



Ministry of Water Resources and Electricity
Hydraulics Research Centre



SHARING EXPERIENCES AMONG WATER USER ASSOCIATION IN SPATE IRRIGATED SCHEMES

REGIONAL WORKSHOP REPORT

PREPARED BY:

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- The Supreme Council of Water Users Associations in Gash.
- The parliament of Kassala State.
- The Gash Agricultural Scheme, and the DG of the Scheme.
- The WUAs of Yemen, Ethiopia, Toker and Khor Abu Habil.
- IMAWESA, UNESCO-IHE, Gezira University, IFAD.
- All farmers and technical staff who attended the workshop.

Executive summary

The Sudan Spate Irrigation Network and the Hydraulic Research Centre (HRC) of the Ministry of Water Resources and Electricity organized a regional workshop from 15 to 18 December, 2012 in Kassala, in the Eastern Region of Sudan. The workshop was attended by 50 farmers and leaders of Water Users' Association (WUA), and 20 water professionals from Ethiopia, Yemen and Sudan. The International Spate Irrigation Network, SpN (www.spate-irrigation.org) and the Improved Management of Agricultural Water in Eastern and Southern Africa, IMAWESA (www.imawesa.net) financially supported the workshop from their respective IFAD sponsored projects.

The workshop was unique in its setting and the first of its kind. The presentations and discussions were led by farmers and WUA leaders; the focus was exclusively on exchange of knowledge, practical experience and the substantial local wisdom farmers have developed over the years in organizing spate irrigation systems and managing the often unpredictable and destructive spate (flood) flows.

The workshop participants deliberated for three days focusing on: 1) establishment and strengthening of WUAs; 2) Water sharing, conflicts and conflict resolution; and 3) operation and maintenance principles and practices. The participants highlighted the major strengths and limitations of their respective WUAs and the lessons they could learn from one another. Further, during a full-day visit to the 60,000 ha Gash Agricultural Scheme (GAS), the farmers and WUA leaders exchanged ideas on water diversion and distribution, land preparation and farming practices. GAS is the largest spate irrigation scheme located in Kassala, Sudan.

The workshop concluded with unanimous agreement on the following recommendations:

- WUA leaders to be democratically elected for a maximum of two terms each having a 3-year duration.
- Water distribution rules are considered fair only if they equally address the special needs of the elderly, women, and the less-able segments of the farming community.
- A community-level court that rules exclusively based on the By-laws of WUAs and has the power to issue final and binding decisions is the best facility for solving major conflicts.
- Establishing farmers' schools dedicated to acquainting farmers with up-to-date practical knowledge and experiences on different aspects of irrigation and farming systems.
- As witnessed in Ethiopia and khor Abu Habil in Sudan, involvement of women in farming and leadership positions of WUAs is crucial and need to be seriously pursued.
- Reliance on water fees from the farmers alone will not result in financial sustainability. WUA leaders should have the quality to establish good network with government and non-government organizations and most importantly with wealthy members of the community residing in the cities within and outside the respective countries.
- Farmer-to-farmer knowledge and experience sharing workshops should be annual events.
- Farmers driven solutions-oriented research to be given attention.

These recommendations aside, the workshop was highly valued by the Government of Kassala State for laying the foundation for a strong bond among the Sudanese, Ethiopian and Yemenis farmers and spate irrigation professionals. The Regional Government has organized a reception and handed certificates of acknowledgement and thanks to the workshop organizers and participants.

1. Introduction

This document reports on the Regional Knowledge and Experience Sharing Workshop that brought together fifty farmers and Water User Association (WUA) leaders managing spate irrigation systems in Wadi Zabid, Yemen; Guguf, Ethiopia and Gash, Toker and Khor Abu Habil, Sudan. In attendance were also about 20 water professionals including the Directors of Gash and Toker Delta Agricultural Schemes in Sudan (government institutions responsible for the overall management of irrigation schemes); coordinators of the Participatory Small Scale Irrigation Development Projects (PASSIDP) in Tigray and Amhara Region, Ethiopia and the spate irrigation project team from Sudan, Yemen, Ethiopia and UNESCO-IHE. The workshop was held in the period 15 - 18 December, 2012 in Kassala, Sudan.

Spate irrigation is a type of water management that is unique to semi-arid environments. It is found in the Middle East, North Africa, West Asia, East Africa and parts of Latin America. Flood water from mountain catchments is diverted from river beds (wadis) and spread over large areas. It is often the poorest segments of the rural population whose livelihood and food security depends on the spate flows.

The four day workshop that included a full-day field visit to the Gash Agricultural Scheme in Kassala, Sudan; addressed the following issues:

1. Establishing WUAs – why and how; organizational structure of WUAs; the leadership issues focusing on appointment duration and incentives, successes and failures in managing the WUA and implementing its main tasks.
2. Water sharing, conflicts and conflict resolution: rules and regulations, enforcement mechanisms.
3. Operation and maintenance: planning, mobilizing resources, fund raising, cooperation with other (non) government organizations.

The Spate Irrigation Network (SpN) (www.spate-irrigation.org) has financially co-funded the workshop from its IFAD funded project. Substantial supplementary funding was provided by IMAWESA, the Improved Management of Agricultural Water in Eastern and Southern Africa (www.imawesa.net). The central aim of the workshop - creating a platform for sharing of knowledge and best practices in management of agricultural water - is very much akin to the shared goals of both SpN and IMAWESA.

The workshop was organized by the Apex Gash WUA, the Sudan Spate Irrigation Network (SSpN) and the Hydraulic Research Centre (HRC) of the Ministry of Water Resources and Electricity. The Director and engineers of the Gash Agricultural Scheme (GAS), the Gash WUA registrar in Kassala and Gezira University, Wad-Medani have made valuable contributions to the organization of the workshop.

2. Scope and objectives

The workshop was of a regional scope drawing on practical experiences of farmers and WUA leaders from Sudan, Yemen and Ethiopia. It addressed organizational, operation and maintenance and water sharing and conflict resolution aspects as practiced by the spate system farmers.

The workshop had two main objectives:

- Create a regional platform for knowledge and experience sharing among farmers and WUAs striving to make beneficial use of floods through proper management of spate irrigation systems.
- Document and disseminate the main experiences and good practices shared in the form of practical notes, videos and photos.

3. Experience shared and lessons learned

This section details the major experiences shared and the lessons learned by the farmers and WUAs that represented the three countries (Sudan, Ethiopia and Yemen) in the workshop. The experiences are organized in three main topics: (i) Formation of WUAs, organizational structure and leadership; (ii) water sharing, conflicts and conflict resolution; (iii) operation and maintenance.

3.1 Formation of WUAs, organizational structure and leadership

3.1.1 The GAS Experience

Strength

- A strong institutional support before, during and after the formation stage of WUAs has contributed to several positive outcomes:
 - 92 WUAs have been established representing the five blocks at GAS: Kassala, Mekali, Tendali, Metateb, Degain and Hadalya. An Apex WUA with two representatives from each block was also formed to serve as a coordinating unit.
 - Farmers' names and records of tenancy have become known and fixed.
 - By-laws approved by the Kassala State Council - the By-laws define the roles, tasks and rights and responsibilities of WUAs and their members.
 - Establishment of a WUA unit within the GAS and the appointment of a WUA coordinator
 - WUAs are increasingly becoming aware of their roles and responsibilities under the law that governs their status.

Limitations

1. Large number of farmers in one *misga* (300 to 600 farmers) that represents the smallest unit of a WUA. This created difficulty in management and timely decision-making. *Misga* refers to a secondary canal that supplies spate flow directly to an irrigated command area, which ranges in size from 450 to 900 ha.
2. Short (2 years) term of WUA leadership is insufficient for properly planning, implementing and evaluating large-scale programmes.
3. Lack of proper annual evaluation of the performance of the WUA leadership.
4. Limited mandate - the WUA is not active in other imperative issues, beside managing water, such as marketing, cropping pattern

Lessons learned and action points considered

The GAS WUA leaders singled out the following experiences of the other WUAs as important and worthy for consideration:

1. Extending the WUA election period from two to three years. *Ethiopian Experience*
2. Group marketing for crops that protects individual farmers from selling their products at a low prices. This is in particular crucial for empowerment of poor farmers. *Khor Abu Habil Experience.*
3. Including women farmers as active members as well in leadership positions - this proved to be useful for better operation and maintenance, enforcement of By-laws and overall management of the respective spate irrigation scheme - *Ethiopia & khor abu Habil Experience.*
4. Incentive system for WUA leaders: either in kind (irrigation priority) or in the form of bonuses or regular small payments. In Ethiopia, the water masters, the WUA leaders responsible for overseeing water sharing, have absolute right to irrigate their fields first. This highly motivates the water masters to work diligently.

3.1.2 Yemen Experience

Strength

1. Well defined steps for formation of WUAs:
 - Step 1: Preparation of extensive data base of farmers: personal details, farming experiences, size and location of irrigation fields, the type and sequences of crops grown.
 - Step 2: awareness creation: extensive meetings and discussions focusing on benefits and responsibilities of being organized into a WUA.
 - Step 3: discussion followed by decision on the best organizational structure and a set of leadership qualities required at different positions.
 - Step 4: Discussing and agreeing on water sharing rules and regulations, water fee and payment modalities, membership criteria and related matters.
 - Step 5: Preparing a WUA working document (by-laws) that encompasses the main outputs of steps 1 to 4.
 - Step 6: training on “managing WUAs” - organizing meeting, book keeping, planning operation and maintenance and related work plans, enforcing rules and regulations, mitigating and solving conflicts.
 - Step 7: Strategies for financial sustainability: developing capacity to be competitive irrigation service providers to other government and private institutions thus generating income, establishing and maintaining contacts with funding organizations (internal and external) as well as wealthy members of the community residing inside and outside the country.

Of the 38 WUAs in Wadi Mawr spate irrigation scheme in Yemen, only 10 followed the above steps with dedication and these have ended up being very successful:

- Built financial capital primarily by tapping into the wealthy members of the community. They have been able to collect 20,000 to 50,000 Yemeni Riyal (100 to 250 USD) each year from a single rich person - they have a database ranging from 50 to 200 persons.
- Established good relationship with the Tihama Development Authority (TDA), the government organization responsible for the overall management of spate irrigation systems in Yemen and the Irrigation Council (IC), the government body tasked with coordinating activities of all WUAs, and several other organizations (Figure 1). Some of the benefits from the string relations with the TDA and IC are:
 - 50% reduction in machinery rent cost from the Irrigation Council
 - Matching funds for operation and maintenance from the TDA and Irrigation Council.
 - Less bureaucratic hurdles to withdrawing and depositing money in their individual bank accounts

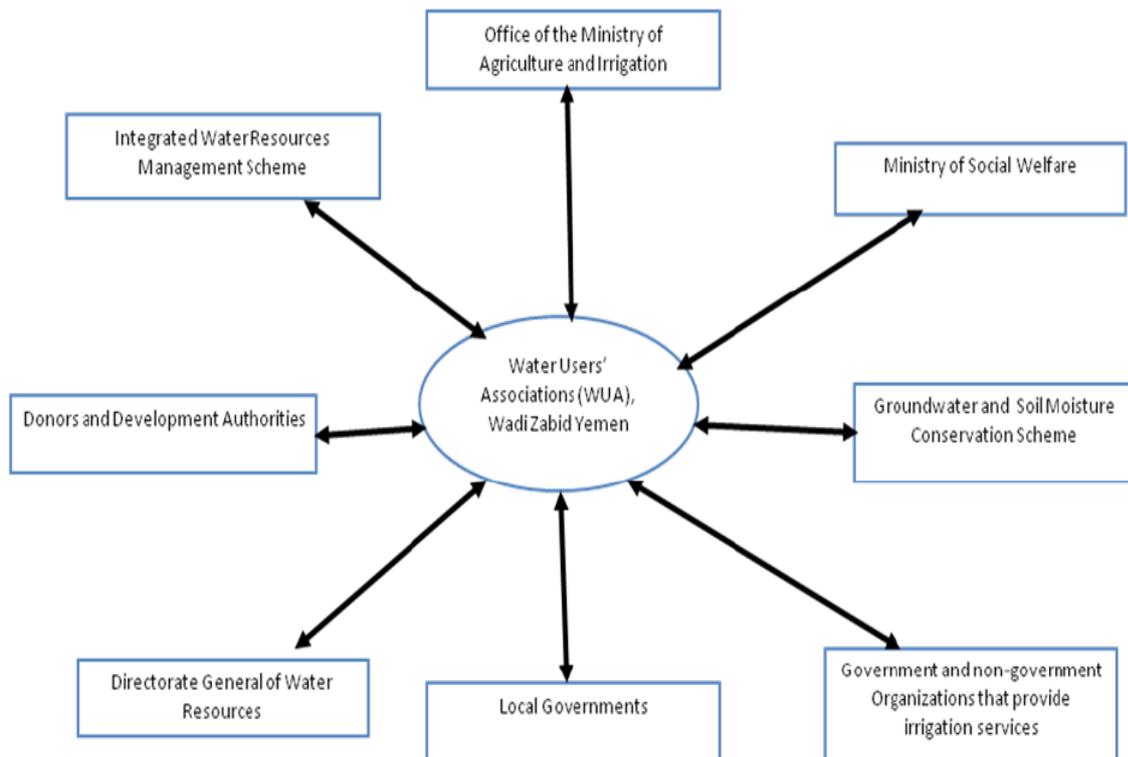


Figure 1: Organizational network of Wadi Zabid Water User Associations, Yemen

2. Full legal recognition of WUAs by the local government, facilitated the following:
 - Each WUA has a bank account with the condition of three signatures for account management; the chair person, executive director and financial manger.
 - Each WUA member has an identity card (ID card).

Limitations

1. The leadership has no power to decide on cropping pattern. The consequence has been extensive banana plantation in the upstream, which has in turn deprived downstream areas of spate flow.

2. The lack of mandate of the WUA to control the digging of wells and manage over abstraction of groundwater - the groundwater level has been and is still decreasing at alarming rate of 1 to 1.5 m per year.
3. Three of the 16 WUAs are big with 500 farmers as members of the smallest unit - this created difficulty in management including holding meetings, controlling the water sharing, proper fee collection and organizing O& M activities.
4. Limited coordination between upstream and downstream farmers along the main river system.

Lessons learned and action points considered

The main lessons considered useful by the Yemen WUA representatives were the following:

1. Reducing the term of WUA leadership from 4 to 3 years and introducing a mechanism for annual performance evaluation (Ethiopia experience).
2. Providing well defined and officially agreed upon incentives for the leadership (Ethiopia Experience).

3.1.3 Ethiopia Experience

Strength

1. Well defined and thorough WUA formation process that includes all, but step 7 stated in the case of Yemen.
2. A strong and effective executive committee that consists of five members: Chairperson, Secretary, Treasury and two Auditors elected with an open vote by the general assembly:
3. Regularly meets on a bi-weekly basis to discuss irrigation and farming related issues.
4. Annual meeting with the general assembly to assess progress and agree on a work plan for the year ahead.
5. A woman representative is always included in the leadership. For instance, the secretary in the current executive committee is a woman.
6. A streamlined organizational structure with manageable (30 to 50 farmers) in the smallest administrative unit (Figure 2)

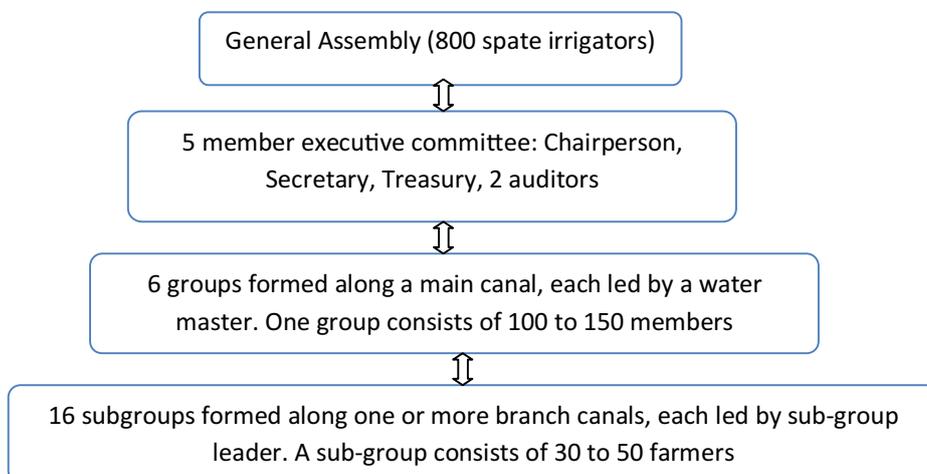


Figure 2: Organizational structure of Guguf Water User Association, Raya Valley, Tigray, Ethiopia,

7. The leadership is granted by the General Assembly an absolute priority to irrigate their fields first. This incentive is instrumental for the dedicated and committed service provided by the executive committee, water masters and sub-group leaders.
8. Good working relationship with the government agricultural extension service - the latter has provided advice on use of fertilizers and crop varieties.

Limitations

1. The WUA leadership have weak relationship with the external non-government funding and development agencies.
2. Absence of an umbrella farmers' organization that deals with the issues that concern two or more WUAs at main river system.

Lessons learned and action points considered

1. Linking the WUAs to development and funding organization to be included to the mandate of the leadership (experience from Yemen).
2. Establish a river system committee to deal with inter-WUA issues (experience from GAS).

3.1.4 Khor Abu Habil Experience

Strength

1. The WUA are well connected to various relevant organizations including the agricultural scheme council, ministry of agriculture, ministry of finance, state executive managers, legal, private companies for seeds and for cotton marketing, agricultural research cooperation.
2. Women farmers are well presented in the WUA management council.
3. The WUA takes central role in protecting farmers from selling of farm products at below market prices.

Limitations

1. The WUA formation was not done on the basis of a thorough process as outlined in the case of Yemen in the above - discussions on steps 2 and 3 were insufficient, while the other steps were barely implemented.
2. The WUAs do not have their own By-laws. They operate under the regulations and rules of the other existing government cooperatives (e.g, Rules of Cooperative council). One of the negative consequences is that the WUAs are not free to choose their own cropping pattern.
3. There are two bodies claiming entitlement to representing the farmers - the labour unions and the newly formulated WUA. There is power struggle among these two bodies as there is not yet clear boundary of responsibilities.

Lessons learned and action points considered

The Khor Abu Habil WUA leaders and farmers singled the following for immediate consideration:

1. Re-launch extensive consultations with the WUAs members to further strengthen their understanding on responsibilities and benefits of being organized into WUA and the best alternatives followed by other WUAs to ensure financial and legal autonomy. *Experiences from Yemen and GAS.*

2. To work for more legal framework for WUA organizational set up. *GAS Experience*
3. Formulate by-laws for each of the WUAs that will guide the activities and decisions to be taken with regard to irrigation and agricultural activities. *Experiences from GAS, Yemen and Ethiopia*

3.1.5 Toker Experience

The Toker farmers have not yet organized themselves into a WUA. They have an informal committee with no clear organizational structure and voluntary leaders. The Toker representatives reflected on the experiences of the other farmers and concluded that they will work towards:

1. The establishment of legally recognized WUA and will follow the approaches used in Yemen.
2. They will implement an organizational structure that goes all the way into small manageable units as is the case in Ethiopia.
3. Identify appropriate incentives for the leadership as practiced in Yemen

3.2 Water sharing, conflict and conflict resolution

3.2.1 GAS Experience

Strength

1. Rotation based well-defined water sharing system: 1st rotation: 10 July to 10 August and 2nd rotation: 10 to 30 August. To create a sense of fairness, the fields entitled to 1st rotation this year will be shifted to 2nd rotation the following year and vice-versa.
2. A tradition of sharing benefits after crop harvest with those who didn't receive irrigation water and hence no harvest.
3. Traditional laws and institutions locally known as Galad, which are led by a group of farmer elders and socially respected people have been successful in conflict resolution.

Limitations

1. Some WUAs are not yet capable of implementing the water sharing rules - it often happens that farmers prepare their lands and do not receive water as planned due to operation and maintenance problems or small size flood.
2. Weak role in irrigation fees collection; GAS management is responsible of fee collection and this proved to be not effective. In addition there is no system of penalties for those who don't pay - this creates tension among the farming community.
3. Improper time of irrigation fees collection. Fees are collected in the start of next season while it is more proper to be collected just after the harvesting time.
4. Improper maintenance of main canals leads to huge waste of irrigation water that is used to irrigate unplanned areas. This leads to conflicts between farmers

Lessons learned and action points considered

The GAS WUA leaders and farmers considered the following lessons as imperative:

1. Improve the fairness of water sharing by adopting the practice of starting irrigation in a new flood season by the areas that remained dry the previous season (Ethiopia experience).
2. The establishment of a community-level court as the final facility for addressing major conflicts as is the case in Ethiopia.

3.2.2 Ethiopian Experience

Strength

1. A well established fair water distribution system with the following main tenets:
 - At the main canal system, upstream has a priority.
 - At branch canal and field level, distribution is based on a lottery.
 - In a new flood season, the area that remained dry in the previous season gets the priority.
 - Water masters who are in charge of overseeing implementation of water sharing rules have absolute priority.
2. A customary system for conflict resolving consist of the following gradual steps:
 - The two parties sit together and try to solve the problem.
 - A third party interferes to seek solution.
 - The chair person or any one member of the executive committee makes a decision to resolve the problem.
 - As the final resort, the case is transferred to the community court that makes the final and binding decision based on the By-laws of the WUAs.

Limitations

The Ethiopian delegation seem to be overall satisfied with the way they are handling the water sharing and conflict mitigation issues. They have, however, indicated that there have been some instances where the water masters failed to properly implement the water sharing rules and regulations causing unnecessary conflicts. The general assemble does not, however, tolerate such behaviour from the water masters and they are immediately relieved of their duties after one such incident.

Lessons learned and action points considered

The Ethiopian representatives found two practices by the GAS WUA as important and worthy for consideration:

1. Sharing of crop harvests with those who did not get irrigation for one reason or another.
2. Traditional Galad system that puts in charge of farmer elders and socially recognized people of solving conflicts before these are referred to the community-level court.

3.2.3 Yemeni Experience

Strength

1. Centuries old water sharing rule that allocates 288 days, 45 days and 32 days of irrigation duration for the upstream, midstream and downstream. Although the upstream are allocated excessively large number of days, there is less chance of receiving substantial

seasonal floods during those days, while the days of the midstream and downstream fall well within the rainy seasons.

2. A multiple source of funding that ensured financial sustainability of some WUAs: Members subscription fees, water fees, contribution from the wealthy members of the community, and complementary fund from government bodies such as the Irrigation Council and Tihama Development Authority.
3. An excellent set of overflow control and canal embankment structures that reduce scouring, sedimentation and increase water distribution efficiency.

Limitations

1. With the exception of the 5 top performing WUAs, the other 11 WUAs in Wadi Zabid, Yemen have various degrees of a weak system of enforcement of agreed rules and regulations:
 - Some farmers use more irrigation turns to banana farms.
 - Some farmers are not constantly willing to pay irrigation fees for maintenance.
 - Downstream farmers break the irrigation canals before the upstream areas finish their irrigation time.
 - Upstream farmers use more water.
 - Conflicts due to water sharing rules.
2. The modernized traditional system has given the upstream farmers more control of the spate flow and resulted in further creating unfairness of water sharing - in some areas, where the WUAs have not been strong enough to preserve their rights, some downstream farmers have altogether abandoned their irrigable land due to lack of irrigation.
3. Lack of mandate of the WUAs to protect the groundwater against excessive groundwater use - some groundwater tables have plummeted to a depth of more than 500 m.

Lessons learned and action points considered

The Yemen WUA leaders and farmers, based on the experiences gained from the other WUAs and farmers, agreed to consider the following actions:

1. Instead of a fixed irrigation schedule, shifting to rotational based water sharing as is the case in GAS.
2. Consideration for community based court that is respected and accepted by all WUA's and farmers. This proved to be more efficient in traditional spate systems. *Ethiopian Experience*.

3.2.4 Khor Abu Habil Experience

Strength

1. An accepted water sharing rules between farmers:
 - Proper size of basin (5 - 12 ha) that could be irrigated within 10-15 days of flooding.
 - Upstream basins are irrigated first and in cascade system the following downstream fields are irrigation next.
 - Women farmers are given similar right for land and water access.

Limitations

1. The water sharing gives absolute priority to upstream users.

2. The WUA has not clear conflict resolution approach.

Lessons learned and action points considered

The Khor Abu Habil WUA leaders clearly stated that they want to adopt:

1. The water sharing arrangement practiced by GAS, which as explained earlier is rotation based, and supplement it with the system in Ethiopia (or GAS) where irrigation in a new flood season starts with the areas that remained dry in the previous year.
2. The Galad traditional conflict resolution system used in GAS as a first order and the community-level court such as that in Ethiopia as the last facility for settling conflicts.

3.2.5 Toker Experience

A traditional system of water distribution that is considered logic and agreed upon by the majority of the farmers:

1. The eastern delta with the highest elevation is irrigated first, followed by the middle and finally they irrigate the western delta that is at the lowest elevation.
2. Less conflict between farmers since same farmers have different lands distributed in the three deltas to increase the chance of flooding occurrence.
3. Conflicts are resolved using community committee initially, and major conflicts are referred to legal courts.
4. Unique Fees collection system that involves taxing of traffic that passes through the delta.

Limitations

1. Lack of well established WUA resulted in the fact that there is no one responsible for overseeing the implementation of the water sharing rules. Prior to the flood period, a group of knowledgeable staff from Toker Delta Agricultural Scheme (TDAS) adjust the flood guiding bunds in such a way that the irrigation happens as per the above stated schedule. There is no one on the ground during the flood period to look after the spate flow distribution.
2. Due to lack of management, extensive areas of the western and eastern delta are infested with mesquite - the middle delta is the only area nowadays available for cultivation.

Lessons learned and action points considered

The Toker representatives were convinced after listening to the experiences of the other farmers that they need to organize themselves into a WUA and with a committee responsible to oversee the distribution of flood water, but were very much satisfied with their water fee collection and conflict resolution mechanisms.

3.3 Operation and maintenance

3.3.1 Gash experience

Strengths

- Good working relationship between the Gash Apex WUA, an umbrella for farmer's organization for the 92 WUAs and the Gash Agricultural Scheme (GAS). This good working

relationship has translated into joint planning and implementing O&M activities and led to tangible outcomes:

- Joint supervision of the main and secondary intake operations that has improved enforcement of water sharing rules and reduced unfairness in water distribution.
- Immediate access by the WUAs to the machinery stock of GAS - loaders and bulldozers - particularly during the flood season when some timely repair and construction work is needed.
- Direct communication line between the Apex WUA and the Gash River Training Unit (GRTU) - the latter is responsible for maintaining the river protection works. This has streamlined administrative bureaucracy and allowed quick action and prevented some inevitable major damages to river embankments that would have caused significant damage to Kassla town and the irrigated command area.
- Regular follow-up and close supervision by some exemplary WUA - this has led to timely maintenance of some secondary canals and field intakes as well as preparation of the irrigable areas.

Limitations

1. The O&M fee (80 SDG or about 12 USD per ha per year) is not sufficient to properly cover the maintenance work requirements of even the tertiary and field structures let alone to make a substantial contribution to the tasks required at main irrigation system and Gash river system levels. For example, the WUAs in Eritrea, which have much less structures to maintain and systems to operate, contribute 40 USD per ha per year. Even in other irrigated schemes in Sudan such as Gezira scheme, farmers pay 300 SDG per ha (almost 50 USD).
2. There is no effective water fee collection system in place - only a few of the 92 WUAs make a proper annual O&M plan with budget breakdown. As a result, whereas some exemplary WUA has a fee collection rate of above 90%, the success rate of nearly 75% of the WUAs is still below 50%.
3. The amount of fees collected and the timeliness of this is affected by technical and other social problems related to water reliability. Responsibility for the collection of the land and water charges must be transferred to the block Water Users Associations. In addition to this, the Way in which these funds are utilised for the benefit of the farmers must be far more transparent with the representatives being fully involved in the annual planned utilisation of these funds.
4. The WUAs are yet to identify alternative financial sources: O&M funding is currently entirely dependent on fees collected from farmers, which is not substantial and budget from the Ministry of Finance, which often gets released late.
5. Lack of incentives for the WUA leaders, financial or otherwise - many leaders have their own farm activities to tend to and allocate little time to coordinating and implementing O&M.
6. Weak operation of irrigation water at field level that lead to:
 - Receiving more irrigation water than needed and/or;
 - Unfair water distribution between different WUA's along the Misga (field) and between misgas; one misga is 300 ha

Lessons learned and action points considered

The GAS WUA leaders and farmers, based on the experiences gained from the other WUAs and farmers, agreed to consider the following actions:

1. Put in place a system for water fee collection that consists of 1) an annual work plan that outlines key O&M activities and the budget requirements. This informs the amount of fees that need to be charged to farmers; 2) a system of penalties that incrementally increases the amount of fees for those who do not pay on time – this could reach as far as depriving a certain farmer who refuses to pay fees. *Experiences from Khor Abuhabil WUA*
2. Strengthen relationship with government and non-government organizations - this could for instance help obtain funding, materials such as machinery, training. *Yemeni Experience*
3. Provide incentives to WUAs leaders – for instance giving them priority to irrigate their land, particularly for those who need to spend significant amount of time in the field. *Ethiopian Experience.*

3.3.2 Khor Abu Habil Experience

Strengths

1. A clearly defined O & M plan that clearly stipulates what need to be done when and by whom.
2. A reliable source of funds for O&M through returns from renting of machinery and fee collection from individual farmers. This helped the WUA's to:
 - Take action in funding the O& M work without delay and without the need to rely on the central government.
 - Make pre plans for next season maintenance work using the government fund which comes later in the previous season.
3. Active in seeking sources and mobilization of funds for farmers to prepare their field and have agricultural inputs timely, through loans facilitation from Agricultural Bank, Cotton Company and non-governmental organization such as FAO which provide micro-credit financing. For instance, a loan of 45,000 USD was distributed over 400 farmers with the objective of covering costs of farming practices, land preparation, harrowing and seeds. Experience showed 92% return of the loan.

Limitations

1. Lack of strong leadership to implement the O & M plans. This emanates from the fact that there is no accountability and proper annual evaluation of the performance of the leaders followed by some appropriate decisions.
2. WUA have only minor direct involvement in the O & M of secondary and main system level structures.

Lessons learned and action points considered

The Khor Abu Habil WUA leaders and farmers, based on the experiences gained from the other WUAs and farmers, agreed to consider the following actions:

1. Greater involvement is needed in the O&M plan for the whole system starting from the river all the way to field as is the case in Ethiopian.
2. Design a strategy for holding the leadership accountable through for instance annual performance evaluation that leads to consequences - this has been useful in the Ethiopian case.

3.3.3 Ethiopia Experience

Strength

A signed agreement with clear plans for operation and maintenance between the government and WUA defines the task and role for each beneficiary. This led to identified responsibilities on who will do what and what are the collaborating organizations, their contribution and time plan.

Weakness

Very limited source of funding for O & M - the WUA does not have established relationships with non-government funding organization, nor does it generate fund from wealthy members of its community.

Lessons learned and action points considered

The Ethiopian WUA leaders and farmers are by and large content with their strategy of O&M that makes sure that every user is involved, but they see the need for more diverse source for fund raising. They are in particular, having heard that it paid dividends in Yemen, interested in approaching wealthy village mates for voluntary contributions.

3.3.4 Yemen Experience

Strength

1. One organization, the TDA, has overall responsibility for assisting farmers with all O & M needs: maintenance of river banks, head structures, provision of equipments at a reasonable cost and the technical supervision. This makes it easy for the WUA to coordinate its activities.
2. WUA are capable for preparing maintenance plans for the intake structures, regulators and canal clearance.
3. WUA are capable of making major rehabilitations works and interventions for the regulator structures, canal banks and river training.
4. A successful fee collection system from wealth members of the community that reside within and outside the country.

Weakness

1. The water fee contribution - 7.5 USD/ha for upstream users who produce banana crops, 3.75 USD/ha and 1.875 USD/ha for mid and downstream groups who cultivate food crops is both unfair and nominal in amount. In particular, the banana growers should pay significantly higher fees.
2. WUAs at different levels along the main water course (river) are not well coordinating with each other in the operation plan of the head structures.
3. Operation rules need to be strengthened among different WUA along the river.

4. Agronomic packages for fair operation are lacking. Upper stream farmers irrigate two turns for banana crop that lead to less water for the downstream farmers.

Lessons learned and action points considered

The Yemeni WUA leaders and farmers, based on the experiences gained from the other WUAs and farmers, agreed to consider the following actions:

1. A system for O&M that consider different stakeholders at the river (Wadi) level with a clear plan. *Ethiopia Experience*
2. Traditional experience in river and canal banks enforcement for prevention of scour using mesquite plant; inserting two pieces of mesquite wood at 45 cm-1 m spacing filled with the mesquite tree that will be naturally cemented later with the sediment from the sediment laden water in the river. *GAS Experience*

3.3.5 Toker Experience

In Toker, there is not yet an established WUA - O & M is planned and implemented through a voluntary committee in collaboration with the Toker Agricultural Scheme authority.

The Toker representative farmers acknowledged that they need to be organized into a WUA and have well established committees responsible for O&M. as is the case in Ethiopia, such committees should be given incentives in the form of payment or in kind such as priority for irrigation. The taxation system of traffic that passes the delta generates already substantial money, but this could be strengthened with better enforcement.

4 Conclusions and Recommendations

After 3 days of interactive sessions and one full day field visit to the GAS, the workshop wrapped-up with the following conclusions and recommendations:

1. The term of WUA leaders should be 3 years - 2 years is not effective. There should be annual evaluation of the performance of a WUA and its leadership.
2. A WUA to be successful, it should be guided with its own internal rules and regulations - its hands must not be tied with other external rules.
3. Fair water distribution rules that give due consideration to the elderly, women, and other less-able segments of the community is an obligation a WUA must implement.
4. A community-level court with binding decisions to solve conflicts on the basis of the by-laws of a WUA.
5. Involvement of women in WUA activities is crucial and need to be given priority.
6. WUA leaders should be given incentives either in cash or in kind such as allowing them to irrigate first - no one works for free.
7. Operation and Maintenance (O & M) can only be effective if there is a plan with clear activities, time-schedule, budget, and division of responsibilities among government institutions, WUA and individual farmers.
8. WUA leadership should make more effort to identify alternative sources of funding for O & M, besides the water fees including contributions from rich members of the community.

9. WUA should have strong relationship with various relevant government and non-government institutions - this is critical for scientific guidance, training and financial sustainability.
10. More focus on farmers training and exchange visits tailored at sharing practical knowledge and experience.
11. Solutions-oriented adaptive research on soil, irrigation and farming systems as well as sustainability of WUAs.

5 Follow-up activities

As part of follow-up activities:

1. A knowledge sharing workshop is to be organized in April 2013 in Yemen when farmers from Sudan and Ethiopia will participate. This will mainly focus on the rich experience of Yemen in different water diversion, distribution and on-farm as well as canal and field embankment protection structures; farming practices and ground water recharging practices using spate flow.
2. The various experiences of WUAs from Sudan, Ethiopia and Yemen summarized in this report will be integrated into the spate irrigation short course offered annually in delft, the Netherlands and other regional training course.