

REPUBLIC OF YEMEN
SANA'A UNIVERSITY – WATER ENVIRONMENTAL CENTRE
SPATE IRRIGATION FOR RURAL ECONOMIC GROWTH
AND POVERTY ALLEVIATION PROJECT - YEMEN

SHARING EXPERIENCES AMONG WATER USER ASSOCIATION IN
SPATE IRRIGATED SCHEMES
REGIONAL WUA WORKSHOP REPORT
Al-Hodiadah - Yemen



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Acknowledgement

First, a great thankful for all how have shared in making this successfully workshop from Yemen especially WEC director, TDA chairman, Irrigation council chairman of wadi wadi Zabid, and WUA's Members in wadi Mwar and Zabid who shared in all activities specially in field visit.

Second the Yemen spate project team is very thankful for the financial support provided by IFAD, UNESCO-IHE and Spate Irrigation Network. Also, the Yemen spate project team would like to express thier deepest gratitude to Dr. Abraham Mehari Haile for his support and coordination for this workshop and other activities of spate project in all countries shared in the workshop.

Finally, very thankful to IFAD, Spate Irrigation Network and UNESCO-IHE for organizing a very successful farmer to farmer experience sharing events.

1. Introduction

Spate irrigation in Yemen has been found since many centuries ago and considered as one of the oldest irrigation system all over the world. The traditional water sharing and distributing rules; operation and maintenance for the irrigation systems; irrigation management system and irrigation structures, all of that are show a high developed irrigation systems. Several studies show that these system are not belong to the present community, but it is at least for 1000 years earlier, since there is a huge distance between the nature of the present community and the complicated and full organized system which include all variables and factors.

In Yemen there are several spate irrigation systems, traditional systems, improved systems, and modern systems. In addition, organizing this workshop in Yemen gives a great opportunity to show the most oldest and developed spate irrigation systems and structures around the world and to learn traditional role and experience and knowledge from the local farmer's in Yemen.

The Sharing Experience among WUA's in Spate Irrigation Schemes workshop held in Al-Hodeida – Tihama plain – Yemen where most spate systems existing. This workshop gives participants chance to share their experiences in spate irrigation water management, conflict mitigation as well as operation and maintenance issues. The workshop was for three days, one day was for presenting and discussing the history and establishment of WUAs; Water sharing and spate water distributing along the field and operation and maintenance principles and practices, the second and third days a field visits are held to Wadi Mawr and Wadi Zebied to see the irrigation systems, the control and division structures, and crops planted in these areas. Moreover, on site discussions were also conducted between the farmers and WUA leaders exchanged ideas during these field visits.

This report draws upon the knowledge and experience sharing workshop that was held Al-Hodeida – Tihama plain – Yemen from 24 to 28 November 2013. The workshop brought together 40 farmers and 10 professionals active in the field of spate irrigation development and management in Ethiopia, Sudan and Yemen. The participants were 4 from Ethiopia, 8 from Sudan, and 38 from WUA's, farmers from different spate regions in Yemen. In addition during the field visit many WUA's members and farmers shared in the discussions.

The workshop was done according to the program attached in annex (A) as follows:

1. Two weeks preparation for the workshop:
 - a. Preparing the Visas for Sudanese and Ethiopian
 - b. Preparing stationaries and printing documents and posters
 - c. Preparing the all facilitations and coordination for the workshop
 - d. Receipting all the international participants 23& 24/11/2013
 - e. Travel with all international participants to Al-Hodiadah at 23& 24/11/2013
2. Workshop first day 25/11/2013: Workshop opening and exchange knowledge and experiences lectures and discussion.
3. Workshop second day 26/11/2013: Field visit to wadi Mawr in the northern of Tihama plain.
4. Workshop third day 27/11/2013: Field visit to wadi Zabid in the southern of Tihama plain.
5. Workshop third day 26/11/2013 evening: Workshop closing ceremony held in Zabid city

6. At 28/11/2013 travel back to Sana'a

In this report, first the specific objectives of the workshop, spate irrigation experiences and field visits are presented. Next, the specific experiences shared are detailed. Finally some recommendations are made.

2. Workshop Objectives

- ❖ Create platform for knowledge and experience sharing in management of spate irrigation systems, and spate water distribution among farmers and professionals from Ethiopia, Yemen and Sudan.
- ❖ Give opportunity to farmers and professionals from the three countries to visit spate schemes to see traditional, improved and modern spate systems, and distribution structures.
- ❖ Promote networking and strengthen linkage among the farmers and professionals from the three countries.

3. Spate Irrigation Experiences and Knowledge

In the first day of the workshop all spate irrigation experiences from different Yemen spate regions and countries shared in the workshop.

First during the workshop opening all speeches was mention welcome to all participants and the experiences of spate irrigation and WUA's participation in this field.



Photos (1&2) Workshop opening

Second the spate irrigation experience in different countries and Yemen different region was presented by spate project team leader and WUA's members.



Photos (3 to 8) Presenting the spate irrigation experience in different countries and Yemen different region

Third the exchange experiences and knowledge were presented from different countries participants and different Yemen wadis WUA's and Farmers participated in the workshop.



Photos (9 &10) Yemen wadis WUA's and Farmers presenting the experiences and knowledge



Photos (11 &12) Ethiopian participants presenting the experiences and knowledge



Photos (13 &14) Sudanese participants presenting the experiences and knowledge

4. Spate Irrigation Schemes Field Visit:

The field visit during the workshop was done to two schemes Wadi Mawr and Wadi Zabid.

4.1 Field Visit to Wadi Mawr:

Wadi Mawr is one of the largest wadis (ephemeral rivers) systems in the Yemen Republic (YR). It has a catchment area of about 7910 km². The mean annual rainfall in the wadi watershed about 475 to 800 mm/year and the mean annual flow of the wadi is estimated at 210 m³. The total irrigated area is about 62,000 ha. In this wadi complete spate irrigation had been constructed, which included diversion structures with sluice gates, intakes, sediment trap and syphon (photos (15&16)).



Photos (15 &16) wadi Mawr diversion structures and main canal

The visit to Wadi Mawr included the visit to the diversion structure include (intakes, sluice gate sediment trap) and syphon which supply south canal and main canal (photos (17 to 22)). In addition to the visit of south canal which is about 20km long, along this canal a several control structures is visited and a discussion between participants. Also, along this canal several agricultural practices were observed such as: Banana plantation, mango and sorghum. Moreover, at the tail of the south canal a small discussion between workshop participants and farmers and WUA's members of wadi more is made (photos 22 to32). In this discussion a lot of experience and knowledge is shared.

During the on-site discussions, it was evident that the banana plantation owners, who are usually big land lords are extracting huge amount of water from the wadi-head leaving little water to flow to the other crops at mid and downstream reaches, where sorghum growing.

Farther, during the field visit key questions were raised with regard to the functioning of every part of diversion structure especially the sediment trap, syphon and the water sharing among the users. This diversion structure Have two sediment traps is seen as an innovation because it makes desilting operation practically possible. As big 4floods could quickly fill the sediment traps, while one sediment trap is operational and supplying water to the main canals, the second one could be flashed and disilted. The sediment traps complemented by the scour sluice gates have been very effective and the Wadi Mawr Scheme has not faced severe sedimentation problems as is the case in many spate irrigation schemes.

Finally, the water sharing in Wadi Mawr follows the traditional water rights rule "al aala fil aala", which means upstream first. This is unfair and gives a lot of leverage to the upstream babana growing by big farmers. In the old days, some 40 to 50 years ago, when only traditional earthen diversion structures were used, the large floods have often broken these diversion structures and the downstream farmers have often received water. With the modern structures in place and the greedy rich farmers in the upstream, water flow to the downstream have been significantly curbed.



Photos (17 to 20) Wadi Mawr diversion structure, sluice gate, intakes



Photos (21 to 22) Wadi Mawr syphon



Photos (23 to 24) Wadi Mawr south canal



Photos (25 to 26) Wadi Mawr south canal control structures





Photos (27 to 30) Wadi Mawr south canal some planting crops (**Banana, Mango and Sorghum**)



Photos (31 to 32) Wadi Mawr south canal small discussion with Framers and WUA's members

4.2 Field visit to Wadi Zabid:

Wadi zabid is the second largest spate irrigation scheme in Yemen with a total estimated irrigated area of about 15,215 ha, with watershed area 4630km, the annual rainfall from 550 to 1000 mm/year, and the annual flow is 135 Mm³. This wadi is the first wadi improve in Tihama region, five structures were constructed through the wadi main channel. These structures were constructed as two modern structures in the upstream reach, two in the middle stream reach, and one the downstream reach. Two of these structures are with one side intake and three of these structures with two side intake (intakes in both banks of the wadi). Moreover, sixteen main canals is constructed through the irrigated area, and sixteen WUA's were formed (WUA for every main canal).As in the case of Wadi Mawr, the change in the crop pattern from cereals crop to cash crop (from sorghum and maize to banana and mango cultivation) led to deprivation of water to the downstream farmers and overexploitation of the groundwater - in some areas the groundwater is as deep as 80m. Banana crop occupies an area of about 3,600 ha (photos (33 &34).



Photos (33 to 34) Wadi Zabid diversion structures

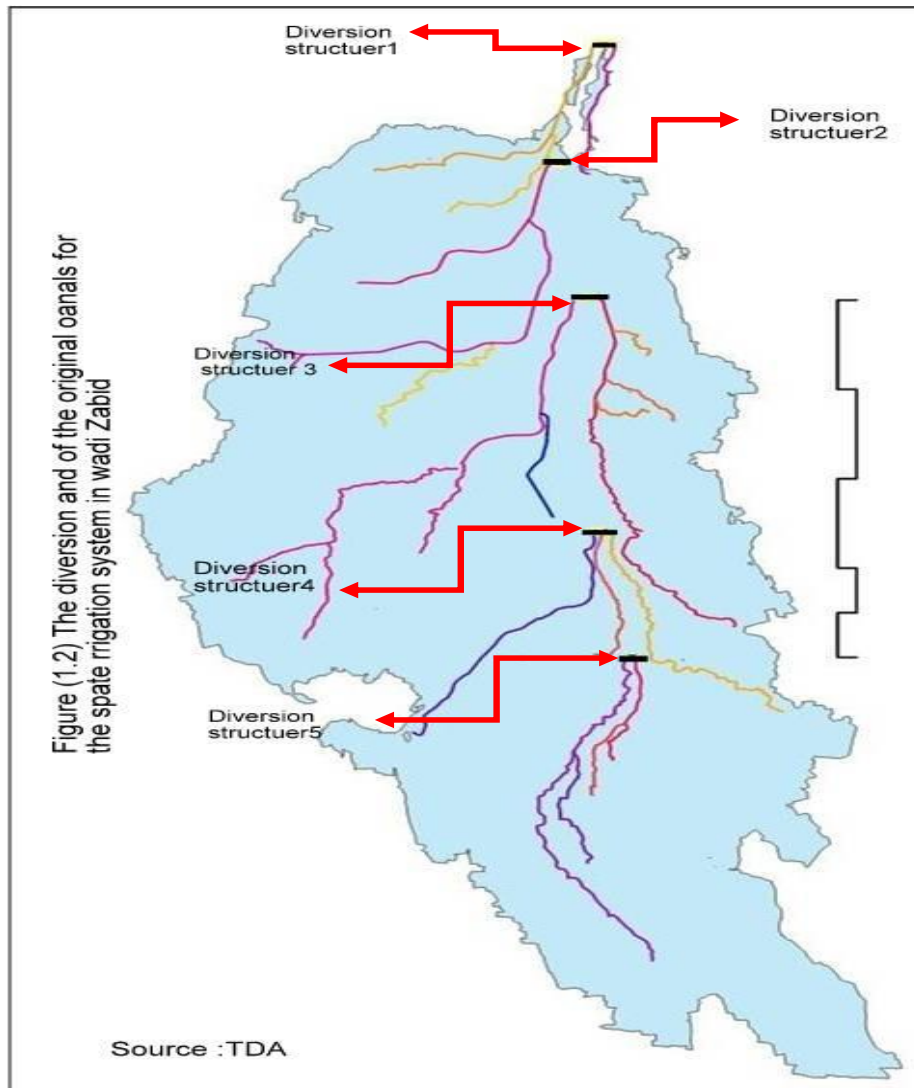


Figure (1) the diversions and main canals in wadiZabid

In wadi zabid the workshop participants with WUA's members and some farmers visited the following structures:

- i. Traditional field spill way: this structure is used to control excess water and erosion of field border and field soil



Photos (35 to 36) Traditional field spill way in Wadi Zabid irrigated fields

- ii. Field visit for improved control and off-take structure in Mawi- Ysiffi main canal in Wadi Zabid



Photos (35 to 36) Improved control and off-take structure in Wadi Zabid main canal

- iii. Field visit to Al-Riyan diversion structures. This structure is one side intake only and exist in the upstream reach



Photos (37 to 38) Diversion structure no. 2 in Wadi Zabid

- iv. Field visit to improved traditional division structure in Garhazi - Ebry main canal in wadi Zabid. This divided the canal flow to two main canals, Garhazi and Ebry in proportional of one third and two third, as the water right for each canal.



Photos (39 to 41) Improved traditional division structure between Garhazi and Ebry main canals

- v. Field visit to diversion structure no. 3 in wadi Zabid. This structure is two sides intake (Mawi – Yusiffi intake at the right banks and Ebry-Garhazi intake at the left banks. For structure safety earthen a fuse-bulge is constructed through the structure.



Photos (42 & 43) structure no. 3 in wadi zabid

There was a very detailed discussion between workshop participants and wadi zabid farmers and WUA's members on every visited structure. They explain the working proses, challenges and constrained. In this field visit a lot of experience and knowledge was share.

5. Closing Ceremony

At 27/11/2013 night the irrigation council in wadi zabid with help of spate project in Yemen made a closing ceremony for the workshop in the collage of education in Zabid. In this ceremony several speeches for TDA- South branch manager and chairman of Irrigation council which were discussed the spate history in wadi Zabid and the formation of WUA's and Irrigation Council and their functioning, in addition to some speech for international participants. Then through the ceremony some traditional dancing and other activities were done. At the end of this ceremony the certificates for all participants in distributed.



Photos (44 to 47) speech of chairman of irrigation council and TDA – south branch manager and participants



Photos (48 to 51) traditional dancing in tihama region in the closing ceremony



Photos (48 to 51) Certificates distribution for participants

6. Experiences and Knowledge shared

The experiences and knowledge shared between the farmers of the three countries can be categorized in to **WUA-WUA meeting, and farmers and WUA's members - farmers and WUA's members through field visit to Wadi Mawr and Wadi Zabid spate schemes**. In addition to, the explanation of maintenance engineers of the two schemes.

6.1 WUA-WUA meeting

The meeting was held on 24/11/2013 at Tihama Development Authority (TDA) in the coastal city of Alhodidah - Yemen. This meeting was attended by deputy of Al-hodiadah governor, TDA chairman, WEC director and chairman of irrigation council.

Yemeni Experience

In the first session, the water and environment center director Prof. Abdullah Saleh welcome the entire guest from different countries. In the same way Dr. Sharafaddin A. Saleh the coordinator of the spate project in Yemen, WUAs director and the government presenter talked about spate irrigation in Yemen.

In Yemen there are Centuries old water sharing rule called Aurf this traditional rule call (Alala ful Alala) main upstream first. This traditional rule applied in all wadis of Yemen with some modification for every wadi.

In wadi Zabid has specialist traditional water right allocated 600 years ago by ALjabrty and still applied till now. This rule divided the spate water between the wadi's three reaches (upstream, middle, and downstream), so that allocates 286 days including base flow period for upstream reach, 45 days on the flood season for middle reach and 35 days on the flood season for 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 an excellent set of overflow control and canal embankment structures that reduce scouring, sedimentation and increase water distribution efficiency.

In wadi Tuban another specialist rule beside the tradition rule of alala ful alala depend on the flood flow if it small flood its used in ras alwadi, if it medium flood its used in small wadi branch, and if it large flood its used in alwadi alkabier

In wadi Bana in Abyan region have other priority beside traditional rule for complete the irrigate land in second season before start the water for new year. In addition to give priority for which have no irrigation water for last three years?

Finally in wadi Mwar, Rima, and Siham applied the traditional rule without any modification.

Ethiopian Experience

Accordingly, the Ethiopian delegates have witnessed that:

- i. In terms of the institutional strengths, the WUA of Ethiopia is the strongest one. This is mainly because:
 - a. The water user associations were able to ensure fair distribution of water between the upstream and downstream users. To ensure the fairness different water distribution techniques are utilized such as “Lottery Basis” and “Turn Basis”.
 - b. Elders and female headed household members are motivated by giving them priorities and avoiding night time turns.
 - c. The WUA chairperson is also motivated by allowing him the first turn during flood diversion.
 - d. Unlike to Ethiopian experience, the water distribution in Yemen is unfair as it ensures the most upstream users full right to divert the flood at any time.

Sudanese Experience

Accordingly, the Sudanese delegates have presented two of the practiced experiences shared by the Ethiopian farmers during the Sudan workshop namely:

- a. The first practiced experience, which has been gained from Ethiopia, is to establish social court at the water user association/ lowest governmental administration/kebele level. This court is acknowledged and empowered by the government and will be responsible for resolving water related conflicts. Furthermore, the court’s decision is binding with no interference from the government.
- b. The second practiced experience is to elongate the service life of the WUA chairman in to three years which was previously limited to a maximum of two years. This enables, to create a stable institution.

6.2 Visit to Wadi Mawr and Wadi Zabid

The schemes visited, Wadi Mawr (62,000 ha capacity) and Wadi Zabid (15,215 ha capacity) are sustainably constructed and the structures are impressive in terms of their design, construction quality and irrigation capacity. The Ethiopian farmers experience in this regard is, to construct many small structures with an irrigation capacity of 500 ha.

The other experience gained from Wadi Zabid is designing the weir as fuse plug in which the central part of the weir crest is made of earthen dyke structure which can easily be destroyed in case of high floods. Furthermore, the construction of field bunds and the water delivery system within these spate systems is inspiring experience to share. Finally, the construction of soil and water conservation structures/stone bunds around the mountainous areas of the highlands is also very remarkable. By constructing these structures, it was able to increase the size of irrigable land around the highlands.

7. Recommendations

1. The key recommendation here is, the experiences gained and shared are valuable.
2. The good experiences should start to be exercised like what is presented by the Sudanese farmers.
3. Similar tour should be prepared by the Ethiopian delegates for esteemed experience sharing.

4. These shared experiences and knowledge should be expand to involve most countries practiced spate irrigation such as Eretria, Iran,etc
5. The spate project should be expanded to continue the spate experiences documentation, and sharing, and to strengthening SpN.

8. Annexes

8.1 Annex (A) Workshop program

REGIONAL WUA - WORKSHOP – YEMEN

SPATE IRRIGATION FOR RURAL ECONOMIC GROWTH AND POVERTY ALLEVIATION PROJECT - YEMEN

22 To28 November 2013

Day/Date	Time	Activity	speaker/moderator	
Monday 25/11/2013	8:30 – 9:00	Registration	Ismail	
		Opening		
	9:00 – 9: 10	Opening remarks: WEC director	Prof. Babaqi	
	9:10 – 9: 20	Opening remarks: UNESCO-IHE and Spate Irrigation Network	Dr. Abraham	
	9:20 – 9:45	Opening remarks: WUAs from Yemen, Sudan and Ethiopia	WUA chair persons	
	9:45 – 10:00	Welcoming remarks: TDA Chairman	Dr. Bdoalsalam Al-Taib	
	10:00 – 10:15	Welcoming remarks: Hodiahah governor	Eng. Akram Abdullah Ateeyah	
	10:15 – 10:45	Coffee break		
	10:45 – 11:10	Overview of spate irrigation systems in Tihama region	Eng. Jafer + Eng. Abdulbaseat	
	11:10 – 11:30	Overview of spate irrigation systems in Abyan & TubanWadis	Dr.Sharaf + Behlol + Alkielah	
	11:30 - 12:00	Overview of spate irrigation systems in Sudan	Eng. Kamal + Eng. Mahmud Abo-Sin	
	12:00 - 12:30	Overview of spate irrigation systems in Ethiopia	Tesfaalem and Martha	
	WUA and farmer representatives share experiences on managing spate irrigation systems			
	12:30 - 12:40	WUA's Experience in all Yemen	Amar Rasam	
	12:40 – 13:10	Experiences from Yemen	Tihama Wadis + Tuban and Abyan wadis	
	13:10 – 13:30	Discussion		
	13:30 -14:30	Lunch break		
	14:30 -15:00	Experiences from Ethiopia	Meresa and kaleyta	
	15:00 – 15:45	Experiences from Sudan	Algash + Abo-habil +	

			Tugar wdis
	15:45 – 16:15	Discussion	
Tuesday 26/11/2013	Field trip and on site discussion on technical, water sharing and O&M issues		
	8:30 – 17:00	Field Visit to Wadi Mawr Headwork , irrigation canals and fields	Wadi Mawr WUA'a + participants
Wednesday 27/8/2013	8:30 - 13:00	Field trip to Wadi Zabid	Wadi zabid WUA'a + participants
	13:00 – 14:30	Lunch break	
	14:30 – 17:00	Free time for participants to prepare for the closing ceremony	
	17:00 – 17:30	Wrap-up: Summary: Main Experiences Shared	Dr. Sharaf
	17:30 – 22:00	Closing ceremony	