountability and reporting.
5. Lack of functional analysis of the management structure for the irrigation schemes meant that inadequate skills, capacity and poor facilitation of scheme staff became the standard leading to low motivation and performance. This disconnect was responsible for poor record keeping and information management.

The above and many more challenges have hindered scheme management to demonstrate the ability to effectively supervise, operate and maintain and deliver efficient irrigation water services; and hampered proper regulation of water resource use and distribution.

The implementation tools of this new initiative mechanism will be considered:

1. Provide training and assistance to the operational staff and cooperative societies to establish sound accounting systems including all financial and cost-recovery mechanism, related bye-law aspects;
2. Assess staff training needs; design and develop training programmes, and assist in preparation of training material and field manuals on such topics as survey techniques; communications skills and social, organization and management techniques;
3. Provide on-the job training to selected district staff to enable them takeover support to the WUAs.
4. Set up a programme to monitor the performance of cooperative societies and the management of irrigation schemes.

6. Irrigation Schemes Under Assessments and the Designed Irrigation Scheduling

General

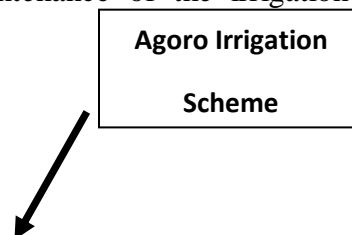
The Ministry of Water and Environment MWE is responsible for development and establishment of management structures at the irrigation schemes. During the last period the MWE managed and succeeded to accomplish/implement/rehabilitate the three main new irrigation projects in Doho, Mubuku and Agoro Schemes. The management transfer of such schemes and its operation in proper way and securing the functioning of the implemented water infrastructures also the maintenances strategy should be reviewed to ensure sustainability.

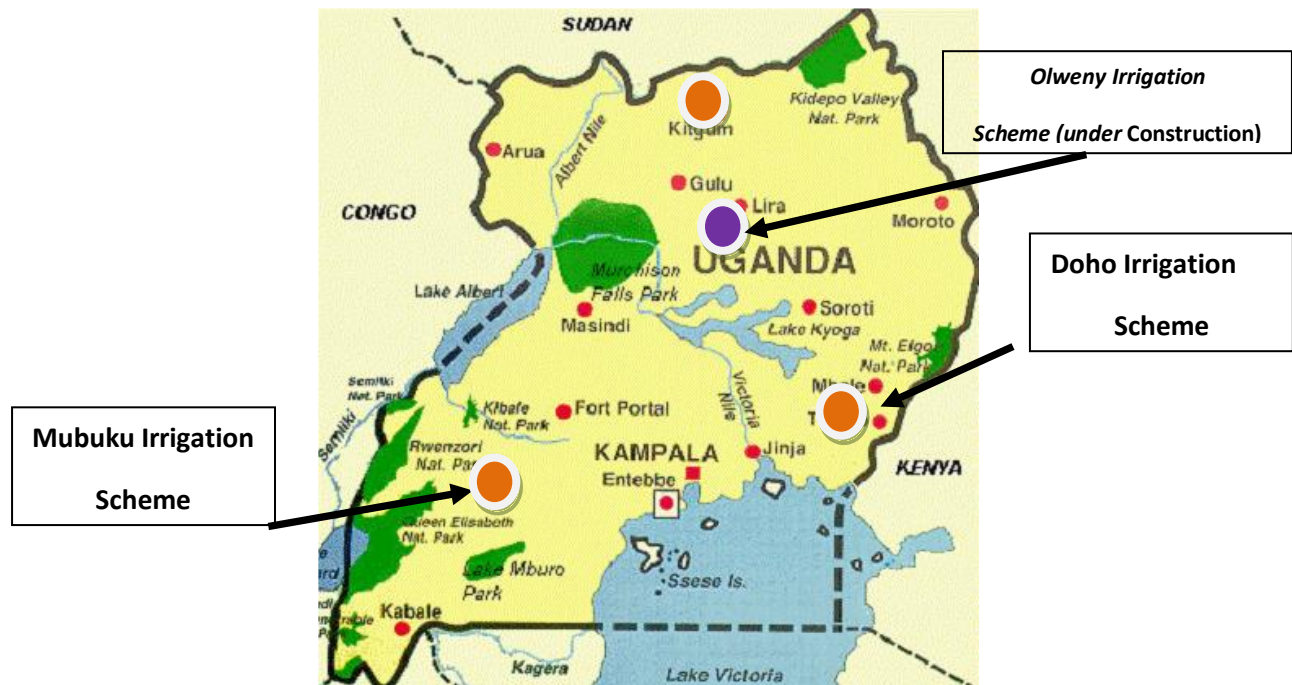
Designed Irrigation Scheduling Operational Systems

When there is already a form of irrigation in place still it is important that the farmer knows how much he/she has to irrigate and how often. In most cases the water sources are scares and the farmer should make use of the water in an optimum way. Over irrigation is a waste of water, time and energy, but under irrigation will reduce yield. For farmers it is often difficult to find the right water balance and designing of such irrigation scheduling is needed.

The demands for irrigation water in a scheme are not constant during the irrigation season since they are largely affected by the amount of rainfall and by the water requirement of crops growing in the scheme. At the beginning of the season large amounts of water may be needed for land preparation, followed by a period of low water demand during the initial growth of the crop. As the crop develops and reaches full growth, water requirements will increase. Finally the demand decreases as the crop is maturing and ready for harvesting.

The continuous flow theory were used to design the required irrigation scheduling in the three commissioned irrigation schemes in Agoro, Doho and Mubuku, where water will be available all the time in the main canal systems and starting to irrigate by the far end part of the scheme, so farmers will be satisfying for the results and ensure no conflicts also to minimize operational woks to the water structures. Operation and maintenance of the irrigation scheme is the responsibility of the formed Cooperative Societies.





Assumptions for operation of Irrigation Scheduling:

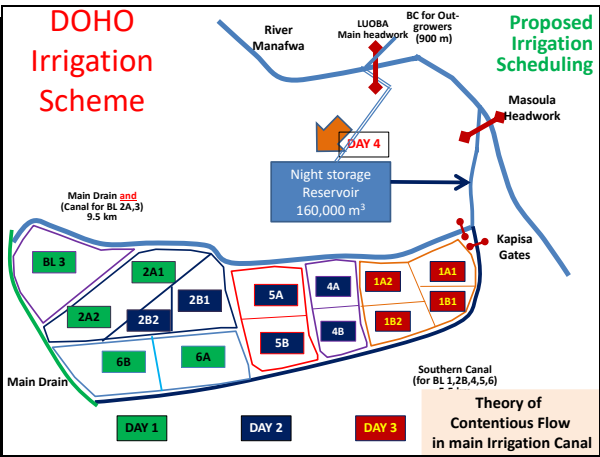
- The Scheme is cultivated with Rice
- The required supplementary irrigation water demand for Rice is about 1 L/s/acre
- The daily operational hours for irrigation is 12 hours (starting 7 am and end 7 pm)
- Maximum duration for water applications/rotations is 3 days for the same block
- The water demands in the main River will be available according to the operational rules of the two weirs
- The amount of flow DS the headwork will be transferred into level stage of water for easy operation by users using the prepared “rating curve” for the main water source.
- These draft irrigation scheduling tables should be reviewed with the society group Leaders and also get the advice from MAAIF technical staff
- Other irrigation scheduling could be needed at on-farm level inside block to distribute water between farmers/valves.

Doho Irrigation Scheme

The Doho scheme is run under Doho Rice Scheme Farmers’ Association (DORSEFA), a company formally registered on 29/05/2000 under the Uganda Registration Services Bureau (URSB), with a membership of 40 individuals. The main source of water is River Manafwa draining from Mount Elgon. The net area is estimated to be 609 hectare. However, the total area to be cultivated by this scheme is 971 hectares.

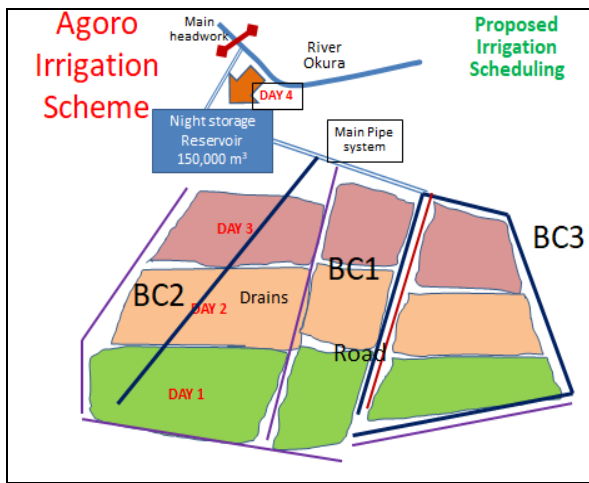
DOHO IRRIGATION SCHEME IRRIGATION SCHEDULEING

SUPPLY CANAL	BLOCK	BLOCK	AREA (HA)	LATERAL CANAL	CANAL LENGTH (M)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
SOUTHERN CANAL	BL 1	R/1A-1	60.3	LC-1A-1	594							
		R/1B-1	60.8	LC-1B-1	725							
		R/1A-2	61.4	LC-1A-2	1100							
	BL 4	R/1B-2	61.3	LC-1B-2	549.3							
		R/4A	62.7	LC-4A	840							
		R/4B	63.0	LC-4B	1653							
	BL 5	R/5A	62.6	LC-5A	892.7							
		R/5B	62.6	LC-5B	1711.7							
	BL 2 B	R/2B-1	65.5	LC-2B-1	1709							
		R/2B-2	65.9	LC-2B-2	1500							
BL 6	R/6A	64.9	LC-6A	836								
	R/6B	65.1	LC-6B	832								
	R/2A-1	65.7	LC-2A-1	1060								
MAIN DRAIN	BL 2A	R/2A-2	65.6	LC-2A-2	2320							
		R/3A	65.2	LC-3A	899							
	BL 3	R/3B	65.1	LC-3B	1677							
		R/3C	65.9	LC-3C	2028							
	Total		1053			427	316	310		427	316	310



Agoro Irrigation Scheme

The scheme is located in Lamwo District. The scheme started as a community initiative in 1966 mainly involved in horticulture (fruits and vegetables). The Main Water Sources for Agoro Irrigation Scheme is River Okura; the Gross Area about 675 hectares and the Net Cultivated area about 613 hectares. The scheme members have an informal but fairly functional arrangement, which they are desirous of formalizing but do not have a clear view of which workable model to adopt. The farmers and leaders also proposed a production committee to guide on enterprise selection and other production related elements.



Proposed Irrigation Scheduling- AGORO

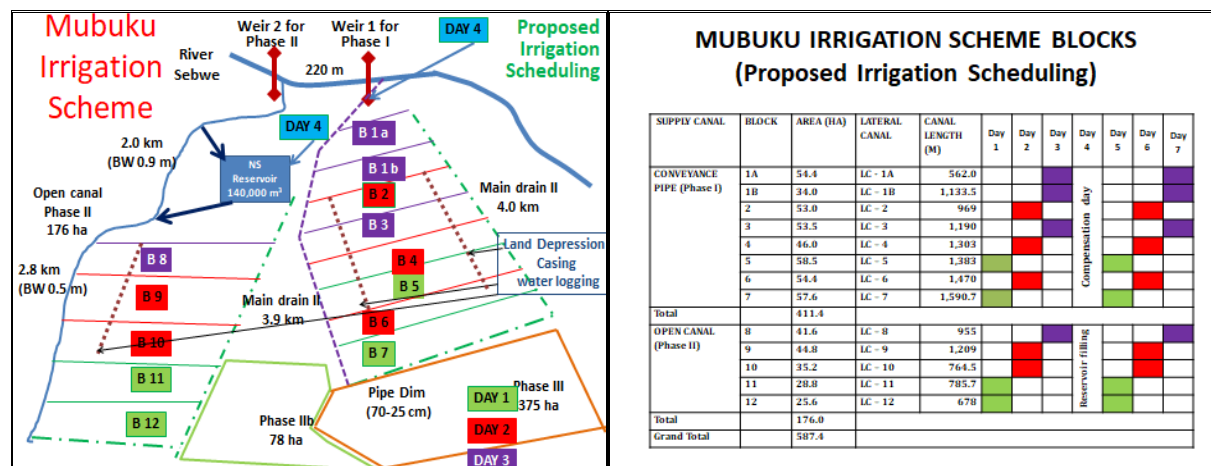
BRANCH CANAL	SUB. CANAL	TERTIARY CANAL	PRODS	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
BC 1 (Reservoir)	R/1A	R/1A-1	60.3							
		R/1B-1	60.8							
		R/1A-2	61.4							
BC 2 (Reservoir)	R/2A	R/2A-1	65.7							
		R/2A-2	65.6							
		R/3A	65.2							
BC 3 (Reservoir)	R/3B	R/3B-1	65.1							
		R/3B-2	65.9							
		R/3C	65.9							

Mubukuirrigation scheme

The scheme is located in Kasese district in the western part of Uganda. It is about 430 km from Kampala and about 5 km east of Kasese. River Sebwe is the main source of irrigation water, while riverMubuku is about 2 km far from River Sebwe.

The scheme was intended for resettlement of farmers from other areas.Mubuku is relatively unique to the other two schemes. Established by Act of Parliament, it was designed as a multi-

purpose resettlement scheme under the Ministry of Agriculture Animal Industry and Fisheries MAAIF. It is not clear from the field consultations what institution holds the function of managing agent, but following decentralization, this role seems to have been assumed by the district local government.



The required field training for testing the designed irrigation scheduling in the three schemes were accomplished successfully with the farmer's cooperatives. The role of Farmer's Water Society Cooperative is essential to operate the designed Irrigation Scheduling to ensure water Equity/Right between its farmers.

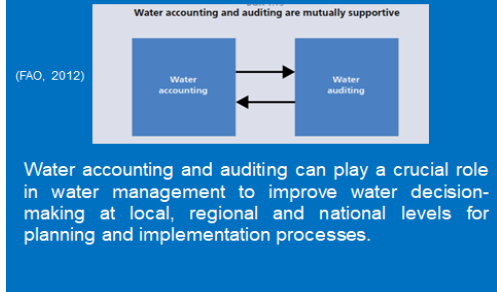


7. The Need to Apply Water Accounting and Auditing in Uganda

As stated in the FAO Studies for water accounting and water auditing, it is very important to apply such strategy for the planned programme for Industrial water needs at regional levels in Uganda. Water accounting provides a sound scientific basis for evidence-informed strategy development, operational decision-making and targeted communication or awareness raising programmes (FAO, 2012). In the meantime, water auditing goes one step further than water accounting by placing trends in water supply, demand, accessibility and use in the broader context of governance, institutions and legislation for water specified domains.

Water Accounting Includes:

- Physical availability of water stocks and flows in time and space;
- Balance between water supply, demand and access;
- Physical capacity and condition of water-related infrastructure;
- Levels of water security of different users and uses;
- Frequency of droughts, floods and interruptions in the delivery of water service;
- Functionality of policies and programmes aimed at regulating demand improving supply.



Water auditing Includes:

- Stakeholder roles, responsibilities and inter-relationships at different levels;
- Governance systems i.e. how decisions are made, where power resides and how power is mediated;
- Political, social and environmental concerns priority issues;
- Levels of public and private expenditure e.g. on operation and maintenance;
- Functionality of formal and customary laws;
- Underlying reasons for “lack of political will” to promote and implement change.

Water Accounting and Auditing Combination

Although water accounting can be, and often is, carried out in isolation from water auditing, the view taken in this guide is that water accounting and auditing are best designed and implemented as mutually-supportive processes. There are practical reasons for combined water accounting and auditing.

For example, there is higher probability of identifying the underlying causes of water-related problems and viable opportunities for addressing problems; a more fundamental reason, however, is that water accounting is more likely to prompt change if it is carried out in conjunction with water auditing. A lesson from water sector reform programmes is that changes often fail or take decades to achieve their goals.

Water auditing without water accounting is even more risky than water accounting without water auditing because it can result in change being promoted that, for biophysical reasons, has little chance of delivering benefits and, in some circumstances, may even make things worse for some water users or uses.

Characteristics of a good scenario

Scenarios that have potential to improve planning process have certain characteristics, which include:

- Scenarios are “owned” by the stakeholders and the narratives have a local flavor in the three irrigation schemes under this research.
- Scenarios are equally plausible and build upon existing information and knowledge.
- In the context of a planning process, results arising from scenario building are expected to challenge and inspire people to depart from “business as usual” policies.

8. Operational Strategy for the proposed PPP

Irrigation schemes offer a mixture of opportunities and interests, both socio-political i.e. public interest and commercial-profit interests which are largely private to individuals or groups of individuals either as households, companies or other institutional mode as acceptable to the respective groups. From this context therefore, whatever management model to be adopted, a combination of public and private interests must be the key focal point.

The fundamental management elements to be considered in the criteria are;

- Clarity of Institutional Mandates and introducing the new concept of Public-Private Partnership PPP;
- Ease of regulation & applying the cost-recovery system for the implemented water/irrigation projects;
- Effective technical support implementation/utilization,
- Capability for sustainable operation and maintenance
- Robust scheme level governance and financial sustainability
- Business growth and market expansion
- Increased production and productivity
- To establish capacity building needs and development; and
- To establish coordination, monitoring and Evaluation mechanisms of Water for Agricultural Production.

9. Target Private Sector Participation and Capacity Development Mechanism

Stakeholder's participation is mandatory, and formation of, and capacity building of beneficiaries organizations is an essential element to prepare the beneficiaries for self-operation and management of the schemes. This training program is to support formation of the required institutional and capacity building to ensure good performance of water management and the operation of water infrastructures.

The main key issues for enhancing the target capacity building for the existing water management and irrigation programs to ensure its successful operation and sustainability could be summarized as follows:

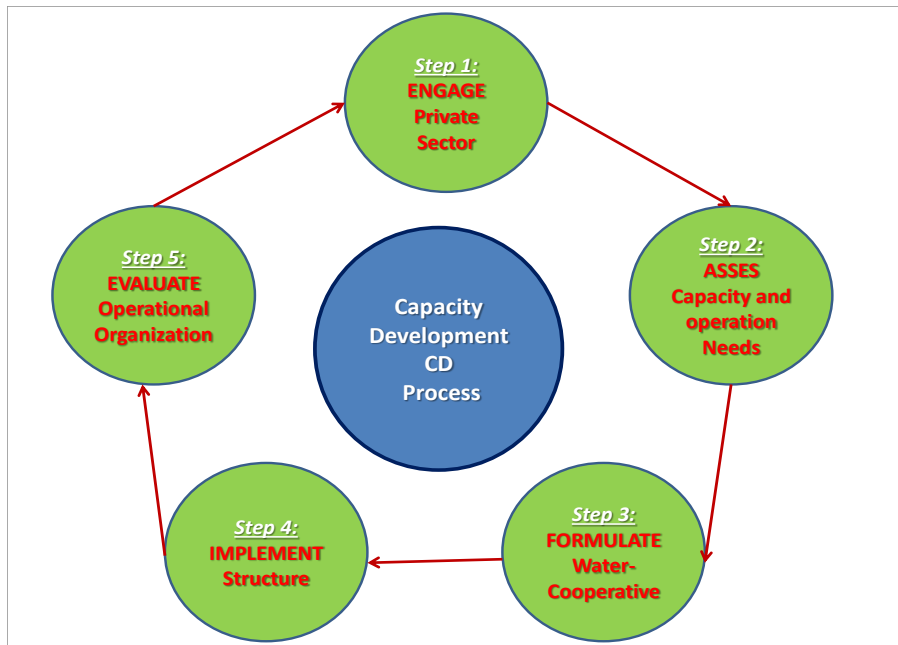
- Demonstrations and awareness raising;
- Drafting the institutional capacity building for scheme’s responsibilities and management then present the results for beneficiaries and different stakeholders in the introduced training assessments in the scheme for final adoption and approval.

As main findings, various stakeholders should play roles in management of the irrigation schemes, including farmers, farmers' groups, local government, central government and other actors. Management systems in place vary from scheme to scheme, depending on factors such as level of development of infrastructure, level of organization of farmers, and extent of government involvement in the scheme. Consultations showed that:

- Mubuku has clearly defined management arrangements, with a tenancy framework administered by MAAIF, a farmers' cooperative to which all farmers belong and operation and maintenance arrangements to which all members of the cooperative contribute.
- Doho has a central government staff team administering the scheme and overseeing infrastructure, and a farmers' 'cooperative' overseeing operation and maintenance. However, the status of the farmers' cooperative – as a limited liability company – is untenable and may need to be reviewed by the farmers.
- Agoro has no central government presence in its management structures and is in the early stages of mobilizing farmers to register as an association. However, it has an executive committee in place to mobilize farmers for operation and maintenance of infrastructure, training, marketing and other activities. Agoro also benefits from support of NGOs both in on-farm and other social development activities.

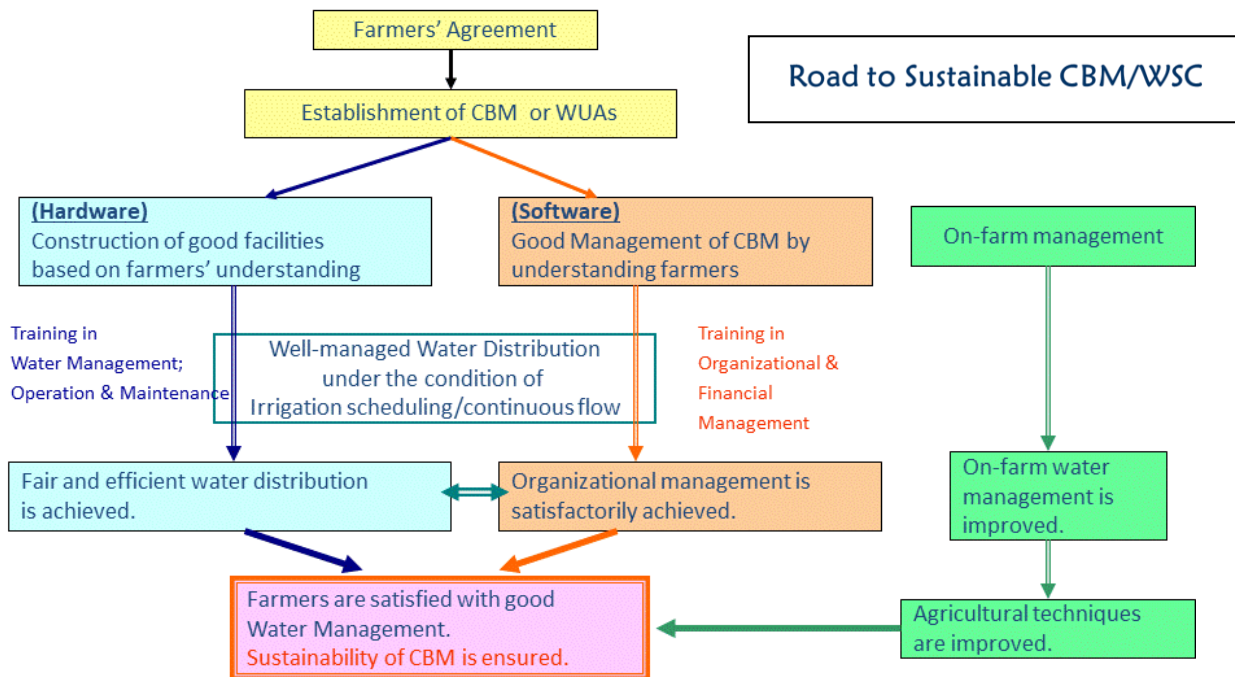
Consultations showed that all the schemes need significant investment in strengthening of on-scheme management structures to enable farmers to organize as associations or cooperatives to sustainably manage the rehabilitated infrastructure and organize themselves to improve production, marketing and value addition.

The following Figure and operational diagram present the cyclical overall Capacity Development CD Process Model, which will be a technically useful benchmark/point of reference in guiding the entire cyclical planning, implementation and Monitoring & Evaluation process, as recommended for this irrigation scheme.



The 5 Steps: Capacity Development Process Model for the Irrigation Schemes

The success of the planned Capacity Development for the scheme require a strong sense of ownership, collective responsibility, partnership and commitment (including readiness to commit, or contribute resources), among all participating stakeholder institutions/entities; as well as a strong sense of readiness and determination to succeed amongst all stakeholders. The following diagram illustrates the suggested road map to ensure operation of the formed Capacity Building Management (CBM) system or the Water Social Cooperative (WSC) for sustainable scheme's management.



The following matrix presents the suggested **operational and logical framework** with the expected results for proper Capacity Development and schemes sustainability; these results came as outputs of the field investigated assessments for the three schemes. These assignments should be implemented and monitored by the established/re-designed management cooperative society for each scheme.

Key Activities	Verifiable Indicators and its Activities	Expected Results
1. Stakeholders Participation and Responsibilities	1.1 Assessment for formation of required Water Society Groups where needed 1.2 Strengthen the existing Society Groups for its responsibilities and communication requirements 1.3 Carry out a baseline survey on Water Management systems and irrigation structures 1.4 Improve knowledge and understanding of irrigation improvement interventions 1.5 Preparing the Participatory M&E data-	Efficient and effective Water Management and operation of irrigation schemes

	sheets	
2. Training and Capacity Building Strengthening	<p>2.1 Develop and facilitate implementation of training program in irrigation water management</p> <p>2.2 Identify, evaluate and promote innovative approaches to farmer training</p> <p>2.3 Formation of scheme operational platforms</p> <p>2.4 Organization of proposed Farmer Field School and promotion of farmer exchange visits between different stakeholders</p>	Innovative approaches to farmer training evaluated and promoted
3. Building communications with different Private-Sector and stakeholders	<p>3.1 Establish technical and administrative operational system for the scheme</p> <p>3.2 Promotion of the working farmers' organizations and valuing addition/introduced technologies</p> <p>3.3 Develop capacity of users for system enterprising</p> <p>3.4 Scale up the use of water harvesting technologies either in domestic or supplementary irrigation needs</p>	Improving the value chain of key developed water infrastructures
4. Develop Community Based Monitoring and Evaluation system mechanism	<p>4.1 Develop Management Information System MIS and relation database on Agricultural Water Management</p> <p>4.2 Project Management, supervision Monitoring and Evaluation at all operational levels</p>	Establish a Motoring and Evaluation operational system for the scheme

10. Designed Cost-Recovery Mechanism

General

The purpose of technical paragraph is to introduce principles and mechanisms for improving recovery of the costs of irrigation and use of water in different Water for Production WFP Facilities in Uganda.

The main concept is to allocate the best Cost-Recovery, not a Water-Pricing; it should be the operative term throughout the technical note. For a variety of reasons, related mainly to popular cultural values, the GOU is reluctant to assign an economic value to water!

Recovery of the costs of irrigation investment, operation, and maintenance has been contentious issues for many decades. The low charges for irrigation water are questioned, as well as, the small percentage of farmers who actually pay the charges. In some projects, fee collection rates are near zero, even when water charges are well below the cost of project operation and maintenance (O&M) (Ahmand 2002; Easter 1993; Govt. of People's Republic of Bangladesh 2000; Svendsen et al. 1997).

This creates serious problems both for irrigation agencies and, in the long run, for farmers. If the fees collected do not cover the costs of an irrigation project, its sustainability, without continued government subsidies, may be at risk.

Water fees are collected from farmers for two main reasons. The first is to cover the O&M cost so that the project is financially sustainable. In many cases, fees will also need to include a charge for the cost of capital required to construct the project. This charge for capital is important for future irrigation investments. The second objective involves pricing to encourage farmers to use less water per unit of output or produce greater net economic returns per unit of water, or both. Historically, the first objective has been paramount, but as water scarcity increases, the water use efficiency objective is likely to grow in importance and be given a higher priority.

The objective of this technical note is to develop guidelines for improving cost recovery and reducing water use per unit of output. The guidelines were developed from a review of studies of irrigation reforms and World Bank studies with responsibility for irrigation sector reforms in countries from Asia to Latin America. From these studies and interviews, we distilled specific reforms that are important in improving cost recovery or reducing water use, or both. Reforms will be needed depend on their institutional arrangements as well as the type of irrigation and its physical condition.

Focus on designing water charges or water markets that will give farmers an incentive to make better use of their water by reducing the amount of water used per unit of output. Also some case studies to determine what reforms can help improve cost recovery and increase collection rates. The goal of such reform was to establish a self-financing and self-managed system

consisting of two integrated parts: the Water Society Corporation (WSC) supplying water from the head works and the water user associations operating at the local level.

Proposed Costing Design

To achieve the primary goals of cost recovery and reduced water use per unit of output in irrigation water management, two key issues must be addressed: first, to design an effective pricing mechanism based on local conditions and, second, to develop a strategy for obtaining high rates of collection.

In this section, we focus on the three major methods for cost-recovery:

1. Area-based pricing,
2. Volumetric pricing, and
3. Market equilibrium pricing.

Emphasis is placed on the first two categories, including extensions, modifications, and combinations of the two; (*the first method could be suitable for the case of Irrigation Facilities in Uganda*).

Area-Based Pricing

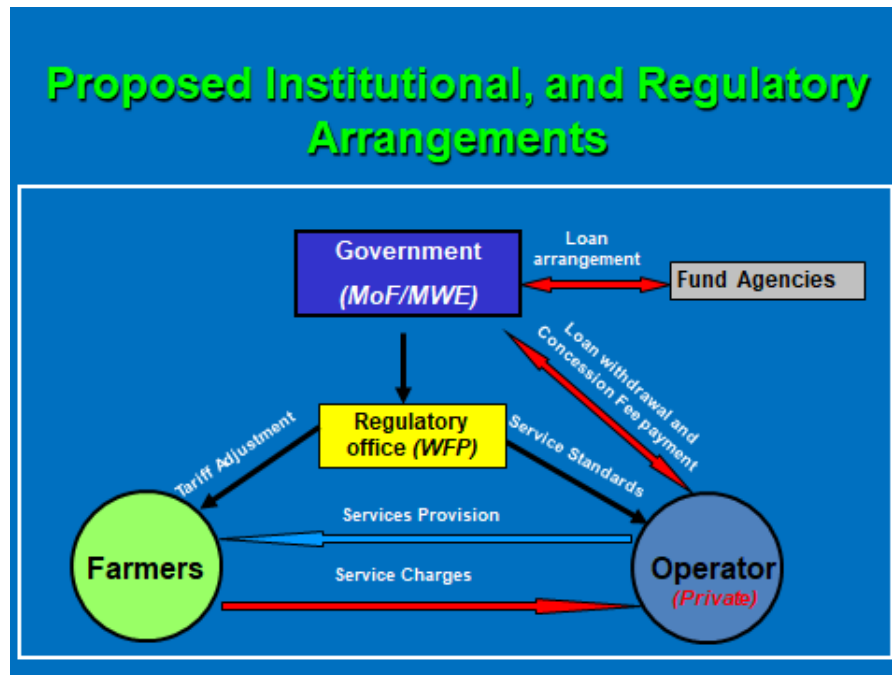
Area-based water charges are fixed charges, based on the area irrigated or “supposed” to be irrigated. They are often calculated by dividing the total area irrigated into the O&M costs of providing irrigation water, which basically follows the average cost pricing principle. Defining O&M costs is important because the water supply entity may have an incentive to inflate the costs charged to farmers.

The advantage is that it is simple to calculate, easy for farmers to understand, and the implementation costs are lower than for volumetric pricing because water deliveries do not have to be measured. Also, assuming 100 percent collection rates, charges per hectare, based on average direct cost, result in full recovery of direct costs. Although it gives farmers no incentive to reduce water use per hectare, it is still widely used in many systems throughout the world due to the simplicity of its implementation. Pure area-based pricing is appropriate in places where water is not scarce, where crops are not varied, and where meter installation is difficult or costly.

By the end of the implemented management program, the following goals could be reached:

1. Beneficiary mobilization so that they effectively participate in the rehabilitation/ construction of the schemes with proper cost-recovery system;
2. Develop procedures for drawing up annual irrigation schedules and water distribution plans; maintenance of water supply, water delivery facilities and distribution systems, and train WUAs leadership to adopt and implement these plans;

The following diagram illustrates the proposed mechanism to deal with the cost-recovery procedure and the link between different parties. Water for production WFP within the MWE will act as the focal entity in the implementation procedure.



Cost recovery and cost sharing

Many countries have greatly improved cost recovery through basic irrigation reforms. The reforms varied with the irrigation system type, management structure, government policies, and institutional arrangements. The legal framework of irrigation cost recovery in Uganda is in a state of transition. The existing legislation does not authorize any form of irrigation cost recovery on irrigation scheme either in private or public properties.

Cost sharing systems should be implemented for all water users. Cost recovery through collection of water services fees forms an important measure to promote the efficient use of water resources.

The recovery of partial services fees has become an accepted practice in drinking water supply already. Steps will be taken to appraise the real cost of the water services. As a start, steps will be taken to make the users aware of the real costs of the water services delivered. The turnover of management and development responsibilities of water resources is an important measure to enhance economic efficiency also outside the irrigation sector; this applies to industrial water needs.

The law stipulates the establishment of water facility revolving fund to avail finance required for Improvement, maintenance of water facility and the supervision of implementation of the mentioned projects and increase awareness in the area of water usage. Financial resources of the

fund are secured from amounts allocated to it from the general budget of the government, loans, grants and payments made by beneficiaries of improvement areas to recover its cost and return on investments.

The success of the program will depend in large measure on the quality of the technical and institutional support provided by MWE to users and local WFP-MWE officials in the forms of executive regulations, assessment and planning techniques, budgeting and accounting formats, and information system development.

11. Conclusions and Recommendations

The findings of this applied research study are believed to give a proposed framework for the operation and management of the current irrigation schemes to ensure its sustainability. This institutional framework is robust, feasible and consistent with existing policy and legal instruments of the country. The required management mechanism and operational strategy for the rehabilitated three irrigation schemes in Doho, Agoro and Mubuku are introduced to secure their sustainability.

All schemes may adopt the introduced model on approval, with variations that are customized to the three schemes based on the existing conditions. Accordingly, while the different schemes can adopt the co-operative society model, bye laws will have to be developed to customize this model to the different schemes in order to reflect the diversity inherent to the schemes.

This study foresees an increasing regulatory role for proposed new WFP-Software team, both in terms of monitoring the management integrity and the operational and financial performance of different WUOs and in terms of acting as referee between local Government and the WFP Directorates with respect to the planning, cost, and quality of maintenance services. Technical assistance to Irrigation Advisory Services IAS may be of use in building its capacity to perform this function. Consolidation of the various Irrigation Advisory Services IAS agencies would provide economies of scale and also increase the stature of the new IAS agency, thus strengthening its regulatory authority. Implementation of the proposed cost recovery program will require legalization, changes in financial management structures, and capacity building. Consolidation of the various MWE-WFP and at Local Government levels water users advisory services is also recommended.

The required Ministerial Decree for the implementation of the bye-law for the cost recovery will establish the rules for and collection of the of the improving cost of water facility and the procedures of informing beneficiaries of the cost and procedures of objection and authorities which collect the cost and deliver it to the revolving fund for constructing the water facility or irrigation scheme also the required funds for its operation and Maintenance

The law stipulates participation of private sector and farmers in irrigation water management, also that determine method of management and use of improved irrigation methods in private lands should consider the following:

1. Establishment of Farmer's Water Society Cooperative at scheme level as form of having a legal entity for beneficiaries of use of water facilities in the private lands.
2. Determination of management method and use of farmers of improved irrigation methods in private lands in which Irrigation practices takes place. The legal entity could not organization except by a clear clause in the law.

Better services will give farmers an incentive to pay their fees as well as an increased ability to pay because better service usually means higher farm incomes. *The target findings and the draft cost-recovery mechanism with the required by-law Articles were presented to the local Government and members of Parliament's decision makers to reach the final modification to be included in the coming Water and Irrigation Law.*

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Annex: Technical Presentation “cost-recovery mechanism, by-law Articles to different decision makers



Ministry of Water and Environment
Water For Production

Strengthening Private Sector Participation Approach and Cost-Recovery Mechanism for Sustainable Water Facilities



Dr. Gamal Elkassar
October 2017

THE PURPOSE OF THIS PARER

is to describe a strategy, process and tactics to be used to work with water users (farmers) in evolving sustainable private water user Organizations, also provide ideas for successful cases for the target Cost-Recovery Mechanism.

CBM is the only way to ensure scheme's sustainability

“Cost-Recovery NOT Water-pricing”

Outlines

Target:

- Looking to improve/assess water productivity and efficiency
- Approaching Irrigation Management Transfer IMT Mechanism
- Successful Cost-Recovery Mechanism in water projects.

Proposed Actions:

- Stimulate of WFP software Activities/Interventions and thinking to introduce the new Irrigation Advisory Services IAS
- Preparation of Irrigation Law and involving “water as an Economic goods”

Expected Results:

- Promotion CBM approach of management, O&M to enhance sustainability and long-term use of the facilities.
- Better access to water through WFP investments and flexibility of agricultural production systems..



Theory of Water Accounting and Auditing

Water accounting:

It provides a sound scientific basis for strategy development, operational decision-making and targeted communication programmes.

Water auditing:

It goes one step further than water accounting by placing trends in water supply, demand, accessibility and use in the broader context of governance and legislation for water specified domains.



The need to combine water accounting and auditing



Driving Principles

- Full recovery of investment, operation, and maintenance costs.
- Concession to private operator to design, build and operate the irrigation system.
- Willingness of farmers to connect.
- Fair allocation of risks.
- Regulatory arrangements.

Theory of Water Accounting and Auditing

Water Accounting Includes:

- Physical availability of water in time and space;
- Balance between water supply, demand and access;
- Physical condition of water-related infrastructure;
- Levels of water security (users and uses);
- Frequency of droughts, floods and interruptions in the delivery of water;
- Types of water use in time and space;
- Functionality of policies aimed at regulating demand improving supply;
- Opportunities for making better use of water and along the value chain.

Water Auditing Includes:

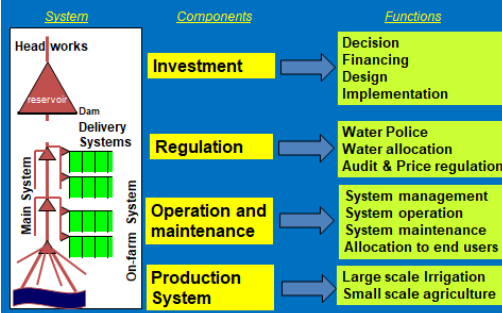
- Stakeholder roles, responsibilities and inter-relationships at different levels;
- Governance systems i.e. how decisions are made;
- Political, social and environmental concerns priority issues;
- Levels of public and private expenditure e.g. on operation and maintenance;
- Functionality of formal and customary laws;
- Underlying reasons for "lack of political will" to promote and implement change.

PPP for Water/Irrigation Projects

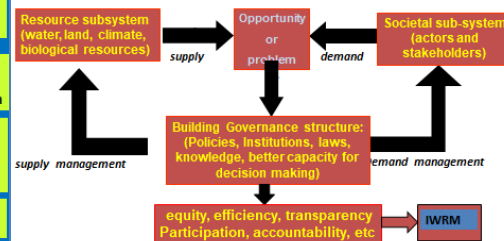
The following interventions are ongoing and proposed to be undertaken using PPP arrangement in the medium and long term:

- small and medium scale Irrigation/agriculture Schemes
- Water Supply Projects
- Bulk Water Systems
- Rainwater Harvesting
- Using of Solar in water pumping System
- Etc.

Components and Functions of Irrigation and Drainage Systems



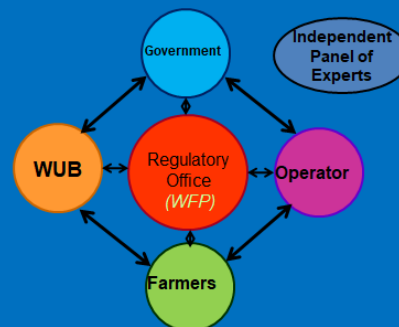
Water Governance: the Way to Sustainability



Participation Concept in PPP:

- PPP is a Tool to reach good Irrigation management Transfer IMT
- Concept of Irrigation Management Transfer to Users/farmers, includes:
 - Efficient use of water.
 - No pollution of water.
 - Paying O&M fees.
 - Proper use of the land (crop rotation)
- Sustainability of water organisation and therefore the water management process
 - Conflict resolution mechanism

Regulatory Framework



What is the Proposed IAS ?

The Irrigation Advisory Service (IAS) is an organizational unit of the WFP/MWE to be established to provide three major types of services to private WUAs. **These services are:**

- to facilitate and assist WUAs in improving and maintaining water delivery,
- improved water use practices and
- helping farmers build sustainable private WUAs around the water facilities.

IAS Strategy

- Internal and External Evaluations
- Regular Monitoring
- Review the scheme's cost recovery by WUA
- Process Documentation of Basic Lessons Learned



Prepared Documents



Cost-Recovery Concepts

- The purpose of this report is to introduce principles and mechanisms for improving recovery of the costs of irrigation and use of water in different Water for Production WFP Facilities in Uganda. *(For a variety of reasons, related mainly to popular cultural values, the GOU is reluctant to assign an economic value to water!)*

Water fees are collected from farmers for two main reasons: The first is to cover the O&M cost so that the project is financially sustainable. The second objective involves pricing to encourage farmers to use less water per unit of output

the first objective has been paramount, but as water scarcity increases, the water use efficiency objective is likely to grow in importance and be given a higher priority.

Cost-Recovery Principles

- The full costs of providing irrigation water can be divided into three categories:
 1. Direct project costs,
 2. Environmental costs, and
 3. Marginal user costs.
- **Direct project costs:** are the easiest of the three to measure, and most projects take only direct costs into account in determining cost recovery. It refers to costs stemming from the process of capturing and delivering irrigation water, which can be broken into fixed costs and variable costs:
 - **Fixed costs** include all investments in irrigation infrastructures such as building reservoirs and canals and installing meters and pumps, plus depreciation and interest payment on the investment.
 - **Variable costs** consist of the operational and maintenance costs of water delivery, lower level administrative costs

Costing Design

- To achieve the primary goals of cost recovery and reduced water use per unit of output in irrigation water management, two key issues must be addressed:
 - first, to design an effective pricing mechanism based on local conditions and,
 - second, to develop a strategy for obtaining high rates of collection.
- In this section, we focus on the three major methods for cost-recovery:
 1. Area-based pricing,
 2. Volumetric pricing, and
 3. Market equilibrium pricing.
- *Emphasis is placed on the first two categories, including extensions, modifications, and combinations of the two; (the first method could be suitable for the case of Irrigation Facilities in Uganda).*

Area-Irrigation Method

- In the area-irrigation method, water charges usually reflect the differences in water delivery costs among different irrigation methods. For example, most gravity-based irrigation systems have much lower variable costs than pump irrigation.
- The advantage of pump irrigation is that water control and measurement of water delivery is generally much easier than it is for most gravity flow systems. Thus, area charges are usually higher for pump irrigation because irrigation costs and net income per unit of water are generally higher.

The role of Farmer's Water Society Cooperative is essential to operate the designed Irrigation Scheduling to ensure water Equity/Right between its farmers.

Authority and Responsibility to Farmers

- Giving farmers more authority and responsibility over water management, usually through any form of Water Society Cooperative or WUAs, is a part of most reforms. In some cases, reform will require other investments or improvements in water management.
- A transparent process, where farmers help decide what components should be included in the costs to be recovered from them through water charges, is an important stepping stone toward increasing their authority.
- To obtain high cost-recovery rates, farmers should not only agree on the costs to be recovered but also see that the fees collected are used to maintain and improve "their" system. Having the fees collected go back into the general revenue fund of the state or federal government, provides farmers with a strong incentive *not to pay fees*.
- As part of widening farmers' responsibilities and authority over water management, the government should provide them with training and technical assistance, as was done in a number of the successful cases (either in Turkey, China and Egypt).

Guidelines for Implementation Cost-Recovery

- An essential part of any cost recovery strategy is implementation
- There are two key steps in cost recovery:
 - first is to design a pricing mechanism that covers the appropriate costs; the
 - second is to achieve high collection rates through effective water management.
- The design involves working with the water supplier and farmers to determine what should be included in the costs, and which of these costs should be collected through a water fee rather than through other taxes (such as a land tax).
- A key to achieving high collection rates, suggested by both literature and field experience, is financial autonomy. Without autonomy, collecting sufficient funds from users does not guarantee improved O&M services because revenues from water charges, in many cases, do not go back to the project. Instead, they are commingled with other taxes in the central treasury.

New legislations were drafted: