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Final report of Local Community initiatives
in Water Governance

ALMALIKA village initiative to prevent
transfer of groundwater in - Bani
HUSHAISH District- Sana'a to other areas
for Qat cultivation

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1. Reconnaissance and Identification of five local initiatives ;

1.1 Introduction:

The concept of water governance refers to deciding on certain weighted and balanced intervention by joining political, social, economic and administrative systems in order to develop and manage water resources, and to deliver water services, at different levels of society” (Global Water Partnership, 2003).

In spite of considerable efforts made and resources allocated by the Yemen government towards the above indicated objective, good governance, as an essential aspect for effective water resource management did not receive the required attention by decision makers. This applies at both the national and the community levels. More attention and considerations for these aspects are observed to have come through the projects funded by international Donors such as WB, GIZ etc...

Nevertheless, several governmental efforts for supporting water governance at community level were found which can be summarized hereunder :

- Development of legal framework laws, rights and regulations which can facilitate the development of water users associations., ,
- Provision of supports on water management through central or specialized projects such as GSCP, Sana’a basin and others.
- Establishing partnership among all water agencies , donors and other stakeholders.
- Support decentralization processes which led to establishing basin committees and the development and application of basin plans.
- Providing supports to administrative and executive decentralization entities such as local councils and related agencies.

The main objective of this case study is to better understand what aids or impedes local community initiatives to be familiar with their performance as to improve related efficiency, to assess equity and sustainability aspects of water resources management systems and develop ways and means on how government can encourage such initiatives to enhance, promote and improve collective social water resources governance schemes (practices and management) in the rural areas.

Some local communities have served as tools for best water governance by adopting mechanisms for managing water resources in an efficient manner and reducing social conflicts among the local community entities. However, high level of poverty and dominant illiteracy in Yemen and at local community levels in particular are considered to be limiting factors that affected the sustainability of these initiatives.

In addition, the envisaged local community initiatives represent unique forms of organized community water governance. Some initiatives succeeded, at least, in securing sustainable water management and in reducing natural and social conflicts and in minimizing risks threatening their water resources. Some of these have been identified as under:

- 1. Local community based initiative for spring water management and conservation in AL-QOSHE'Y Village- Otuma District-Dhamar province**
- 2. Community based spate water management initiative MoazSpate Diversion structure- Shibam district , Hadhramaut Governorate.**
- 3. Local community initiative- on monitoring groundwater in ALMAAFER district - Taiz Governorate**
- 4. local community based initiative on management and conservation of harvesting water Kohl Village – Dhebain District - Amran Governorate**
- 5. Local community based initiative to prevent transfer of groundwater from Al-Mailkah village , Bani Hushaish district, Sana'a Governorate to other areas through tankers for irrigation of Qat**

The sustainability of these initiatives have been found to vary depending on social participation , economic situation of the community members , availability of technical and financial support, institutional arrangement and educational level of the society..

In this report we have studied and assessed five local community water governance initiatives, that cover several sectors of water resources management systems.

1.2Methodology & Approach Description:

The assigned team has applied the following steps for identifying the above initiatives and performing in depth analysis to assess these initiatives.. These steps are described as follow:

1. communication were established with subject matter specialists in the targeted regions based on close coordination with GSCP.

2. Designing of guidelines, as a reference, to be applied for focus group discussions/ .Focus group discussions were held with all interest groups related to selected initiatives. These meetings were conducted with beneficiary representatives, responsible individuals for each initiative, community leaders and sector related projects and respective governmental bodies.
3. Separate meetings were held with women which were led and moderated by the gender specialist of the team.
4. In all meetings focus group discussions approach was applied where important data and information have been recorded and collected according to a list of guiding questions and based on field observations.
5. Available and relevant initiative's documents were reviewed, including internal organizational by-laws, annual plans, accounts records etc..., and used for the assessment process.
6. Topographical and selected photos were taken over initiative locations and their respective territorial operations.
7. Conducted field visits to all initiative's sites based on allocating 4 days for each selected initiative.
8. After concluding all field visits, round meetings were made by the team to review all collected data and information and to identify likely gaps . The purpose of these meetings was also to complete information shortcomings through repeated contacts with related stakeholders and to summarize final outcomes.
9. As a final step the team has elaborated the draft mission report according to the related TORs provisions.

1.3 Detailed description of the five initiatives:

Annex I , gives the historical background of the above five initiatives identified related to use and management of water resources, social and environmental issues related to water use , development of initiatives , constraints faced and the contribution of the communities in resolving the constraints etc.

2. Selection of the local Initiative for detailed study as for TOR

After the identification of five local initiatives as described in Annex I , The five initiatives were selected on the basis of the following criteria:

- These are relevant to other communities that might want to undertake similar efforts.
- These may have potential impact on the equity, efficiency and sustainability of water resource and stakeholders livelihoods
- Government could encourage such initiatives.

Based on the above criteria, the following local initiative was selected for detailed study as per the TOR:

“Local community based initiative to prevent selling of groundwater to local vendors in Al-Mailkah village , BaniHushaishdistrict, Sana’a Governorate”

3. Summary of Case Study of Local community based initiative to prevent selling of groundwater to local vendors from wells around Al-Malikhah village , BaniHushaish district, Sana'a Governorate;

1. Summary

Geographical location of Al Malikhah village;

ALMALIKA village is located 20 Km North east of Sana'a city , under Bani-Hushaish districts Sana'a Capital local administration . The coordinates of the area are (38p) 422 433.74mE , 1770814.21mN and altitude 2234 m.

According to the local sources, the population of the area is about 4000 inhabitants , 49% females. All the residents belong to Bain Al-Harith tribe.

Main economic activities of the residents;

Agricultural is the main income source for majority of local population . The total cultivated land is estimated to be 6440ha. 7% of this area (440ha)is owned by Al-Malikhah village residents and the rest by neighboring villagers.. The groundwater is the main irrigation source in the area. The Main agricultural crops are:

- Several types of grapes (Asemi, Raseqi and Sawad) , representing 35% of cultivated areas.
- Vegetables , represent 30% of the total cultivated area. and
- .Qat , represents 35% of the total cultivated area.

2. Water Resources in the Area and its Uses;

- **Rain fall in the area:**

Rain fall ranged between 80 - 200 mm. according to the available records. However, the rainfall varies over years and within each year including its distributions.

- **Groundwater sources and uses:**

The area is part of Sana'a basin .Groundwater level within Al-Malikhah village is decreasing by 0.5-1.5m. every three years. The village has water user association (WUA) mandated, among other tasks, to observe the use of groundwater in the 15 wells near the village. Agriculture consumes up to **80% of groundwater** and 20% is used for household activities.

3. Selling of ground water to outside vendors:

The well owners were selling groundwater from their wells to local vendors.

3.1. Main reasons of selling groundwater from wells in Al-Malikhah area can be summarized as under:

- Increasing use of groundwater for Qat cultivation in neighboring areas.
- The attractive price offered by Tankers / outside vendors for groundwater to well owners .
- Poor living standards of local people which led many owners and users of wells to look for other income sources through selling water to others. This was the situation before the initiative to prevent selling of water started.

3.2. The price of sold water in YR/cubic meter.

The prices of sold water ranged between 1000-1500YR /20 m³ Tanker . It is estimated that sold water reached 20-50 tanks from each well/ day. The water was sold to be used mainly in irrigation of Qat farms which explains the high price paid.

3.3. The problems created by selling of ground water

Since the groundwater is extracted from the same basin, which all residents share , such extra extraction has affected the entire basin . These effects are summarized as follows:

- a) The increased sale of groundwater to vendors has led to widespread activities of water vendors in the area, to transport and sell more groundwater to other areas thus leading to more groundwater extraction and then
- b) This in turn has decreased water levels of the wells in the village The decline in the water level is found to be between 0.5-1.5m every three years.
- c) By increasing the depth of groundwater wells the salinity level is likely to increase .
- d) Eventually ,this will lead to water shortage and scarcity.

3.4 The Concept of the Initiative

The above adverse impacts of selling groundwater to neighboring areas, led to the development of this initiative. The idea came from local leaders which focused on preventing the selling of groundwater from the village wells to outside vendors. **In June 2008**, the initiative was adopted officially by the local community .

Consensus among villagers to adopt this initiative: Since 6 wells are not located, in Al-Malikhah' village their owners didn't agree to comply with banning water selling from their wells. Local community (WUA) tried to arrange a deal with those well owners and offered same payments to them but with no success. The other owners of the 9 wells fully comply with the initiatives and stop selling groundwater from their wells to outside vendors

Governmental role in supporting the initiative SBWM project and Sana'a NWRA branch also supported this initiative through implementing public awareness campaigns

3.5 Social impact of the initiative;

Good level of awareness among the members of the community is being created..

These campaigns have created an alert to the local community of Al-Malikhah and neighborhoods societies, on threats caused by continuous selling of groundwater leading to decrease of the ground water levels.

3.6 Women role towards the initiative:

Women played a major role in supporting this initiative by advising their husbands on the importance of preserving groundwater in the area for irrigation and drinking purposes.

3.7 Economic impact of the initiative;

By preserving groundwater selling to outside vendors, thus enabling the community to irrigate other crops that will bring additional income to the family.

3.8 Environment impact of the initiative; it decreases the fear of declining water depth and fear of increasing water salinity of drinking fresh water. It would improve sustainability of Sana'a Water Basin.

3.9 Main obstacles :Low levels of awareness, Lack of initiative promotion, enforcement, skills and absence of governmental supports after closing of Sana'a Basin Water Management Project.

3.10 Sustainability of the Initiative; as a result of saving of 1500 m³/d of groundwater after this initiative , there has been positive response of the community.

3.11 Replication of the Initiative in other areas; this initiative was replicated by Wa'alan WUA, Bait Sarhan and Alhamrmaly WUA , Al Ma'akhady WUA and Qa'a Al-Shams WUA, all these are in Amran Governorate.

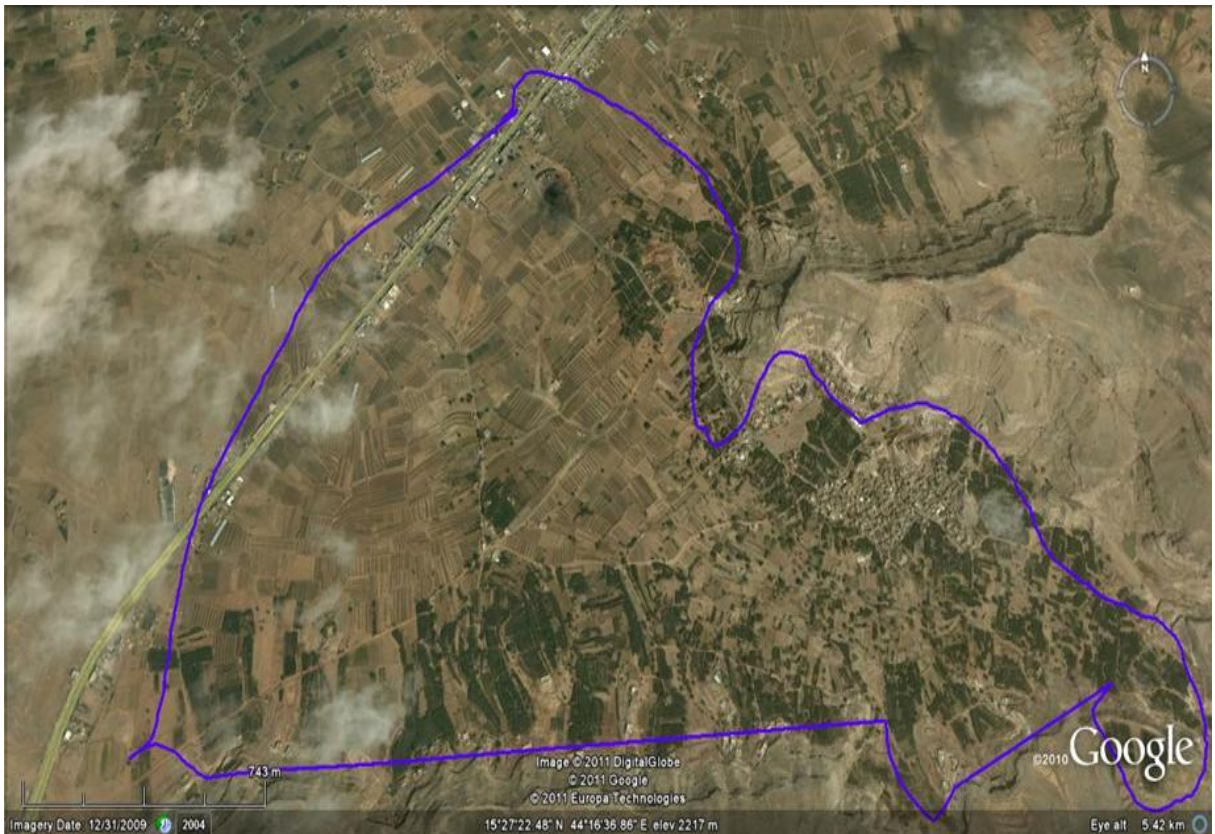
3.12 Opportunities for future improvement and major lessons learned: NWRA and the local administration have supported this initiative by taking several actions including awareness campaign among the farmers about the importance of saving of groundwater through the prevention of selling f groundwater to vendors for use in other areas, especially for qat cultivation. The campaigns also focused on the use of saved water for drinking and other household purposes in future as well as for changing of the cropping pattern .. This initiative has encouraged close observation of illegal drilling

4. Details Report of Case Study of Local Initiative “Preventing the selling of GW for outside Venders by Well Owners in Al –Malikah Village

4.1 Introduction:

- **Geographical location of Al Malikah village;**

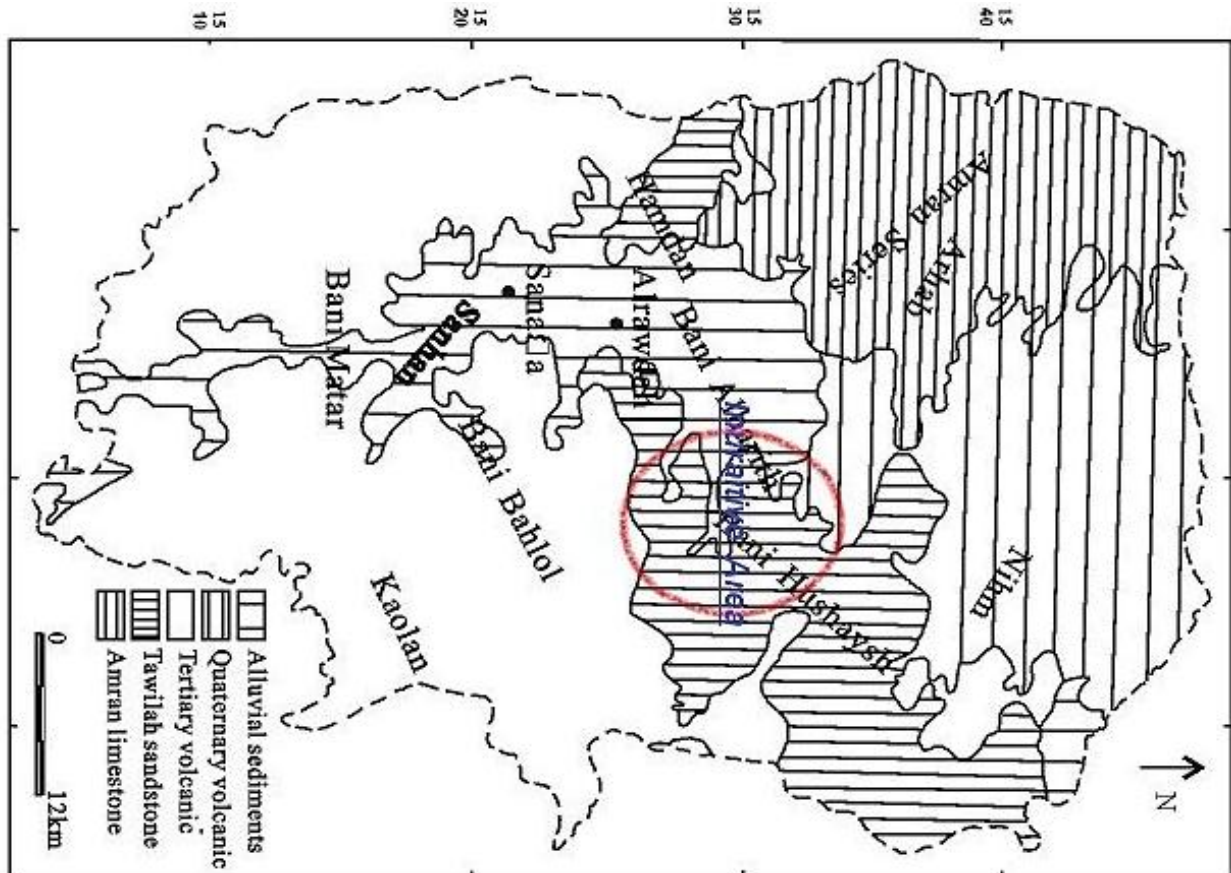
ALMALIKA village is located 20 Km North east of Sana’a city , under BaniHushish districts - Sana’a Capital local administration . Its borders are rest of ,BaniHushish from the east, Jabal ALSAMA- Arhab district from the north, Bait ALHANAMI and the main Road (Sana’a- Marib) and Bait Dehra mountain and Sana’s city from the south .



The area coordinates are (38p) 422 433.74mE , 1770814.21mN and altitude 2234 m.

- **Topography of the area;**

Al-Malikhah area is surrounded by mountains from 3 directions. The morphological features of the whole country as well as of the study area, formed largely as a result of the tectonic and volcanic activities during the Tertiary, were then modified to some extent during the Quaternary period. Then drainage systems developed; river terraces, alluvial plains and coastal plain were formed.



Unconsolidated deposits of the Quaternary cover about 15% of the Basin area. The area is part of Sana'a sub-basin number 11 that confined to wadi Al-Sirr which represents part of the areas that form the Sana'a plain.

- **Population of Al-Malikhah village;**

According to the local sources, the population of the area is about 4000 inhabitants , All residents belong to Bani Al-Harith tribe.

- **Main economic activities of the residents;**

Agriculture is the main source of income for the majority of the local population. Agriculture has developed on the use of ground water as a main source for irrigation

The total cultivated land is estimated to be 6440ha, 7% of this area(440ha) is owned by Al-Mlikah village residents and the rest by the neighborhoods villagers

Main agricultural crops are:

Several types of grapes (Asemi, Raseqi and Sawad) , representing 35% of cultivated areas. Vegetables , represent 30% of the total cultivated area. And .Qat , represents 35% of total cultivated area.

4.2 Water Resources in the Area and its Uses;

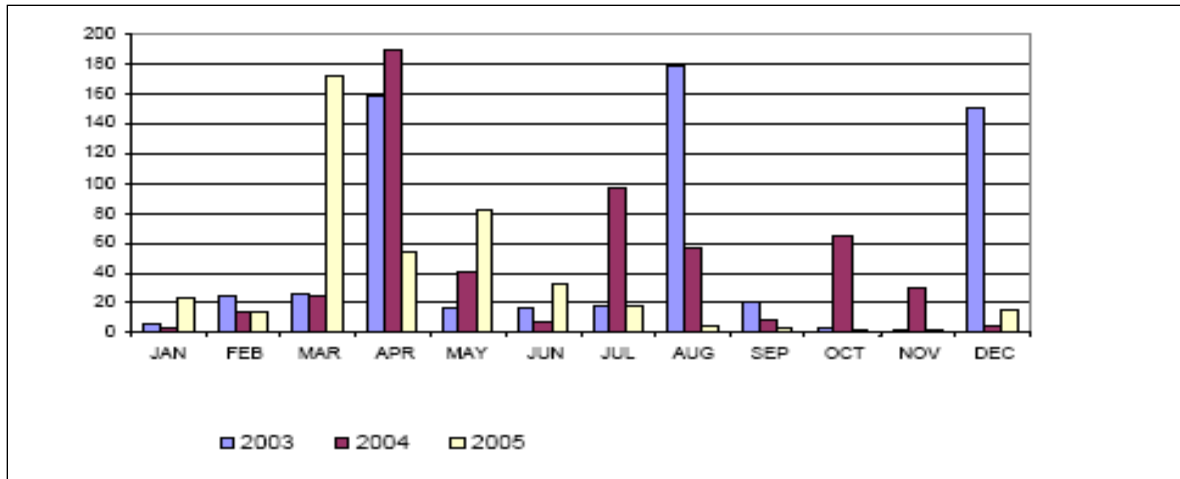
- **Rain fall in the area:**

The area is located within the highland where climate is considered to have relative moderate climate components. It lays within Sana’a water basin. The main crops grown and cultivated in this area are Grapes, and figs while it is observed that Qat fields are increasing. The figures displayed in table 1 below show the quantities of rainfall during the period 1998 through 2002 and the rainfall in 2010Table (1): in north of Sana’a

No.	Year	Rainfall (mms)
1	1998	277.4
2	1999	91.9
3	2000	63.9
4	2001	302.2
5	2002	83.4
6	2010	200-

However, **it could be observed from the figures presented in the above table that** the quantity of rainfall vary over years. In addition it is also reported that the quantity of rainfall varies within each year (i.e. the distributions).

The figure (1) shows the variation in average monthly rainfall in Sana'a basin for the period **from 2003 to 2005**



Source; (NWRA, 2006)

- **Groundwater sources:**

The area is part of Sana'a basin (SB) and covers the area lying at the eastern side of western highlands (within a longitude between 39 and 45 and between the lines 16.70 south and 17.40 north). It contains a total estimated area of 3240square kilometers. Its upper part forms the main source for feeding wadi Al-Khared which is considered to be one of the two main sources for feeding AL-Jawf valley ending up towards Al RUB ALKHALI desert. . SB is considered to be one of the most critical basin in terms of water scarcity. This is created by acute depletion of groundwater as a result of the various economic activities in the region.

Hydrologically, the Sana'a Basin can be divided into an upper (northern) unit and a lower (southern) one. These units are referred to as the Wadi Al Kharid Hydrological Unit and the Musyareka Hydrological Unit, respectively. Within each groundwater zone, there are a number of major wadi catchment zones, or sub-basins. On the basis of surface water drainage systems and topography, a total of 22 sub-basins have been identified

Sana'a basin is facing a gradual depletion which became evident through decreasing ground water levels.

Al-Malikharea contains 15 wells. 6 of these wells are located in BaniAlharith district and 9 in BaniHushaish district as the targeted village is located within these two districts.

Water is obtained in Al Malikah village through drilling of wells which are drilled between 150- 300m. deep

Table No (2) shows, Average wells depths and drawdown from 2008 to 2009.

District	Location			Types of wells	Average well depths /m		Drawdown
	N	E	Elev.		2008	2009	
BaniHus haysh	1716731	429585	2275	Bore	46. 83	46. 89	−0. 06
	1715023	431087	2239	Bore	117. 28	117. 18	+ 0. 10
	1715863	439084	2336	Bore	50. 18	58. 82	−8. 64
	1707697	420466	2245	Bore	156. 82	160. 84	−4. 02
	1709461	440184	2414	Dug	7. 16	7. 33	−0. 17
BaniAlharith	1718800	425298	2184	Bore	53. 31	53. 56	−0. 25
	1716847	417905	2180	Dug	27. 62	28. 48	−0. 86
	1709663	409308	2238	Bore	164. 14	177. 76	−13. 62
	1708942	409754	2234	Bore	123. 99	126. 68	−2. 69
	1707277	411185	2219	Bore	80. 06	81. 57	−1. 51

*source: Approach to quantification drawdown of groundwater wells ,a case study for Sana'a CityYemen, Abdulhakim GH Al-KHOLID, SUN Youhong ,Aref M. O. AL-JABALI and SUN Zhifeng (WB)

According to the local sources, the water level within Al-Malikhah village is decreasing by 0.5-1.5m. every three years. The village has water user association (WUA) mandated with many tasks including observing the use of groundwater in the 15 wells around Al Malikha village.

Agriculture consumes up to 80% of ground water produced in the wells of the village. This rate of water consumption is used for various agricultural activities, i.e. 50.4% for the irrigation of fruit trees, 13.8% forthe irrigation ofQat, 3.8% forthe irrigation of foddors and 3.2% for the irrigation of vegetables . The remaining 20% of ground water is used for household and other purposes. Drinking water doesn't constitute any problem for the local community at present as it is taken from wells around the

village. Water quantity provided to households and consumed ranges between 40-50l./day/capita.

- **Selling of water to outside vendors:**

According to the discussions made with beneficiary farmers and other local beneficiaries, the main reasons for selling groundwater from wells in Al-Malikhah area can be summarized as follows:

- Increasing use for Qat cultivation in neighborhoods
- The attractive price that was offered by Tankers .
- Low living standards of local people which led many well owners to look for other income sources through selling water to others. This was the situation before the initiative is implemented. .

The price of sold water - YR/cubic meter.

The price of sold water ranged between 1000-1500YR /20 m³ Tanker . It is estimated that sold water reached 20-50 tanks from each well/ day. The water was sold to be used mainly for irrigation of Qatfarms which explains the high price paid.

The problems created by selling ground water

Since groundwater is extracted from the same basin which all residents share, extra extraction affected the entire basin . There are several adverse impacts resulting from the extensive extraction of groundwater which can be summarized as follows:

- a) The increased sale of groundwater to vendors has led to widespread activities of water vendors in the area to buy, transport and sell more groundwater to other areas. This will lead to more groundwater extraction.
- b) Decreased water levels of the wells in the village. The decline in groundwater level is found, recently, to be between 0.5-1.5m every three years.
- c) By increasing the depth of wells the groundwater salinity level is likely to increase.
- d) Eventually ,this will lead to water shortage and scarcity in the area around Al Malika village

4.3. The Concept of the Initiative of Preventing the Selling of Groundwater from the Village Wells to Outside Vendors;

- **The idea of the initiative;**

The idea came from local leaders who, observed this phenomena They realized that selling of groundwater to outside vendors for Qat will affect the availability of groundwater in their area and decided to call for this initiative Their aim is to eliminate and prohibit these practices .

All the residents of Al Malikah village reached a consensus and signed an agreement to ban the selling of groundwater in the area. According to the agreement, violators will be subject to penalties to ensure better and proper adherence to the agreement. . The agreement of prohibiting selling of groundwater to water vendors outside the area is the core of the initiative under consideration

Therefore ,the local leaders in Al-Malukah village requested assistance from SBWM project to help the local community to address this issue through establishment of community based management mechanism such as Water User Association (WUA).

In June 2008, the initiative was adopted officially by the local community through establishment of Al-Malukah Water Users Association as a mechanism for observing the implementation of the agreement of prohibiting the selling groundwater outside the area and addressing other water management issues .

Al-Malukah WUA was established by the village residents ,well owners ,representative of Ministry of Social affairs with assistance of SBWMP in a public meeting at Al-Aqil 'house.

Local leaders and Shaikhs as well as teachers and youth played major roles towards adopting the initiative through convincing the local community (raising their awareness) about the threats of selling groundwater from their area and its impacts on their future.

- **Consensus among Al Malikah villagers to adopt this initiative;**

Through the discussions made with local activists and community representatives, it was found that only well owners from al.Malukah community participated in the process of development of this initiative while well owners outside al-Malukah village refused this initiative and continued selling groundwater . On Bani AL-Harth side, the owners of 6 wells which are not located, in Al-Malukah' village, didn't agree to comply with banning the selling of groundwater from their wells. Local community (WUA)tried to arrange a deal with these well owners to agree by paying them some payments but without success

- **Government role in supporting the initiative;**

There is no evident role for Bani-Alharith or Sana'a Capital local administrations in promoting this initiative. However the Ministry of Water & Environment has contributed through SBWM project and Sana'a NWRA branch, towards the establishment of Al-Malikh WUA and in conducting awareness campaigns on water saving, water governance, and water uses.

4.4 Impact of the Initiative;

a) Social impact of the initiative;

The existence of water user association (WUA) and the efforts of its management board has played a positive role towards achieving high level of awareness among the members of the community on water issues..

This initiative represented an alert to the local community of Al-Malikh and neighboring societies, on the potential threats caused by continuous selling of groundwater, as this will lead to more decline in the ground water levels.

The management board of the WUA and the local leaders continue the dialogue with the well's owners whose wells are located outside Al-Malikh village to be included in the initiative.

- ***Women role towards the initiative:***

Women, indirectly, played notable role in supporting the adoption of this initiative by the local community. This is made through advising and guiding their husbands on the importance of preserving the groundwater in the area for drinking and other household uses in future.

b) Economic impact of the initiative;

The amount of groundwater saved as a result of this initiative will enable the local community of Al-Malikh village to irrigate other crops, thus bringing additional income to the family. The cultivation of high valued cash crops e.g. Grapes, figs, tomatoes etc will help local people to generate better incomes and accordingly farmers will try to conserve their groundwater for this purpose..

- **The total saving of groundwater achieved by this initiative;**

The total saving of groundwater achieved by this initiative can be calculated as follow:

15wells were working on selling water for 15 hours daily to tankers. 10 wells stopped selling groundwater through joining the initiative. Each well supplied water to about 20 - 30 tankers , with average volume of 5 cubic meter/tanker .The total saving of groundwater reached to about more than **1000 cubic meter/day**.

C) Environmental impacts of the initiative;

The implementation of this initiative has positive environment impacts including but not limited to;

- Decreasing the fear of declining groundwater level in the area, thus leading to the sustainability of groundwater resource.
- Decreasing the fear of the likely increase in the groundwater salinity level.
- Increasing the availability of fresh ground water for drinking ,

D) The main obstacles threatening the initiative sustainability:

- Some of the well's owners **did not adhere** to the initiative and they continued selling groundwater from their wells to outside vendors. Out of 15 wells, 10 well owners agreed to stop selling groundwater from their wells which are located in the village. On the other hand, the other 5 well's owners in BaniHushaish did not cooperate and are still selling groundwater and thus threatening the initiative sustainability.
- **Low levels of awareness** among the local population, in particular among well owners. This requires focused and targeted awareness campaign in the future.
- **Therefore** posters, leaflets and other publicity materials should be designed and distributed among local community..
- **Lack of skilled** staff in water user association executive board who can enforce the implementation of the initiative in the community.
- **Absence** of the governmental and local administration support for the initiative activities .

4.5 Sustainability of the Initiative;

- **Sustainability level**

Usually the demand for groundwater is manifested by over pumping in the existing wells, illegal deepening of wells and illegal drilling of new wells . In Al Malikah village

the extra demand is from the neighboring areas. Further, expansion of irrigated areas in the outside areas (mainly Qat) combined with low level of living conditions of the local community over the past years represent key factors that led to weak response of some well's owners to cooperate for the initiative's success. Also the high income derived by selling water brings more financial benefits for well owners than cultivation of their own lands.

In view of the above, the initiative sustainability level of Al-Malikh WUA can't be assured without evident support from the relevant government entities such as NWRA Sana'a branch and the local administration council (district).

- **Reasons likely to promote the sustainability of this initiative**

Despite many negative factors , there are several key reasons that enhance promoting the sustainability of Al-Malikh initiative. These are summarized below:

- The continuous adherence of the well owners of Al Malikh village on the initiative and their banning to sell groundwater to outside vendors despite the fact that some well owners close to the village continued selling groundwater from their wells.
- The groundwater saving estimated to about 1000 cubic meter/day has encouraged the local community to adhere to the initiative..
- The high education and awareness levels of village leaders are the key factors to establish and maintain this initiative and this can be supported by awareness campaigns and spreading water knowledge among the whole area.

4.6 Replication of the Initiative in the Area;

Al-Malikh initiative is well known to the adjacent villagers specially well owners adjacent and outside the area because the WUA tried several times to involve the well owners outside the area to join the ban on selling groundwater but with no success.

- **Replication of the initiative**

The replication of this initiative has been found outside Sana'a governorate. These initiatives that ban ground water transportation by tankers are implemented by ; Wa'alan WUA, Bait Sarhan and Alhamrmaly WUA , Al Ma'akhady WUA and Qa'a Al-Shams WUA all these WUAs are in Amran Governorate.

4.7 Opportunities for future improvement and major lessons learned

Generally, the adoption of this initiative will help to decrease water scarcity and can be supported by Ministry of Water & Environment, Ministry of Agriculture and Irrigation, and National Water Resources Authority in coordination with Local Administration through the implementation of the following:

- **Encouraging local communities and well owners**; try to involve the well owners outside Al-Malikah Area and neighboring areas. This will be achieved by bringing stakeholders together to deliberate, build consensus, and act together.
- **Enhancing knowledge and understanding of the aquifers through**; Training sessions to: improve knowledge and skills regarding irrigating efficiently, organizing seminars / workshops on groundwater management and economic benefits of saving groundwater.
- **Facilitating local consensus-building and action**, by helping Al-Malikah local community and local administration of Bani Al-Harith districts to learn to use the legal framework to make and enforce rules governing groundwater and
- **Weaving wider links for sharing** experience and acting together, with similar initiatives.
- **Improving farmers' income** through increasing water use efficiency and convince well owners to agree to stop selling ground water from their wells
- **Provide empowerment tools** through enforcement of the legal framework to be applied by local authorities, security forces, agencies and courts, to reinforce legal provisions related to groundwater conservation. .
- **Invest/ share in funding local** public goods such as household water supply, irrigation infrastructure, watershed conservation, and groundwater recharge
- **Crop water budgeting** for the entire hydrological unit on the basis of available recharge – with farmers in the end deciding themselves how to adjust their cropping system. This will show the benefits of water saving processes.
- **Farmer water schools**, largely run by farmers – to improve understanding of groundwater and introduce water saving techniques and change cropping patterns.

- **Creating and implementing innovative mechanisms** for sharing economic, social and environmental benefits of water (versus physical entitlements)

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ANNEX I

I. Local community based initiative for Spring Water Management and Conservation in AL-QOSHE'Y Village- Otuma District-Dhamar province

1. Introduction:

AL-QUSHEI Village is one in series of villages within Otuma District (a natural protected area) located half way on the slope down of JABAL JARAH situated at an altitude of 2060 m. above the sea level. It is surrounded with ANMAT and AINAN villages on the south and with ALMAHAL village on the north while to the east and west is agricultural terraces

AL-QUSHEI Village depends, for its water supply, on surface water sources. Its population relies on spring water for drinking. The spring is called MAGEL ANMAT. For irrigation purposes the population uses other natural surface water sources. This water spring is located at an altitude of 2066 m. with 230m. air distance from the Village. Nevertheless, the real distance between the village and the water spring, on the ground, is 500 m. Seasonal rain falls on this region amounts to an annual quantity ranging between 300-700mm., i.e. 500mm./ annum average. The climate in the village is similar to the middle highland climate which is rainy and wet in summer and dry in winter with moderate temperatures allover the year.

According to the discussions with the local community in the village, this water spring is being also used for irrigation purposes. In the past water was transported from its source to irrigated fields through traditional canals which were made along the edge of terraces, however, canal networks got Spate diversion aged over time and couldn't be used. Agriculture cultivation in the village is practiced on terraces,, therefore, it was very difficult to measure/ estimate the total area irrigated from this water source due to the nature of terraces. The main cultivated crops are corn, white and red sorghums.

Local population/ community is divided here, according to the use of water, into two categories :

- a. Main users composed of:
 - AL-QUSHEI Village (20 families)
 - ANMAT Village (10 families)
- b. Secondary users composed of:
 - AINAN village (50 families)
 - ZHABAT ALHAMAM village (15 families)

- MOUKEBAN village (14 families)

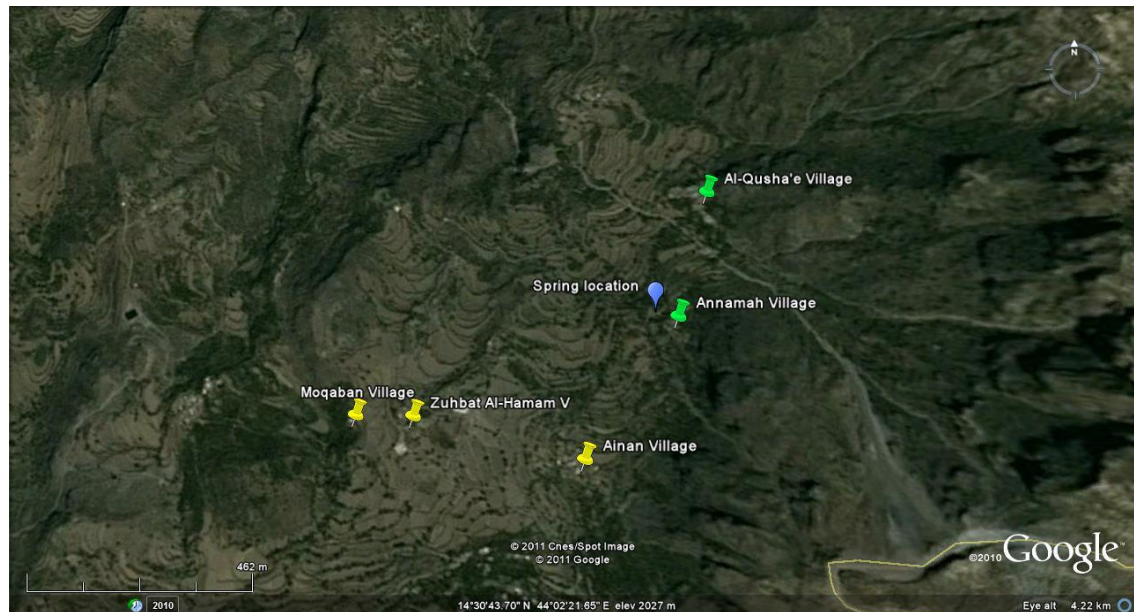
The local community has almost no access to health services and the limited services are only provided at the district centre level which is the capital of the district. During the last five years local community was provided with an electrical network (electricity supply). Waste disposal system is not available and waste is disposed partly into dug holes or into the slopes of nearby Wadis.

2. Historical background on the use and management of the water source:

The water source comes out from the bottom of a medium size mountain with a 45 degrees slope. It is situated within transformed sedimentation rocky layers. The water flow is based on what is called “siphon principle” where out coming quantity starts to increase after 14-25days of raining, while it starts to decrease 20-30 days after raining stops. Sedimentation layers require this period of time to be saturated with water and thereafter to release it. During the 20-30 days period water is being used by the community for respective purposes, i.e. for household uses and for irrigation purposes.

This water source is considered by the community as the main supply source for household water as it provides the community with safe, clean and high quality drinking water. Thus, 80% of this source is used for drinking and other household purposes and the surplus of up to 20% is used for irrigation purposes.

Figure (1): water source location and surroundings villages & agric. terraces



- Green pins indicate priority use of water as drinking water and yellow pins indicate possibilities of water use for other purposes out of surplus quantities.

The rate of water flow increases during the rainy season . Outflow fluctuates over the whole year depending on the seasonal rain fall. It reaches its peak with production levels ranging between 3000-3600L/ hour and remains at this level for 30-45 days after rains stops . Basically, this water source produces 28-30 cubic meters of water/day throughout the months of May-July . However, this flow decreases in August to 5 cubic meter/day and increases again in September to 10-15 cubic meter/ day. Thereafter, water production starts, gradually, to decrease in January so that it reaches its minimum level at 0.5cubic meter/day by the middle of March.

In addition to this main water source, there are secondary sources, i.e. springs, which become active in summer times, however, they are hardly utilized by the community as major part of out-coming flows is wasted into the Wadis together with surpluses from the main source. On the other hand the Ministry of Agriculture and Irrigation has constructed a ground water cistern in the area which is 150m³.

Based on the discussion made at the local level, the local community members had not been satisfied in the past regarding water distribution mechanisms which led to continuous disputes and conflicts among community members. As a result people started to look for proper solutions for those problems over water uses. This has ultimately led to developing the initiative under investigation. After adopting this initiative local people became satisfied and related problems have been solved.

Because the initiative came by community of **AL-QUSHEI Village** who, controls the water source and traditionally, have the right to use water for irrigation purposes, the **AINMAT village** community has the right to use spring water source for household purposes, **AINMAT** community objected to this arrangement.

3. Social and environmental consequences resulted from water uses:

Participants in focus group discussions agreed on identifying some problems related to water uses which can be summarized below:

- During dry seasons, particularly in winter, water flow decreases in such away that the availability of drinking water become a serious problem for women and girls who stand in long lines and wait for their turn all day. .
- Hence it becomes dangerous for women and girls who collect water late in the day to carry water to their village for a distance of up to one Km., .
- Around 89% of the spring water is used, for household purposes (i.e. for drinking, washing, cooking etc..) and around 11 % for irrigation purposes.
- Over the last five years, it is observed that the overall levels of quantity of water produced by this source declined due to environmental deterioration of the area &the source feeding this spring. . This environmental deterioration

occurred as a result of soil erosion and road construction works in addition to the degradation of floras

- Sizable quantity produced by the source is wasted in summer and autumn where flow exceeds the needs. If this excess flow could be utilized it may be more than enough to cover the shortage in dry seasons.

4. Problems & Conflicts related to the use of water source:

Throughout the meetings conducted with members from the local community the following problems related to the use of the water source were also identified;

- Disputes and conflicts usually occur among community members over water uses for irrigation during the two rainy seasons (March-May and August-October). It is observed that powerful village members took more rights than others in this regard. Only **AL-QUSHEI Village**, traditionally through written document, has the right to use the source for irrigation in certain periods of the year according to distribution mechanism. However the uses of water for household purposes is open for all villages around the year. Hence, this has become a source for conflicting interests.
- As water becomes scarce in the source, especially in winter, main users representing the two villages compete for getting water (men and women wait for long time to collect water for their homes) and some try to avoid waiting for long time leading to conflicts. On the other hand, users from other villages, during the dry seasons, put additional pressure on the source which make the problem worse as all are competing for getting water from the same source.
- Women and children do suffer most as these two social groups are traditionally responsible for collecting and carrying water from the source to their villages.
- The worst situation may occur when water source is totally depleted for some times. This happened once over the last 20 years.
- The main users, don't seem to have major problems with water transportation from the collection point to the related villages.

5. About the initiative and its unique features:

This initiative is considered, as confirmed by the members of the community, to be the first one of this kind in the area. . Information by the local community revealed that, this initiative was replicated in neighboring areas with some differences in the adopted management tools.

The initiative's concept was initially developed in 1992 when a group of educated youth from the village gathered during Eid holiday. It is a tradition that community

members get together in such occasion with many of them coming from the cities where they work or study.

The core of the initiative was based on consensus building among community members to solve water problems in the following manner;

Water distribution and schedule for irrigation were made and agreed to be executed for families located under the water source and according to the size of owned agric. Land respectively. Water on Fridays to be entirely allocated for the mosque cistern. , Water for drinking and HH purposes was given first priority for villages and only surpluses is used for irrigation purposes according to the schedule agreed upon.

- a) Connecting water source to the mosque cistern in the village to collect water for drinking and for other HH purposes is based on cost sharing principles among all villagers. This was accomplished through several stages:
 - Every family in the village (total of 13 families) contributed towards the cost of 300-500m. long plastic pipe to transport water from its source to the mosque cistern so that women can collect the water from the outlet of the cistern in the village.
 - As plastic pipeline couldn't sustain climate factors and it always got damaged . ,Villagers gathered again, headed by the village leader, and agreed to replace it with a 3/4 inch galvanized iron pipe. In addition , they agreed to build a 1.2 cubic meter water reservoir nearby the water source to serve as distribution tank and to release water through the pipe to the mosque cistern. The galvanized iron pipe is used for distributing water for both, HH and for irrigation . A group of youth from the village were authorized to purchase all the required inputs necessary for accomplishing the related works.
 - In recent years water flow decreased to very low levels (20L/h only) so that the acquired water was restricted to be used for drinking and HH purposes only. The community agreed to build a water tank with capacity of 3 cubic meters for collecting the water next to the mosque cistern. The tank outlet is agreed to remain closed over night so that the tank can be filled. 3 individuals were made in charge of distributing the collected water in the morning for all local families on an equal basis.

After the adoption of the Al-Qushei people initiative to construct pipeline from the spring to village, local community confirmed that local people were allowed to have access to water as much as they need during summer and Autumn , however, in dry seasons, mainly in winter when the level of flow decreased, water distribution is managed as follow:

- During the day the right of water use is given to ANAMAT village and water is distributed for all village members on an equal basis.
- During night time AL-QUSHEI Village is having right and water is collected into a water tank nearby to the mosque in the village. When water collection tank is filled, with water it is distributed on an equal basis for all village members. Distribution is made by the village leader supported by selected village youth.

6. Contribution mechanisms and community interactions for implementing the initiative:

It is acknowledged that the concept for this initiative was developed by some youth from the village and proposed to all villagers in a joint meeting between all parties (i.e. youth, elderly people and women). Decision for accepting the initiative was taken by the vast majority of the local community members. The agreement over the initiative was documented and signed by all through representatives from each family. As women were mostly advantaged by the initiative, they have supported the adoption of the initiative through their remarkable efforts to adhering to the agreements and respecting instructions made by the management to adopt the initiative .

Community contributions took several forms over time:

- a) Financial contributions: each family paid YR1000.- (equivalent to U\$200.- at 1988)for covering the initial investment costs. For covering spare parts and other material costs the village leader advanced the due costs which was distributed on an equal basis among all families of the village (total of 13 families) and recovered.
- b) In kind contributions: local individuals took part in various activities related to the project works and for establishing and connecting the water pipeline and the entire network. Villagers usually meet periodically at the village leader's house where important issues are discussed. Problems are solved during these meetings and any agreements made are documented and signed by all family representatives.
- c) As generally agreed all families share the responsibility to operate and assure the delivery of water to the village through the network, i.e. one family each day.

7. Obstacles faced and how are addressed;

1. At the beginning the neighboring village (ANAMAT village) showed resistance against the initiative based on its right to have free access to drinking water from the same source. However, a consensus agreement was

reached to construct a reservoir close to the water source to be a collection point. Collected water over night was made for one village and during the day, water collected, is agreed to be shared by the two villages,(i.e. free access).

2. During dry seasons water flow decreased significantly and this causes many women and children to spent long timefor collecting water from the spring source. To minimize risks and to solve the related problems, a water collection tank was built in Al-Qusheivillageand the water was stored during the night in this 2cubic meter tank to be distributed in thenext morning for all villagers on an equal basis under the supervision of the village leader.

8. Factors that Promoted the Initiative Sustainability for 2 decades:

There are many factors that contributed towards successful and sustainable operation of the initiative, the most important of which are:

- The relatively high level of education among local community individuals;. It is found that 80% of adult population got secondary level education and more than 40% of village females can read and write .
- Local community considersthe project as a matter of existence and achieved level of awareness of the majority on the vitality to cooperate with each others.
- Most families have relatively good income as almost each family has at least one of its members hold a permanent job (mostly in cities) .
- The initiative management relies on common decisions made by all members of the community through periodical meetings. The community is characterized by relatively high level of integrity and solidarity.
- The role of the village leader is limited to facilitation and coordination aspects. Once all agree on any decision (addenda, fees, maintenance etc..), it will be adhered to by all community members and if one member can not pay his contribution in due time the village leader or someone else will volunteer to advance the due share so that it would be paid back later by the related person
- The community is convinced that the implementation of this initiative contributed to spring water conservation through the construction of the piped net work and the water tank i.e. reduction of water evaporation - reduction of water seepage and reduction of wasted or unused water .

9. Recommendation for Strengthening the Sustainability of the Initiative;

1. Construct/ water reservoir of a 200-300cubic meters so that wasted surplus water during rainy seasons can be stored to be used by the main users (the 2 villages) in winter and during dry seasons. This project can be constructed by

Co-funding mechanism between Rural Areas Water Supply Project, Social Fund and Local Community contribution.

2. Organizing training and awareness campaign by local NGOs, aiming at minimizing/ avoiding social disputes in the future through reviving certain traditional principles and moral values related to water use aspects.
3. Develop and implement program(s) for protecting flora and trees surrounding the water source and replant trees in place of the already existing aged plants . Meanwhile, certain campaign have to be initiated to protect, maintain and rehabilitate terraces as well as to avoid soil degradation processes. The cost can be estimated through primary feasibility study.
4. The initiative is replicable and could be adopted by other communities with slight modification . However, so far **the Initiative hasn't been replicated in other areas..**

II. Community based Spate Water Management Initiative Moazi spate diversion structure Shibam district , Hadhramaut Governorate

Introduction:

MoauzShibam Spate Diversion,: Shibam District, WadiHadamout



Location of Al Mouz (Aldhameer) Spate diversion and shibam city

Description of the Study Area:

Envisaged area is located in wadiRabba within Shibam district and situated in wadiHadamout and west to Shibam city, the district capital.

The envisaged area is located to the west of Shibam city and is composed of agricultural land made up of fertile clay soil derived through being at the bottom of the main WadiHadamout. The area is located on an altitude between 700-750m. a.s.l.

Valleys/ Wadis:

Among many wadis the so-called wadiALSIRR is considered to be the longest one. It is estimated to be 92Km. long crossing Shibam city and meeting with AL Mouz Spate diversion Valley in a location called "HaidQasem" about 3-5km. to the west of Shibam city.

Vegetation Cover; :

Desert districts of Hadramout valley are characterized by diversified flora and vegetations (such as Acacias, Arc in addition to the appearance of seasonal vegetations and various types of grasses etc....). However, Palm trees cover most of the area, especially in those parts of the districts located in the valley of Hadramout. Hence, palm trees form the main part of vegetations dominating the district

Climate:

a) Temperature:

Shibam district has a desert climate characterized by hot temperatures in summer and it is dry all over the year with very little rain fall. In summer temperatures reaches 46 c. grade while it fell to 8c.grade in winter. The extreme hot dry air in summer is considered adequate for the palm trees .

b) Rainfall:

It rains over the high mountainous region surrounding the area two times a year and the area depends on the flood coming over from high lands through wadis. The first rains occur during March/ April and the second in October -November of the year with a total quantity of rains ranging between 50-66 mm./ year.

c) Floods:

Mostly flood is flowing over the area during Spring (March .-April) and during Autumn (Oct.-Nov) each year. With regard to the quantity of water flow it is found to be as follow:

- Construction capacity of the spate diversion canal is 70-80 cubic meter/ second
- Max. flow (Q5) is 62 cubic meter/second once during 5 years.
- Max. flow (Q10) is 90 cubic meter/second once during 10 years. Max. flow (Q20) is 120 cubic meter/ second once during 20 years.
- Average quantity flow is 41 cubic meter/ second
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Area irrigated under the Scheme:

The total area irrigated by this scheme under Al Moauz Diversion Structure is estimated at 71ha. with an average ownership size of 1.3ha / farmer.. Some of the land owners cultivate their own land themselves while others rent their land to other farmers based on agreed arrangements .

Cultivated Crops in the Area under Study:

- Main crops:
 - a) Palm trees represent up to 80% of all crops grown in the area

- b) Sorghum (Dhurra) make up to 15%
- Secondary crops:
 - a) Sesames
 - b) Certain types of beans
 - c) Some types of grasses of special demands for local markets

Concept of the Initiative:

Shibam, as a historic city, is situated within the main stream of Wadi Hadramout. The major part of Moauz diversion structure is located in west of Shibam city.

Local community, according to focus group discussions, acknowledged two facts which form the body of the initiative and which need to be addressed and dealt with accordingly:

1. The water flow passing through the Moauz used to be wasted while it can be better utilized by the farmers.
2. Before the construction of Al Moauz diversion structure flooding used to represent a potential threat for the historical city of Shibam.
3. Efficient operation and maintenance of the MOAUZ diversion structure by beneficiaries enures adequate spate water management and equitable spate water distribution.

Description of Moauz Spate diversion

Moauz Spate diversion is supplied with flood water from various sources (i.e. water is collected in AQAD area before passing into the Spate diversion which will be distributed later through the diversion structure. Water coming from different wadis e.g. DAWAN, AMAD, ALAYN, SIRR, and AQRAN WADIS, flow into the Spate diversion. Collected water is controlled for the purpose of distributing it through a canal network composing of 12 canals derived from the main outlet canal to irrigate the entire area covering 71ha..

Management and Maintenance:

Applied irrigation mechanisms:

Water quantity is considered to be more than sufficient so that each canal can get its full share of water and on equal basis. In rare cases water level decreased so that priority is given to palm dates fields and once usual levels are regained water distributions get back to its normal distribution mechanisms without restrictions.

Each field is irrigated through its own inlet allowing water to flow from the distribution canal to each field independently. Irrigated fields have overflow mechanisms made up of stones as to prevent water overflows by releasing any surpluses away from fields. Any damages that occur to the distribution canals or to the prevention walls is fixed immediately by a committee and related costs are shared by all beneficiaries. According to the discussions made with the local community that contributions towards maintaining the entire system was made by all the beneficiaries and its collection didn't form any problem so far.

The Cooperative Association Committee and its Tasks:

The committee mandated to manage water distribution was converted in 2004 into a Cooperative Association (CA) in order to become responsible for managing and maintaining the entire distribution network. This conversion was based on consensus agreement between all beneficiaries (i.e. farmers, land owners and local community members) represented by 92 members. The new Cooperative Association (CA) was created under the supervision of the office of the Ministry of Labor and Social Affairs in Hadramout. 11 members have been chosen in addition to 3 inspectors to form the management board of the Association which became mandated to fulfill the following tasks:

- Protection, maintenance and the operation of traditional flood irrigation scheme (i.e. from the main distribution canal to the inlets of fields).
- Organizing and regulating the use of fields as a source for making limestone for house construction purposes so as to ensure the rights of land owners without affecting the Association shares.
- Establishing links to governmental and non-governmental organizations to acquire additional assistance for developing the main construction works of the scheme like GTZ, GWSCP
- Prevention of illegal drilling of wells and selling their water to farmers.

1. Key Activities and Achievements of the Association Committee:

- The organization of training courses in the fields of administrative and spate water management aspects for the Association members and in the fields of animal husbandry, fertilizer application techniques etc...for farmers (males and females).
- Receiving of external supports towards the development of the scheme in 2010(e.g. GTZ provided assistance for strengthening some construction works and rehabilitation of certain parts related to the main distribution canal).
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- Banning of illegal / random drilling of any additional wells and managing equitable water distribution to all beneficiaries.
- Collection of monthly fees as well as contributions made by , beneficiary farmers based on the size of owned land. Collected amounts vary depending on the required maintenance and cost of maintenance , however, no obstacles were faced regarding fee collections so far.
- Opening a shop to supply farmers with required inputs.
- Removal of physical components hindering water flow in the main and distribution canals

Support of the local Authorities;

According to the focus group discussions, the local community appreciated the supports provided by the local Council (LC) representatives to the scheme, however, it was indicated that the support provided so far is still limited and more support is required. It was found that the LC has so far facilitated and forwarded requests for assistances to external funding parties when major damages occurred to the scheme in order to get external supports.

Resistance to the Initiative :

Almost all the members of the local community agreed that there were some resistance made by some beneficiaries, mainly farmers, at the beginning. Opposition was based on protecting self-interests . However, it was made clear to all the beneficiaries that certain legal provisions will be applied which regulate and protect the interests of both land owners and land users. Based on the traditional social arrangements the conflict of interests was resolved and everyone became happy. Hence, there are no threats of conflicts and oppositions to form an obstacle for the initiative sustainability.

Sustainability of the Initiative:

Many factors have contributed to the sustainability of the initiative . The most important factors are summarized below :

1. Awareness of the local community over the importance of the initiative
2. Cooperation and efforts of all the Association members
3. Well defined tasks and responsibilities of the committee and members of the Association.
4. Synergy among and within the management team of the Association
5. Widespread awareness of the community and the beneficiaries over expected threats which may be caused by the Spate diversion failure .

6. Successful financial management which led to developing and sustaining the performance of the Association.

Gender Consideration:

It is found that women involvements are still limited to the acquisition of certain training provided by the association to suit their traditional role in the society. Moreover, women are neither represented in the management board nor in the general assembly.

Replication of the initiative;
the initiative is replicable but there is no available records about similar initiatives in Yemen.

III. Local community initiative on Monitoring Groundwater in ALMAAFER District Taiz Governorate

1. Introduction:

The study area covers ALKALAYBA and part of ALSAWDA sub-districts within ALMAAFER District in addition to WADI BANI KHAWLAN sub-district which belongs to JABAL HABASHI district. The area under study has a total area of 88 Km² with a total flat agricultural land of 2200ha.

Topographic Features :

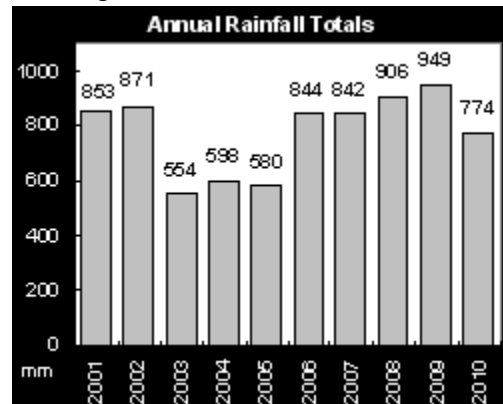
The study area is made up of valley sediments, with agricultural land of about 1100ha. Low sediments penetrate the valley with 1000m. width at ALBUAIB village forming the potential for surface and ground water sources for ALBUAIB village and ALKALAYBA sub-district respectively.

Climate of the Area :

Generally, the climate in the entire area is moderate all over the year, however, it becomes relatively hot in summer times as temperature may reach 35 Degree Centigrade. . . This is because the area is situated in a depression surrounded by high mountains from all sides while temperature remain between 20-30 Degree Centigrade. in winter. Wind is moderate and becomes active over summer times without changing direction. So the climate elements are observed to be similar to those dominating mountainous areas in Yemen in general.

The main rainy season in this area is between June-October of the Year. The highest rain intensity comes in August while some irregular drops of rain may occur in other months. The average rainfall in the area is 776.2mm/year while it reaches 776 mm/year on the surrounding mountains

The Figure shows the rain fall fluctuation over 2001 - 2010



The rain fall is high and enough but not utilized due to steep and narrow valleys as well as the deterioration of the terraces.

Population and Standards of Living :

Most of the families in the area are considered to be poor due to big family size and very small land ownerships per family. It is estimated that each family composed of 9 members. Most agricultural terraces cannot be cultivated as they have not been maintained and hence were destroyed/deteriorated over time especially in the southern part of the area.

2. Available Water Sources :

The area under investigation has 3 water sources, i.e. (i) direct rain over the area, (ii) floods coming from surrounding mountainous areas and (iii) ground water source.

(i) Direct rain falls on the area amounts to an average quantity of 776.2mm./Year.(ii) Floods driven from the rain in other surrounding areas form, together with the direct rain over the area, the main source for continuous feeding of the ground water in the area which is stored within the sediment aquifer

(iii) Groundwater represents the third source in the area which is stored in three basins. Groundwater in the first basin is renewable and made up of various sediments which are 50m. wide in some areas. The second basin is relatively smaller basin covering most of the area and composed of volcanic stones, however, it is characterized by many side fractures from which water can be taken. On the other hand, this basin is very steep so that water quality pumped reaches 2000 micromose/cm. The third basin is made up of sand stone on its upper layers to the south west of the area.

Average Depth of Wells in the Area; :

According to discussions with local community, water levels in the wells were at around 38m. in 1990. The increased investment in agriculture activities over the last 20 years, had led to depleting ground water and accordingly water levels were found in 2010 to be between 90-100m. in many wells of the areas. Moreover, in some wells water levels are found to be at about 160m. Al-sinah basin contains 35 agricultural bore wells, owned by farmers either individually or shared. Most of these wells were developed in the 1970s. However, the water table is declining continuously: a decline of 6 m was observed in the year 2010.

The Irrigation Systems:

Discussions held with local people revealed that wells production is higher in the rainy seasons and decreases in dry seasons. As a result of this, farmers have changed their

irrigation system from traditional open canal to PVC piped conveyance system and galvanized iron pipe (GI pipe) networks. Recent survey results show that about . 80% of the fields in the area have adopted the new piped conveyance network irrigation systems. Since the introduction of the Community Water Management Project (CWMP), farmers became more aware of the importance of the new improved irrigation systems, This has led to the installation of improved and modern irrigation techniques in the area. Many argue that adopting these new irrigation techniques, was not possible without the CWMP activities in the area.

Dominant Irrigated Crops :

The table below shows crops irrigated by ground water.

Cereals 60%	Vegetables 17%	Fruits 23%
Millet	Tomatoes	Mango
Sorghum (Dhurra of all types)	Potatoes	Papaya
Corn	Onions	Limon
	Retag	
	Parsley	

This is in addition to the Qat cultivated area which reaches to about 14% of the total area.

3. Background on CWMP

Project main Objectives:

- o Organize communities to better manage scarce groundwater resources
- o To support community development of Water Users Associations (WUAs), and enable these to develop management plans
- o To explore the scope for local regulation of groundwater and open up opportunities to improve income from efficiency water management.
- o To support the implementation of the local management plans by WUAs
- o Create awareness building on water issues in the area based on formal and informal trainings and interactions with the community:

The project has achieved the following;

- Creation of two local Water Users Associations (WUAs) (one for males and one for females)
- Providing supports for both established associations in forming specialized committees such as:
 - a) Awareness building committees for water
 - b) Monitoring committees for groundwater use

- c) Irrigation committees
 - Provision of capacity building measures for the management boards of the associations to be capable in managing water resources
 - Coordination with the ground water and soil conservation project (GSCP) for training water monitoring committees, and provide them with monitoring instruments
 - Conducting a comprehensive awareness building program for specialized committees of the associations based on the collected monitoring data
 - Conducting of series of workshops with concerned authorities and related stakeholders and exchanged information on water status in the area.
- **Reaction of the local community regarding decreased levels of ground water levels:**
 - Positive response was shown by local community to the fruitful cooperation with the project through the creation of the associations mentioned above. Creation of water monitoring committees supported by the Groundwater and Soil Conservation Project .
 - Local community provided commitments to take over the costs and responsibilities related to awareness programs after project completion
 - Ground water monitoring committees are taking over burdens of groundwater monitoring activities

4. Adopting Groundwater Monitoring Initiative:

1. Brief initiative description:

It was started by establishing two monitoring committees (one for male composing of 11 members and one for women composed of 9 members).

Each association is mandated to:

- Participate in installing flow-meters (as flow measuring instruments) on 26 wells. Male and female committees were made responsible for equal no. of wells (i.e. 13 each). Flow-meter instruments were provided by the Ground water and Soil Conservation Project.
- The groundwater monitoring committees have been trained to become able and in charge of recording the flow of the quantity of water pumped for irrigation by each well on certain time intervals.
- Groundwater monitoring committees were mandated to fulfill the following tasks:
 - a) Conduct monitoring activities in terms of reading and recording pumped groundwater via the installed flowmeters on the 26 wells and deliver readings / reports to related authorities on periodical basis, specially NWRA

- b) Submit results and reports to the management boards of the associations and the awareness building committees including recommended measures to be considered by farmers, e.g. on how to save water and other costs as well as on improved irrigation techniques etc..
- c) Initiate certain awareness programs for the community over related problems and water rational use etc.. as to reduce pressures on ground water sources

5. Relationship between Local Community and Related Authorities:

1. Relations with National Water Resource Authority in Taiz ;

Initially, there were intensive interactions with the authority in Taiz which expressed interests to work with the associations/ local community . In return, respective reports on water monitoring activities were delivered to the authority. However the , cooperation of the authority with the associations/ local community became less active in spite of some remained contacts from time to time.

2. Relationships with GSCP FU in Taiz;. Focus group discussions reflected that the relation and cooperation are very good with the associations which was reflected by:

- Distribution of modern / improved irrigation systems for Association members
- The Field Unit Follows up the monitoring activities carried out by the committees and receive the monitoring reports on periodical basis.

3. Cooperation and relationships with local authorities:

Discussions with the members of the association showed that this relationship is rather weak but can be improved for the interests of the association and the local authorities . Local authorities do not seem to be active in this regard. The measurement collected by the community during the past 3 years is also kept within the WUAs archive.

6. Financing Monitoring Activities :

- The support provided by the Community Water Management Project (CWMP) , according to discussions held, was restricted to organizing capacity building of local community members and the management boards of the WUAs , and facilitating links with GSCP. In addition the CWMP delivered to the committees of the WUAs a manual on instruments for water measurement . After CWMP closed related groundwater monitoring committees operated based on self-finance which

couldn't be sustainable all over the time due to shortage of financial resources

- .
- The established associations ,have relied on the collected annual membership fees, to cover the costs of the groundwater monitoring including for the transportation between the wells and the villages to conduct and record the measurements. The collected annual fees have declined and therefore, measurements have been changed to be conducted every 3 months instead of being made on a monthly basis.
- Required annual budget to carry out the groundwater monitoring activities; It is estimated that the two, water monitoring committees require a total of 960.000.-YR./ year to be able to carry out the groundwater activities , i.e. 40.000YR./ Committee/ month, (i.e. US\$ 2,000 / committee /month)

7. Initiative Impacts on Groundwater Resource Management and Conservation:

The impacts of the initiative is quite evident in terms of the increased number of requests made by farmers for improved / modern irrigation systems Focus group discussions with the association committees revealed that more than 90% of farmers have replaced their traditional irrigation systems with the improved / modern irrigation systems ,

Over the last period NWRA water resource management unit in Taiz was able to stop drilling of 20 wells as they were informal based on information delivered by the associations and the related committees. This has contributed towards more control over ground water use in the initiative area.

- **Information dissemination on ground water situation:**
 - **Monitoring** results are recorded and delivered to the Ground water and Soil Conservation Project
 - Same results are also delivered to management boards of the associations and hence to respective awareness building committees which conveyed these information further to farmers during the awareness campaigns
 - cumulative impacts of disseminating these results have encouraged farmers to change their irrigation techniques into more efficient irrigation systems So that more water could be saved.
- **Information collection mechanisms that applied for measuring pumped water:**

The monitoring activities were made by monitoring committees (male and female committees) through special instruments at the well sites . measurements were made once a month, however, due to lack of own financial resources, measurements are decided to be made once every 3 months.

- **Initiative Sustainability:**

In this context it is observed that reports are submitted to the NWRA (national water resource authority) office in Taiz based on requests rather than on periodical basis as supposed to be. Related groundwater monitoring committees deliver reports and results to the authority free of charge. As a result of shortage of financial capability of the groundwater monitoring committees, the frequency of data collection and delivering of reports have slowed down.

This activity could be sustainable if NWRA provides financial support to the groundwater monitoring committees to enable them meet the recurrent costs to carry out this activity).

Information on monitoring results are distributed by local community representatives to well owners who get them from the related committees of the associations and the water resource authorities as well as from awareness committees.

It is worth to note that the quality of data gathered by the groundwater monitoring committees is not assured by independent party. The water resource authority in Taiz is conducting field visits to the sites and the committees, however, these irregular visits are made to get some information rather than to verify the quality of data collected by the committees. Hence, there are no mechanism applied to assure the quality of data.

IV Local Community based initiative on management and conservation of harvesting water Kohl Village – Dhebain District - Amran Governorate

• **Introduction:**

LOCATION:

KOHL Village belongs to Marhaba sub district of Dhibeen district . It is situated to the south-east of Amran governorate. It is 40Km. far from Amran city and . about 96Km. from Sana'a. It is located in the northern side of Amran water basin. Its borders are defined by Sufian sub-districts from the North, Kharef district from the south, Alhait village from the east and the historical Dhafar Valley from the west.

KOHL village is being built on the hill of a mountain and is surrounded by many agricultural valleys and terraces.

ALTITUDE:

It is situated at an altitude of 2353m.above sea level

RAINFALL :

Rain is falling on this area during summer with its most intensity being on the western mountainous parts. The rate of rain fall vary on the village and its surroundings such that, the average quantity is ranging between 150-450mm./year.

CLIMATE:

Moderate climate dominates in summer while it is getting colder in winter with some variations in other seasons.

AGRICULTURAL AREA:

Agriculture , including animal husbandry, makes up the main economic activities for the local community in the village and the surrounding villages.. The total agricultural area is estimated to be between 6-10ha. Where many crops are produced, such as cereals, beans, lentils and fodders. QAT plantation is very limited in the area and it is estimated to be planted on just 0.5ha.

POPULATION:

The population of KOHL Village form the main targeted beneficiary group from the initiative under consideration The total population is estimated to be between 500-550 inhabitants.

HEALTH CARE SERVICES:

There is one health clinic in the village which was built in 2006 for this village and to serve other neighboring villages.

Background on the Water Resource Management and Conservation Initiative Historical Overview of Amran Basin:

Dhibeen district forms an integral part of Amran basin which is covering an area of about 1618 square Km. in three governorates, i.e. Sana'a, Amran and Al-Mahweet,. It is lying at an altitude between 1840-3149m. a.s.l.. Contained water is kept down at the so-called Al-Bawn area within its deepest geological context. Al Bawn area is characterized by basalt and sedimentation compositions where most of its water is stored. This basin represents the main source of water for more than 400.000 inhabitants. More than 90% of the local population depends, for their economic activity, on agriculture. Qatcultivation makes up to 62% and the cultivation of the other agricultural crops is making up 38% of the total agricultural; land.

Water Sources and Uses

KOHL Village depends on rain water for meeting its drinking needs and other various household purposes. However, seasonal rains are also used for agricultural purposes. During rainy seasons the local community harvest rain water through collecting it in cisterns to be used during dry seasons.

- **The Situation before the initiative**

- a) As the initiative area is located on a mountain, ground water cannot be an option, therefore, local community is totally dependent on the limited available surface water source.
- b) During dry seasons, water collected in open reservoirs represents the only source for the local community.

There are only 3 cisterns which can store up to 10.000 cubic meter of water/year for the entire community. This makes the area very poor in water resource availability

- c) It was observed that cistern water was left for various pollution factors so that efforts were made by the community to overcome this problem.
- d) Initially the quality, of drinking water, was hardly accepted as drinking water, therefore, it was boiled by villagers as a preventive measure. Many conflicts were faced prior to the adoption of the initiative as many were unsatisfied with the random distribution, especially during dry seasons.
- e) Women were disadvantaged as they had to transport water for long distances (500-3000m.) for their homes. Water collected was limited from traditional reservoirs and many girls couldn't be enrolled in school or left it in early times to get engaged in water collection and transportation s.

- f) Water distribution is made under the supervision of the local water committee. Water is distributed according to family size. All the members of the local community seem to be satisfied with water distribution mechanism. Any problems/ disputes are solved in coordination with village leaders.
- **The Nature of the initiative:**

- **The Initiative Concept:**

In 2006 some activists (teachers and other) in the village brought up the first idea about this initiative. Based on that, the village leader together with village school teachers and the Mosque Imam called most of the people in the village for a meeting to discuss water supply situation i.e. water harvesting, channeling from the mountains, water pollution and contamination problems and to find out common and adequate solutions.

In this meeting, according to discussions made, it was agreed for the initiative which aims at solving related water problems through:

- Rehabilitation of an old reservoirs and building of natural filters to purify water through supports provided by the GIZ project.
 - In cooperation with GIZ and other parties, provided the local community with 100 water filters for 100 families who contributed 10% of total real filter costs.
 - The committee has, collected and documented all types of traditional and cultural knowledge and arrangements applied. In particular, those related to flood and water distributions have been systematically documented to make use of the best of them wherever possible and applicable.
 - Coordination with local community and conduct cleaning campaigns as well as agreed on waste disposal arrangements and determine certain waste disposal sites for the village.
 - Implement a cleaning campaign to clean village cisterns and its surroundings to avoid pollution factors including, the collection of all types of wastes away from water collection points.
 - Apply and impose certain fee (as a fine) against anyone washing or keeping animals in or nearby to any reservoir
 - Preventing women and children from entering water storage sites with shoes
 - Elect Local Water Management Committee to follow up implementation of the activities related to, management of water resource and to acquire farther financial assistance.
- **Implementation steps of the initiative;**

The elected water management committee was formed and composed of 5 males and 3 females who were responsible for implementing this initiative. Based on discussions held with water committee members over initiative development and its successful implementation it was concluded that:

- Initially, local community representatives were invited to the village leader's house where initiative was introduced to them. Meanwhile, the mosque was used to address the initiative and its advantages for the entire community.
- Finally many were convinced and agreed on cooperation with local committee of water resources management on implementation measures
- It was decided to connect cistern's water through a pipeline to the village centre where 8 tapes were installed as distribution outlets.
- Thus, water was distributed to villagers during certain times so that each family was able to get 2-4 water containers filled with 20litre containers .

*Investigation team, during its field visit to the village, couldn't get from the local community any estimation regarding initiative implementation costs as many related activities were undertaken by the water committee due to absence of appropriate skills .

- **Problems that faced the implementation steps and how they were overcome:**

- At the beginning there were resistance and reservations from some community members due to their ignorance about the potential benefits to realized from the implementation of the initiative ., However, as they realized the benefits generated by adopting this initiative allthe community members decided to join and accept the local committee initiative.
- Women acceptance was higher in the village when female members of the committee introduced the initiative to the women in the village through separate meetings as they have realized that they would benefit most when this initiative is implemented.

- **Sustainability of the initiatives**

According to discussions with all stakeholders during the field visits, it is confirmed that the following factors will make the initiative sustainable in the future:

- The relatively high rate of education in the village especially among male individuals compared with neighboring villages All teachers in the school village are from the same village.

- After the acquisition of supports from the GTZ project the initiative was strengthened and it was observed that women's contributions was the motives for successful initiative execution and achieving its objectives
- Scarcity of water and the lack of alternative water source motivate local people to keep the initiative in operation and to keep it functioning.
- Many local community members are migrants who supports the initiative through transfer payments to the village committee for the initiative activities whenever requested.
- The success of the initiative promoted other neighboring communities to call for replicating this initiative
- **Replication of the Initiative in adjacent area:**
- despite the initiative is replicable but it was replicated in the adjacent areas because the circumstances are deferent.

V. Local Community based initiative to prevent selling of ground water in ALMALIKAH village- BaniAl-Harith District- Sana'a

Introduction:

Location:

ALMALIKA village is located 20 Km. to the east of Sana'a city. It belongs to SARF sub-district under Bani HUSHAISH district. It borders Bani ALHARETH district from the east, jabal ALSAMA'A from the north and Bait ALHANAMI and the main Road (Sana'a- Marib) from the south. It has about . 4000 inhabitant

: Main economic activities of the population

The majority of local population depends mainly on agriculture for their economic livelihood Ground water is the main irrigation source for their crops / fields. Many crops . are produced such as cereals, vegetables and fruits including the best grapes in the country. Some of the local people are working also for public and private sectors. The total agricultural land is estimated to be 6440ha. and about 7% of this area belongs to **ALMALIKA village.**

Rainfall situation in the area:The area is located within the highlands where climate is considered to have relatively moderate climate components. It lies within Sana'a water basin. The main crops grown and cultivated in this area are Grapes, and figs while it is observed that Qatfields are increasing. Rain fall for 2010 is about 200-mm/ annum. according to records available. The rates of rain vary over years and within each year including its distributions. The table 1 below shows the available data on rain fall quantities over 5 consecutive years.

Table (1): rain quantities fallen over BaniHushaish district for 5 consecutive years.

No.	Year	Quantity - mm/ year
1	1998	277.4
2	1999	91.9
3	2000	63.9
4	2001	302.2
5	2002	83.4

AL-MALIKAH village is characterized by ground water availability as it lies within Sana'a water basin geographical area. Water is acquired in the village through drilling of wells which are drilled between 150- 300m. deep. Sana'a water basin is facing gradual depletion which became evident through decreasing water table. In ALMALIKA village water table is decreasing by 0.5-1.5m. every three years. The village has water user association (WUA) mandated, among other tasks, to observe ground water in the 15 wells around AL-MALIKAH village.

Historical background over Sana'a water basin (SWB):

SWB contains the area lying at the eastern side of western highlands (within a longitude between 39 and 45 and between the lines 16.70 south and 17.40 north). Its area about 3240squarekilometers. Its upper part forms the main feeding source for wadi Al-Khared which is considered to be one of the two main feeding sources for AL-Jawf valley ending up towards RUB ALKHALI desert to the east. SWB is considered to be one of most critical basin in terms of water scarcity. This is caused by acute depletion of ground water as it represents the main source for various economic activities in the region.

Water uses:

Agriculture consumes up to 80% of ground water pumped in wells adjacent to the village. The pumped ground water is used for various agricultural production activities, i.e. 50.54% of pumped water is used for fruit trees, 13.8% of pumped water is used for Qat, 3.8% of pumped water is used for fodders and 3.2% of pumped water is used for vegetables. Around 20% of ground water is used for drinking and other households purposes. Drinking water doesn't constitute any problem for the local community in the village at present. Ground water quantity produced and consumed by each household ranges between 40-50l./day/capita.

Initiative concept:

According to the discussions made with farmers and local members of the community, representing all beneficiaries, it was reported that some of the well's owners sell groundwater from their wells to water vendors coming from outside the area. As demands for water in other areas increased more water was sold from the wells adjacent to Al MALIKA village at attractive prices (1000-300YR per tank of 2-5 cubic meters capacity). Local leaders have, observed that sold water was increasingly used for Qat cultivation. Based on this the local community decided to call for a meeting, aiming at eliminating and prohibiting the selling of groundwater for the cultivation of Qat in other areas. The community was convinced that if selling of ground water is left unchecked will affect the availability of groundwater for the village populations in the future. Thus, all the community members agreed and reached a consensus on preventing the selling of ground water from the adjacent wells. Hence, It was agreed in writing and the representatives of the community and well owners signed the arrangement to ban the selling of groundwater to Qat cultivators from outside the area. According to the agreement, violators would be subjected to penalties so as to ensure better and proper enforcement. Water user association (WUA) in the village has played major role for accomplishing this agreement which is the core of the initiative under consideration.

Initiative geographical area:

The initiative is applied for the village and related locations only.

Number . of wells in the targeted area:

Targeted area contains 15 wells. 6 of these wells are drilled in BaniAlhareth and 9 in BaniHushaish districts. The targeted village is located within these two districts.

1. Factors and reasons led to adopting the initiative:

- a) Widespread activities of water vendors in the area who sell water to other areas (e.g. to Thuma, Al-Asri etc..). It is estimated that sold water amounts to 20-50 tanks from each well/ day.
- b) Decreased water levels of the wells around the village which is found to be between 0.5-1.5m every three years.
- c) Expansion of Qat cultivation and other crops in the neighboring areas has led to increased demand of groundwater and accordingly to increased transportation of groundwater from Al-Malikahto neighboring areas that cultivate Qat and have limited water resources.
- d) High population density due to increased population growth in the area which increased the poverty level and pushes wells owners to sell groundwater wells as new income sources. The income generated from water selling fluctuates between 1000-3000.-YR/ tanker depending on the purpose of , water uses and the distance between the well and the targeted use area

2. Community participation for assuring sustainability:

- Through the discussions made with local activists and community representations it was found that community participation took several forms to ensure initiative accomplishment:/ sustainability
- On Bani AL-Hareth District side, where 6 wells are located, local people prevented any selling activities from these wells. However, one of these wells was owned by somebody from outside the area and he refused to comply with banning selling groundwater from his well. Local community decided to purchase the due well to contain the situation and keep it under control which was paid for by the community.
- Local leaders and Shaiks as well as teachers and youth played major roles towards implementing the initiative through convincing local community (raising their awareness) on the threats of selling water from their area and its impacts on their future.
- The Ministry of Water and Environment contributes through organizing awareness campaigns in support of adopting the initiative..

3. Up to date sustainability factors:

- The existence of water user association (WUA) and the efforts of its management board has played a positive role towards achieving high level of awareness among the members of the community..
- Cultivation of high valued cash crops enabled local people to generate better incomes and try to conserve their groundwater for this purpose e.g. Grapes, figs, tomatoes etc..
- High alert on threats caused by continuous decrease of the ground water levels.
- Continuous dialogue with the remaining well's owners to be included into the initiative.

4. Obstacles threatening initiative sustainability:

- Some well's owners do not adhere to the initiative provisions and they continue selling water from their wells to outside the area. Out of 15 wells, 9 well owners succeeded to prevent selling groundwater from their wells. which are located in the village. On the other hand, the other 6 well's owners in BaniHushaish do not show cooperation and are still selling water which threaten the initiative sustainability.
- Low levels of awareness among the local population, in particular among well owners. This implies that focused targeted awareness campaigns are essential in the future.
- Lack of initiative promotion; since there are no posters, no leaflets and no other guiding materials which could be designed and distributed among local people to address the negative impacts of allowing water to be sold to outside vendors..
- Resistance of some well's owners to respond and agree to adopting the initiative. This is the case in BaniHushaish where 9 wells are drilled.
- Lack of authority of the water user association in the area to enforce the initiative provisions in the community.
- Absence and / or nonexistence of official supports to the initiative accompanied by very limited supports by the local council.

5. Women role towards the initiative:

Indirectly, women played important roles in favor of supporting the implementation of this initiative by the local community. This is made through advising guiding their husbands on the importance of preserving the water in the area for future household use, including for drinking and for other household purposes, however, women can not have any influence on irrigation and sold water at the well site as social interactions outside home is purely male affairs.

6. Initiative experiences and its replications:

this initiative was replicated by Wa'alan WUA, Bait Sarhan and Alhamrmaly WUA, Al Ma'akhady WUA and Qa'a Al-Shams WUA, all these are in Amran Governorate

Furthermore, low level of living conditions of the local community; decreased rain fall and water scarcity in the regions over the last years represent key factors that led to weak response of some well's owners to cooperate for the initiative success. For these reasons and due to limited supports of the local council for enforcing water related legislations the initiative couldn't be replicated in other regions.