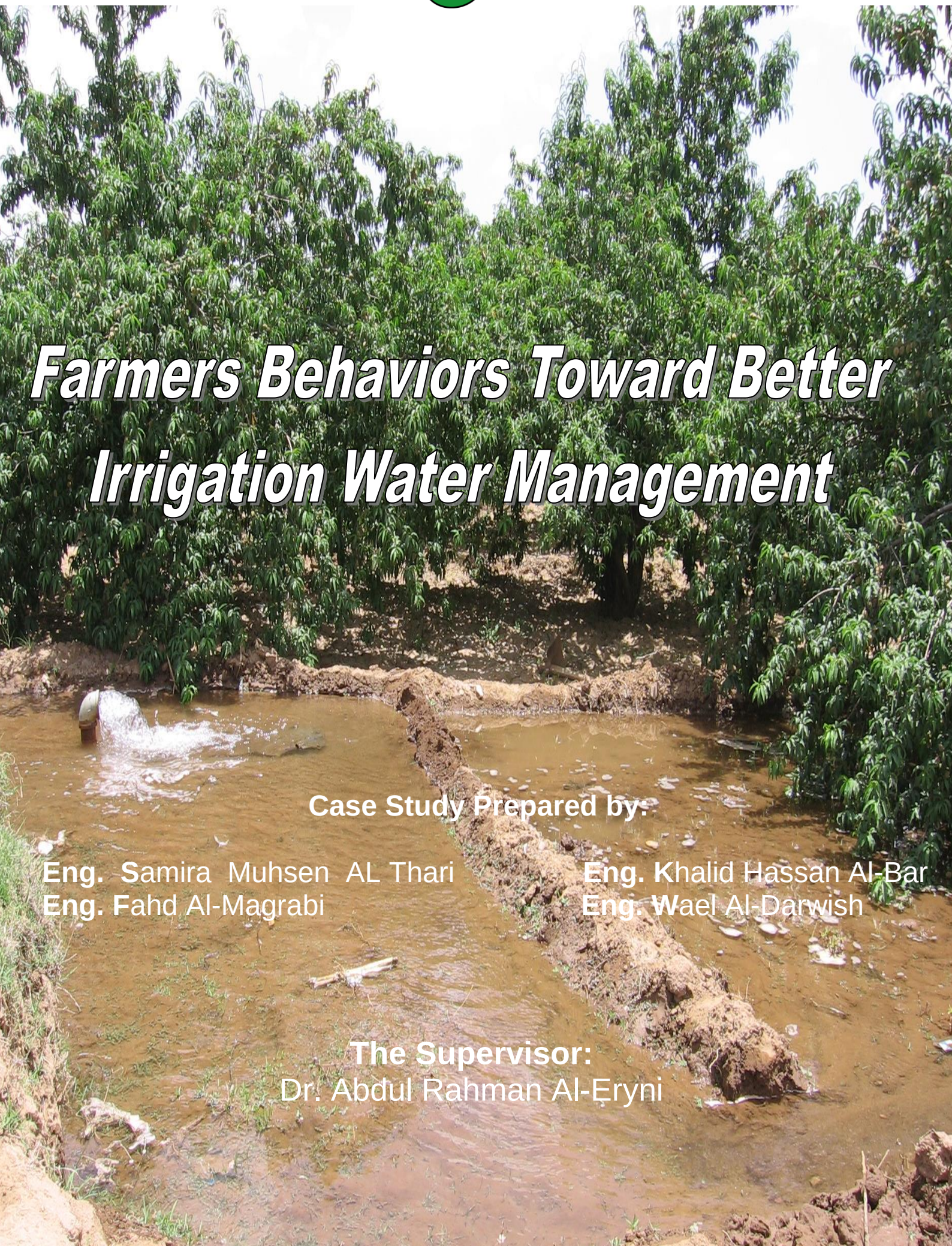
Republic Of Yemen
Sana'a University
Water and Environmental Center

Integrated Water Resources
Management (IWRM) Program



Farmers Behaviors Toward Better Irrigation Water Management

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بسم الله الرحمن الرحيم

قل ارايتم إن أصبح ماؤكم غوراً فمن يأتيكم بماءٍ معين

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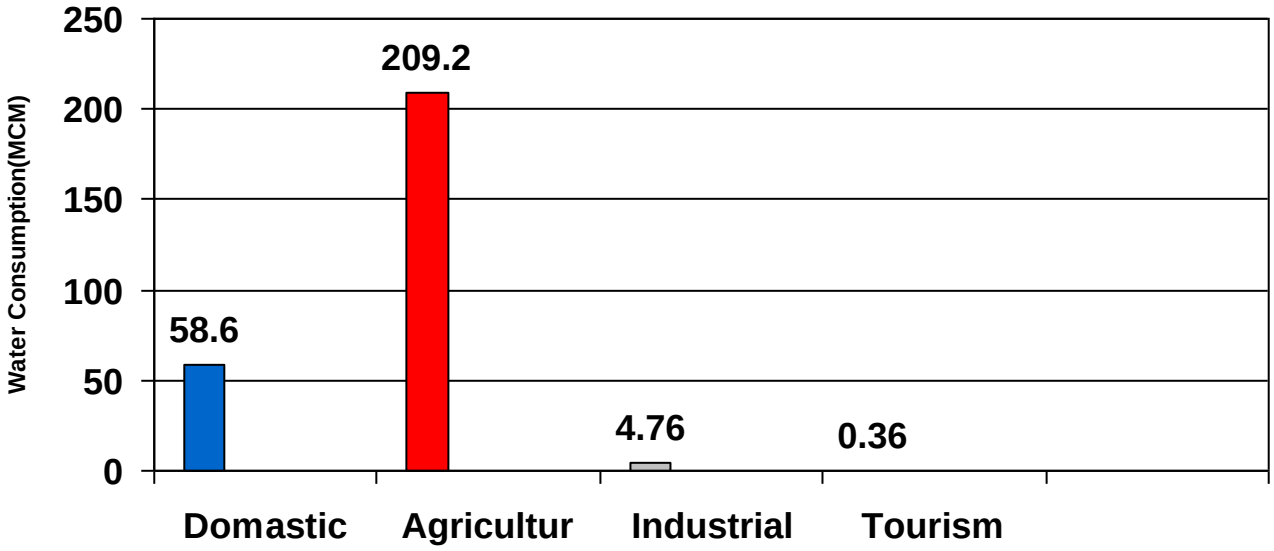
1 Introduction

Sana'a basin within the intermountain located in the central highlands and the groundwater are being heavily exploited to meet irrigation demands that far in excess of the natural replenishment. Depletion of groundwater especially for irrigation where exceed more than 85% threaten the economic and development and the agriculture itself see figure(1).

figure (1) Quantity of Water abstraction from groundwater for maigor uses



Decrease the groundwater in the basin led to rising the demand, competition, pollution and interregional transfer especial that the capital is located in the central of the Basin. Population has increased from 80 thousand persons in 1972 to about one million persons in 1991(High Water Council 1992). The groundwater in Sana'a Basin are depleting very rapidly because of continuously increasing water demands by all water consuming sectors.

The total water demand in 1990 was estimated to about 178 Mm3 where the agriculture sector was estimated to consume about 86%. The gross abstraction for irrigation increased from 33Mm3 in 1980. Recently the total demands estimated about 280 Mm3 and the agriculture sector was estimated to consume about 250 Mm3. Area of irrigation in Sana'a basin if it compared with rainfed area estimated about 18953.60 Hectares and cultivated with cash crops such as Qat, Grapes, and vegetables which are high water consumptive crops. See table (1).

Table (1) show Irrigated and rainfed area and grown crops

Irrigated area	Qat	Grip	Other	Fruit	Rain cultivated area	Total cultivated area
18953.6	11471.7	5814.5	1554.3	113.1	18498.7	37452.3

After JICA

1.1 Problems Definition:

The agricultural sector in Yemen employs more than 55% of the country's labors force and consumes around 3.1 billion cubic meters – 91% of the 3.4 billion cubic meter of water resources renewed annually (High Water Council 1992). In the past the predominant farming systems in Sana'a basin were spate, rain and spring irrigation. In the last thirty years tub-wells became the main source for water irrigation, in Sana'a basin about 6689 wells are using for irrigation, which causes groundwater depletion. In Sana'a basin water irrigation consume more than 250 MCM from the total water abstraction. Sana'a basin was selected to applied this study because that the basin exploited the groundwater mainly for irrigation and by bad manner which causes crises in the futures between water uses , domestic use portion also is very high as a result of dense population in Sana'a city as a capital of Yemen. There are many uses and many of users for groundwater, but the concentrated was on farmers and agriculture which consumed approximately 90 % of groundwater for irrigation by using traditional irrigation methods. So huge amount of fresh groundwater is in continuation lost. Therefore it is very important to assess farmer's behaviors toward saving irrigation water in Sana'a basin.

1.2 study important

The importance of this study relate with importance of water for agriculture and other sectors where The agriculture depended mainly on groundwater especially in Sana'a basin. So, this study focused on farmers whose considered the primary responsible of water irrigation management on the field level. This research achieves the information from the farmers themselves directly through the questionnaire which done with the formers where the data represent the opinions of the farmers and show how the farmers manage the water of irrigation.

1.3 Study objectives:

- ✓ To discernment irrigation water management on-field level.
- ✓ To evaluate the role of economic incentives in groundwater depletion.
- ✓ To assess farmers awareness, policy and the application of legislation to improve irrigating water uses efficiency.

2 Background of study area

Sana'a basin is the largest of the intermundane plains in the central highlands. Area of the basin is 3250 Km2(325000 ha) and forms the upper part of the catchment of Wadi Al-Kharid, a sub-catchment of Wadi Al-jawf. The elevation is about 1900m amsl in the outlet of the basin toward wadi Al-jawf and reach to 3000 amsl in west part of the Basin but in the capital estimated about 2200m amsl
(figure 2).

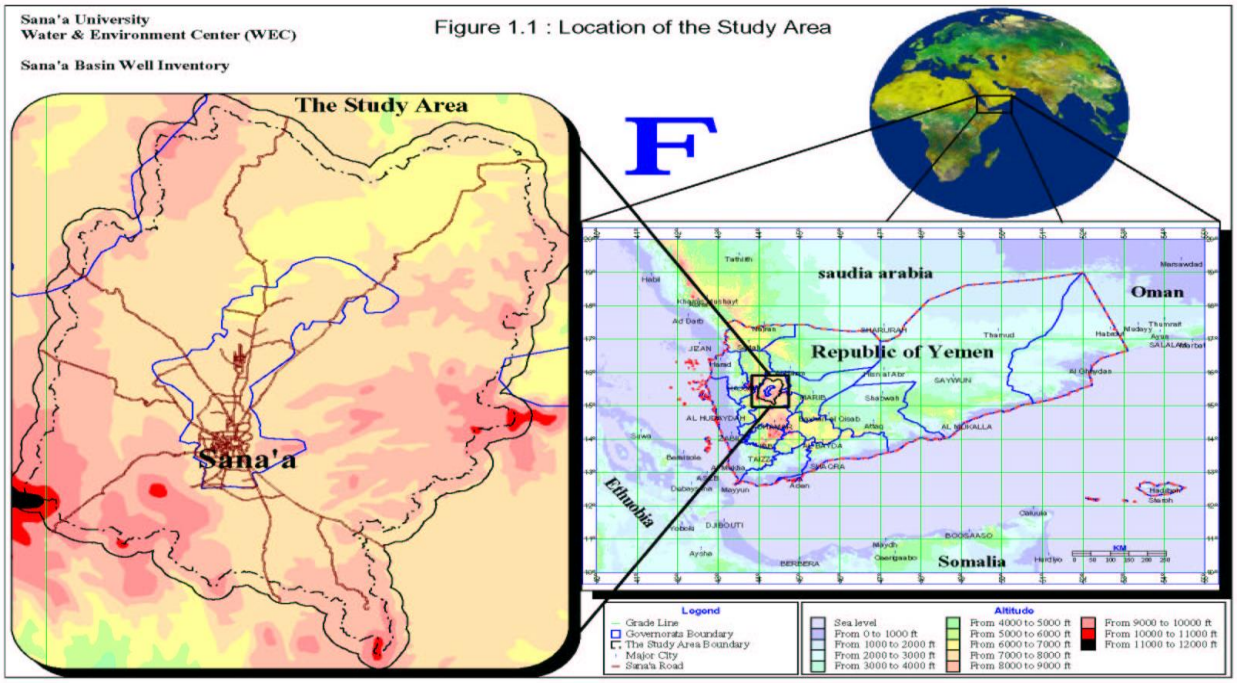


Figure (2) show location of Sana'a basin

Climate in Sana'a basin descript as semi arid with Average rainfall of about 200-250mm/y. Sana'a relies entirely on groundwater for its needs so it stated abstraction ground water from Dug wells and springs (ghayls) from the first aquifer quaternary deposits in the began of the 1960s and increased rapidly from the mid of 1970 especially though enter new technical to the country illustrated in diggers which can reach to the deep aquifers. And exploited the groundwater for both irrigation and municipal water needs. Cultivation which depended on rain in irrigation and it concentrated mainly in the district of Bani-mater because it is located in high land and the rainfall is high, but in the rest districts it depended mainly on groundwater. Sana'a basin includes parts or all of twelve administrative districts occurring within the Sana'a Governorate. Practically all of the local populations of three of these districts (Kharif, Raydah, and 'Iyal Surayh) live outside the Basin. Therefore these districts have been excluded from all further discussions. Rural districts examined within the context of this study are Bani Hushaysh, Bani Al Harith, Khawlan, Bani Matar, Arhab, Hamdan, Nihm, Sanhan-Bani Bahlul, and Al Amana, or the Sana'a urban area. See table (2).

2.1 Previous studies:

Sana'a basin submitted to many of studies started. The first study which done by Ital-consult which aimed to study northwestern field for Sana'a city supply where drilling (15) wells in sandstone aquifer between 1970-1973. the second study is haword hammvi which drilling another (15) wells in the eastern field for Sana'a city supply between (1980-1983). The Russian too done studies by Mosgiprovodkhoz, 1986 which studied the basin and it suggested created Al-Karid dam. WEC study in 2001 which aimed to inventoried and analysis all water points in Sana'a basin for integrated water resource management. SBWMP with Hydrosult study in 2003 which aimed to studied groundwater, irrigation

improvement and increases the awareness about water and it is continues. JICA study in 2007 which aimed to make (action plan) for water resource management in Sana'a basin and improvement water supply in rural. But all of recommendation in all studies dose not applied to now which represented big problems in the future especially that the water level in the basin drop from 5-7m yearly.

Table (2) show area of districts and population within Sana'a basin				
district	Area(km2)	%	Population	%
Capital	404.2	100	1747834	85.57
Bani-Hushaysh	340.7	100	73957	3.62
Sanhan	483.8	80.6	64832	3.17
Hamdan	442.1	74.9	63612	3.11
Arhab	556.5	43.2	38891	1.90
Nihm	474.7	24.2	10046	0.49
Al-tyal	128.6	32.5	11779	0.58
Bani-mater	319.6	28.6	28605	1.40
Jahanh	36.6	5.9	3009	0.15
After JICA 2007				

2.2 Geology

Sana'a basin geologically divided in to the following as show in figure(3):

1- Quaternary Alluvium with thickness reach to 350m

2- Quaternary Volcanic with thickness reach to 400m

3- Tertiary Volcanic with thickness reach to >2000m

4- Cretaceous Sandstone with thickness reach to 150-400m

5- Jurassic limestone with thickness reach to 100-400m

2.3 Hydrogeology

Groundwater is abstracted from four main aquifers across the Basin: alluvium (mostly in the Central zone), volcanics (most dominant in the Southern and South western zones, sandstone (currently exploited in the Bani-Hushaish, Hamdan, and Nihm areas but also found throughout most of the Musayreka hydrologicl unit in significantly deeper horizons), and limestone (in the Wadi al Kharid hydrological unit, i.e. the Northwestern and Northeastern groundwater zones) (WEC 2004).

2.4 Agricultural water

Annual water consumption for irrigation purpose, which was estimated by WEC-ITC (2001) by calculating the actual evapotranspiration (ETa) through an analysis of cropping patterns based on satellite imagery analysis, was calculated

at 151.4 MCM, adopting 40% as the irrigation water efficiency . The well inventory (2002) was estimated at 217.5 MCM for the annual water abstraction, through interviews with owners of wells and on-site measurement. Approaches and methodologies for the estimation of these studies are different. later, GAF(2007) made an estimation at 139.47 MCM, applying the 60% as irrigation water use efficiency, for annual water consumption of irrigation purpose using the same methodology as WEC-ITC(2001) by sub –basin. As for irrigation water use efficiency, the adopted value differs from study to study see table(3)

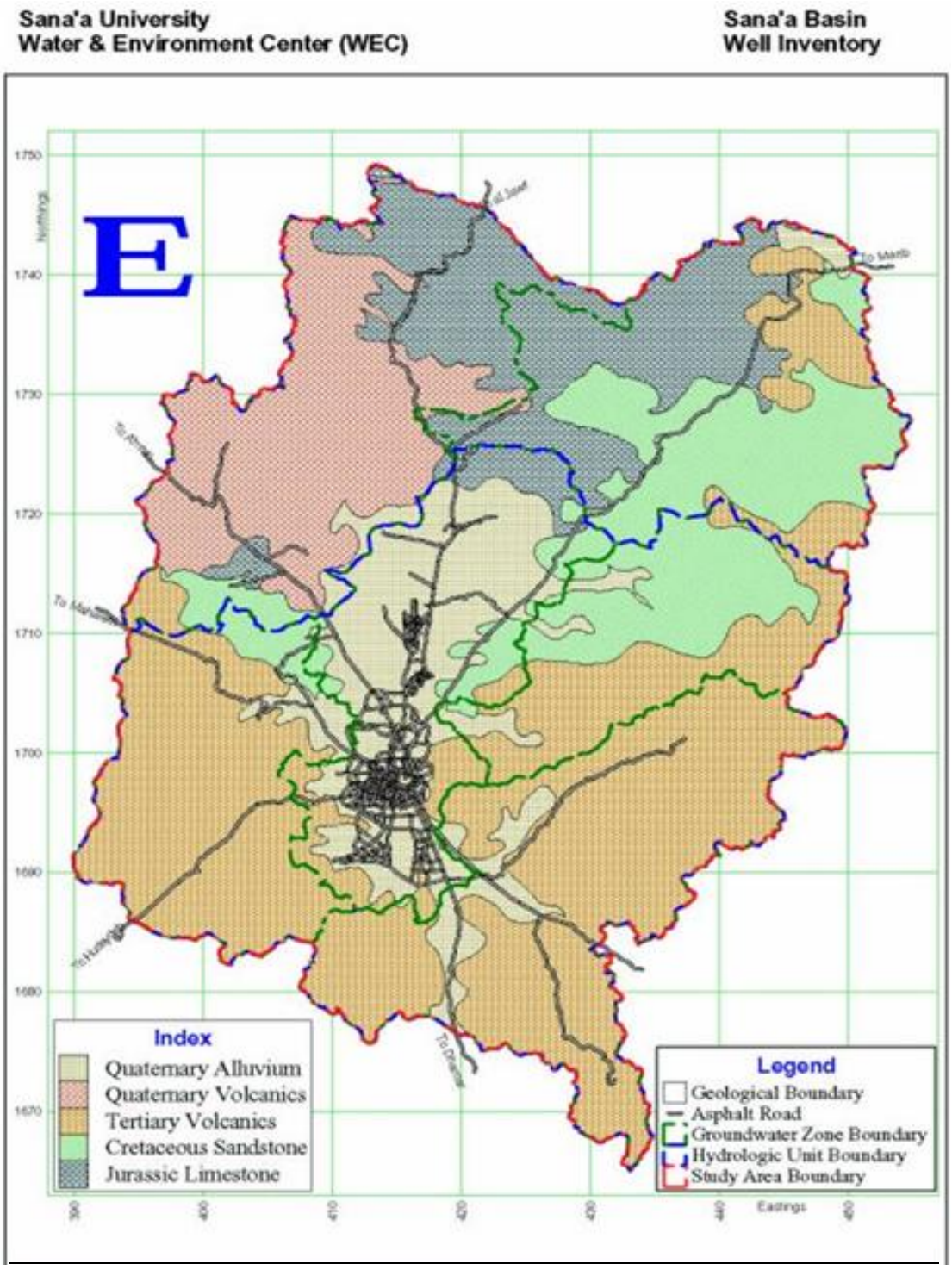


Figure (3) show geology of Sana'a basin (after WEC)

Table (3) show irrigated area and abstraction in different studies					
WEC-ITC 2000		Well Inventory 2002		GAF 2007	
Irrigated area	Abstraction	Irrigated area	Abstraction	Irrigated area	Abstraction
23.380*	151.4**	26.577*	217.5**	18.953*	139.47**
*hectare ×1000 **MCM after JICA 2007					

In this study, the irrigation water efficiency of 40% was adopted after considering following conditions:
According to MWE (2006), the main irrigation methods used inside Sana'a basin are furrow and small basin methods, and farmers use surface irrigation by applying a sheet of water to the fields up to knee height; therefore the field application efficiency is very low, and might reach 45% while the conveyance used for irrigation are iron and plastic pipes with considerable amount of water leakage , and earth channels crossing tracks with long distance causing. (JICA 2007)

2.4.1 Sources of water for irrigation

According to the well inventory (2002),(58.66%)7781 wells were inventoried for irrigation use purpose.(87.32%) 6786 operational wells ware inventoried, (51.03%) 3,463 water points were accounted for operational dug wells, (49.97%)3323 of the water points were accounted for operational deep wells. See table (4).
Only 0.48 %(64) of the points inventoried was as operational springs and dam/pools. Boreholes are concentrated in the middle area of the basin, in the sub-basins as Wadi Bani Huwat, Wadi as Sirr, Wadi al Furs and Wadi al Iqbal. Dug wells are concentrated at the east side of the basin. (JICA 2007)

2.4.2 Irrigation water demand:

Irrigation water demand was estimated by GAF (2007) calculating the ETa based on FAO approach and result from satellite data analyses .ETa reflects the gross amount of water consumed by the vegetation (crop), i.e. the minimum amount of water necessary to the plant. However, it must be considered that more water is used by farmers to irrigate his land than the plants itself. This difference is expressed in the irrigation efficiency. TS-HWC (1992) recommends irrigation efficiency of 35%for low efficiency, 55%for medium efficiency and 75% for high efficiency to obtain a reasonable range of irrigation water requirement and GAF (2007) has adopted an irrigation efficiency of 60%. Projection for water demand was estimated based on results of GAF (2007) which has calculated the total ETa of each crop.

Table (4) show distracts and number of wells which used for irrigation in Sana'a Basin											
Distract	Sanhan	Sana'a	Hamdan	Nihm	Khawlan	Arhab	Bani-Matar	Bani- Al -Har	Bani-Hushaysh	Aill Soraie	total
No. of Wells for Irrigation.	1172	341	734	869	760	334	150	897	2501	23	7781
%	15.06	4.38	9.43	11.17	9.77	4.29	1.93	11.53	32.14	0.30	58.66
No. of operation Wells	1034	307	680	750	625	295	135	821	2118	21	6786
%	15.24	4.52	10.02	11.05	9.21	4.35	1.99	12.10	31.21	0.31	87.21
Opr. Dug wells	734	118	13	643	581	104	66	199	994	11	3463
%	21.20	3.41	0.38	18.57	16.78	3.00	1.91	5.75	28.70	0.32	51.03
Opr. Deep Wells	300	189	667	107	44	191	69	622	1124	10	3323
%	9.03	5.69	20.07	3.22	1.32	5.75	2.08	18.72	33.82	0.30	48.97

In this study, ETa per unit of irrigated area of each crop was calculated to achieve the water demand in relation to the increase of irrigated land projected above. Calculated ETa per unit of area is shown in table (5)

Table(5) show calculated ETa per Unit of Area by Type of Crop					
Crop Type	Unit	Qat	Grape	Irrigation. Mixed Crop	Fruit Orchards
Total ETa	MCM	59.17	16.83	7.01	0.67
Irrigated Area	ha	11,471.7	5,814.5	1,554.3	113.1
ETa per unit of Area	MCM/ha	0.00516	0.00289	0.00451	0.00592

3 Methodology:

In this research we depended manly on three methods to achieve the objectives of the study, they are:

3.1 Library activity

To revise the previous studies we should collect the refer information from existing studies in the available libraries in WEC, NWRA and Nwra -Sana'a Branch to reach to clear vision of Sana'a basin situation in regarding to water scarcity problem.

3.2 Interviews

Interviews with decision-makers and government Authorities and Projects involved in this regard for the plans and programs designed to rationalize water use by farmers as well as know how their assessment of the performance of farmers in alleviating the water used in irrigation.
The visits included the Ministry of Water and Environment representative of the General Authority for Water Resources, Sana'a Branch of water resources, Basin Water Management Project Sana'a in addition to the Ministry of Agriculture and Irrigation as a first and last on agriculture and farmers

3.3 Data collection

For data collection we depended on three methods to achieve the data as the following:

3.3.1 Questionnaire design

The questionnaire consists of (87) questions design to serve IWRM topics. So, we divided it to discussed six subjects:

1- General questions: consist of (19) questions
2- Crop pattern and water management in the field: consist of (8) questions
3- Economic incentives: consist of (18) questions
4- Social awareness: consist of (17) questions
5- Polices: consist of (10) questions
6- Laws, legislations and conflicts: consist of (10)

3.3.2 sample planning

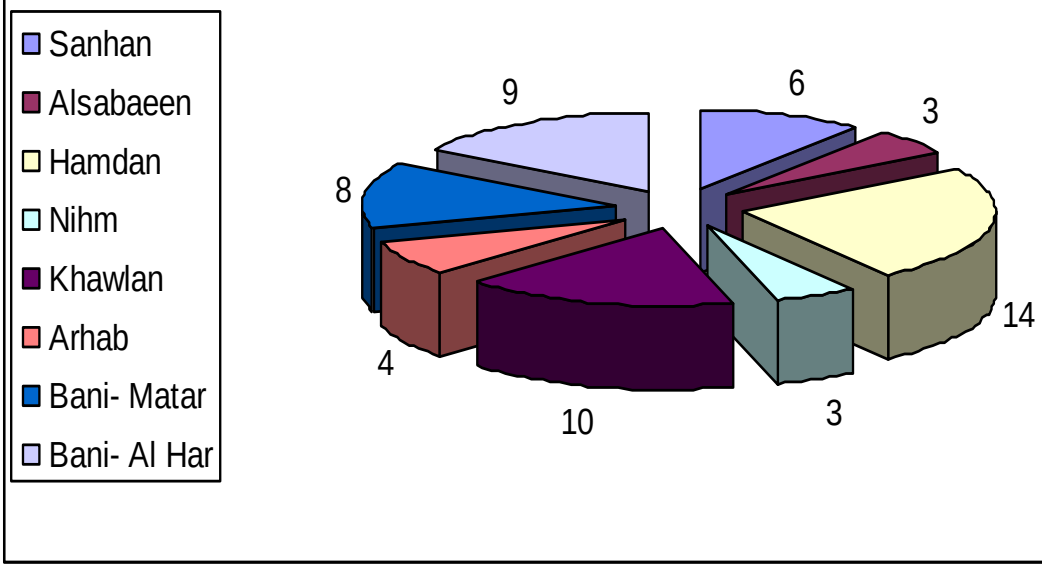
From the title we make questionnaire and we applied this questionnaire in Sana'a basin to obtain data from the farmers themselves, assesses the situation of farmers and irrigation through the data which collected from the field and How farmers make to save water irrigation and the methods which used to conservation water. In questionnaire applied we choice eight distracts in Sana'a

basin to do this study. And we focused on districts which have large irrigated area like Hamdan and Bani-alharith. And we determine how many samples in each district in the table (6). From the following figure (4) we see share of all districts from the samples which explain how we distribute the sample depending on agriculture activities on each district.

Table (6) show distracts and number of samples in each distracts

Distract	Sanhan	Alsabain	Hamdan	Nihm	Khawlan	Arhab	Bani-Matar	Bani-AlHar	total
No. of Samples	6	3	14	3	10	4	8	9	57

Figure (4) show share each district from sample in Sana'a basin



3.3.3 farmers interview

in the interview we gone to the field to done the questionnaire and to be closed with the farmers to achieve the data from the farmers directly.

In the questionnaire applied we decrease number of samples or no illustrated it in some of districts for the following obstacles:

1- Incentives is low
2- Time is not enough
3- Sana’a basin has large area
4- Some districts described as non safety region like Arhab, Nihm and Bani-Hushaysh especially in time of do this study
5- Most of roads in Sana’a basin are roughness
6- Some people refuse the interview

4- Results and discussion

4.1 General questions

Table (1) show the educational level of the samples studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
unlettered	Count	2	0	5	1	0	5	1	3	17
	% within district	33.30%	0.00%	35.70%	25.00 %	0.00%	50.00%	10.00%	42.90%	29.80%
	% of Total	3.50%	0.00%	8.80%	1.80 %	0.00%	8.80%	1.80%	5.30%	29.80%
primary school	Count	0	1	1	2	0	5	2	1	12
	% within district	0.00%	33.30%	7.10%	50.00 %	0.00%	50.00%	20.00%	14.30%	21.10%
	% of Total	0.00%	1.80%	1.80%	3.50 %	0.00%	8.80%	3.50%	1.80%	21.10%
Secondary school	Count	1	1	5	1	3	0	5	2	18
	% within district	16.70%	33.30%	35.70%	25.00 %	100.0 0%	0.00%	50.00%	28.60%	31.60%
	% of Total	1.80%	1.80%	8.80%	1.80 %	5.30%	0.00%	8.80%	3.50%	31.60%
collegiate	Count	3	1	0	0	0	0	2	1	7
	% within district	50.00%	33.30%	0.00%	0.00 %	0.00%	0.00%	20.00%	14.30%	12.30%
	% of Total	5.30%	1.80%	0.00%	0.00 %	0.00%	0.00%	3.50%	1.80%	12.30%
High diploma	Count	0	0	2	0	0	0	0	0	2
	% within district	0.00%	0.00%	14.30%	0.00 %	0.00%	0.00%	0.00%	0.00%	3.50%
	% of Total	0.00%	0.00%	3.50%	0.00 %	0.00%	0.00%	0.00%	0.00%	3.50%
master's degree	Count	0	0	1	0	0	0	0	0	1
	% within district	0.00%	0.00%	7.10%	0.00 %	0.00%	0.00%	0.00%	0.00%	1.80%
	% of Total	0.00%	0.00%	1.80%	0.00 %	0.00%	0.00%	0.00%	0.00%	1.80%
Total	Count	6	3	14	4	3	10	10	7	57
	% within district	100.00 %	100.00%	100.00%	100.0 0%	100.0 0%	100.00%	100.00 %	100.00 %	100.00 %
	% of Total	10.50%	5.30%	24.60%	7.00 %	5.30%	17.50%	17.50%	12.30%	100.00 %

The table shows the educational level (unlettered) more numerous in the districts of Hamdan and Khawlan, as the proportion (8.8%), while the ratio is less in the districts of Arhab and Bani-Al Harith, by up to (1.8%) and the sample studied had not noticed that there illiteracy in the districts of each of Alsabain Nihm. and the primary education level, reaching their highest in

the district of the Khawlan by (8.8%), while the ratio is less in the districts of Alsabain, and Bani-Mater Hamdan, a rate of up to (1.8%). It is thought the sample had not noticed the presence of primary education in the districts of both Nihm and Sanhan. The secondary-level education more numerous in the districts of Hamdan and Bani-Al Harith, by up to (8.8%), while the ratio is less in the districts of Alsabain Arhab and Sanhan and up to (1.8%) and from the sample studied had not noticed the presence of secondary education in the District of Khawlan. The university-level education in increasing the proportion of the District of Sanhan (5.3%), while the ratio is less in the districts and Alsabain Bani-Mater (1.8%) and from the sample studied had not noticed the presence of university education in the districts of Hamdan, Arhab Nihm Khawlan and. While the educational level of higher diploma rate of increase in the district of Hamdan (3.5%) and from the sample studied had not noticed the presence of diploma of higher education in the districts of Sanhan, Alsabain, Arhab, Khawlan, Nihm, Bani-Al Harith and Bani-Mater. Educational level master highest in the District of Hamdan (1.8 %) And from the sample studied had not noticed the presence of master's level education in the rest of the district.

Overall literacy rate of obtaining higher education in Sana'a basin and those included in the questionnaire only accounted for 17.6%, while the proportion of low-educated is the highest rate with up to (82.4%), Which indicate that the awareness of almost non-existent in terms of the rationalization of water use within the basin and poor education cause of non-rational use of water by farmers.

Table (2) show years of experience of the sample studied

Year		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
1-10	Count	3	0	5	1	2	0	3	2	16
	% within district	60.0%	.0%	38.5%	25.0%	66.7%	.0%	37.5%	25.0%	29.6%
	% of Total	5.6%	.0%	9.3%	1.9%	3.7%	.0%	5.6%	3.7%	29.6%
11-20	Count	2	2	3	2	1	3	5	3	21
	% within district	40.0%	66.7%	23.1%	50.0%	33.3%	30.0%	62.5%	37.5%	38.9%
	% of Total	3.7%	3.7%	5.6%	3.7%	1.9%	5.6%	9.3%	5.6%	38.9%
>20	Count	0	1	5	1	0	7	0	3	17
	% within district	.0%	33.3%	38.5%	25.0%	.0%	70.0%	.0%	37.5%	31.5%
	% of Total	.0%	1.9%	9.3%	1.9%	.0%	13.0%	.0%	5.6%	31.5%
Total	Count	5	3	13	4	3	10	8	8	54
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.3%	5.6%	24.1%	7.4%	5.6%	18.5%	14.8%	14.8%	100.0%

Table shows that those who have less experience (1 - 10 years) more than their share of the District of Hamdan, up to (9.3%), while the ratio is less at the District Arhab reaching as high (1.9%). Whereas those who have the highest proportion of agricultural experience (11 - 20) years in the District of Bani-Al Harith. And the ratio is less in the district and by Nihm (1.9%). Those who have more experience than (20) over age accounted for in the District of Khawlan, the ratio is less in the districts of Arhab and Alsabain, by (1.9%).

Overall, those who have experience ranging from agricultural (11 - 20) per year (39.6%), followed by those who have agricultural experience more (20%) and proportion (31.5%) and who have experience of (1 - 10) years, which indicates that the Precious experience with farming more (10) years and up to the proportion (70.4%) and this experience can be used in the rationalization of water consumption and conservation by farmers through the culture and knowledge of the ways in which maintain the water and support scientific and introduction of new methods help.

Table (3) show basic income of the sample studied

		District								Total
	District	Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Agriculture	Count	5	3	13	4	3	10	10	5	53
	% within district	83.30%	100.00%	92.90%	100.00 %	100.00 %	100.00%	100.00 %	71.40%	93.00 %
	% of Total	8.80%	5.30%	22.80%	7.00%	5.30%	17.50%	17.50%	8.80%	93.00 %
Militarization	Count	1	0	0	0	0	0	0	1	2
	% within district	16.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	14.30%	3.50%
	% of Total	1.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.80%	3.50%
officer	Count	0	0	1	0	0	0	0	1	2
	% within district	0.00%	0.00%	7.10%	0.00%	0.00%	0.00%	0.00%	14.30%	3.50%
	% of Total	0.00%	0.00%	1.80%	0.00%	0.00%	0.00%	0.00%	1.80%	3.50%
Total	Count	6	3	14	4	3	10	10	7	57
	% within district	100.00 %	100.00%	100.00%	100.00 %	100.00 %	100.00%	100.00 %	100.00 %	100.00%
	% of Total	10.50%	5.30%	24.60%	7.00%	5.30%	17.50%	17.50%	12.30%	100.00%

Table shows that those who represent them agriculture basic income greater than in the district of Hamdan (22.8%), while the ratio is less in the districts of Alsabain and Nihm, up to (5.3%), while the rate of increase of militarization in the district to Sanhan and Bani-Mater (1.8%) and the sample was not examined And the militarization of farmers in the districts of Alsabain Hamdan, Arhab, Bani-Al Harith, Nihm Khawlan, increase per employee in the districts of Hamdan, Bani-Mater (1.8%) and the sample studied had not noticed the staff member in the districts of Sanhan, Alsabain Arhab, Bani-Al Harith, Nihm Khawlan.

Overall, the proportion (93.0%) of those included in the questionnaire within Sana'a basin depend mainly on agriculture as a key source of revenue with another source of income other than agriculture does not increase the proportion (7%), which indicates that it is still greater reliance on agriculture and that to date We could not find alternative sources of income from agriculture is sufficient to preserve the water.

Table (4) appear the secondary income of the sample studied

		District					Total
		Sanhan	Hamdan	Khawlan	Bani- Al Harith	Bani-mater	
Agriculture	Count	1	1	0	0	2	4
	% within district	25.0%	33.3%	.0%	.0%	100.0%	26.7%
	% of Total	6.7%	6.7%	.0%	.0%	13.3%	26.7%
Militarization	Count	2	1	1	0	0	4
	% within district	50.0%	33.3%	100.0%	.0%	.0%	26.7%
	% of Total	13.3%	6.7%	6.7%	.0%	.0%	26.7%
Officer	Count	1	1	0	2	0	4
	% within district	25.0%	33.3%	.0%	40.0%	.0%	26.7%
	% of Total	6.7%	6.7%	.0%	13.3%	.0%	26.7%
Free work	Count	0	0	0	3	0	3
	% within district	.0%	.0%	.0%	60.0%	.0%	20.0%
	% of Total	.0%	.0%	.0%	20.0%	.0%	20.0%
Total	Count	4	3	1	5	2	15
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	26.7%	20.0%	6.7%	33.3%	13.3%	100.0%

Table shows that those who depend on agriculture as a secondary income or increase in the district of Bani-Mater (13.3%), while the lowest them are Sanhan, Hamdan, by up to (6.7%) and from the sample studied had not noticed presence in the districts of Agriculture and Bani-Al Harith Khawlan militarization. while a source of revenue Secondary increase in the district or to Sanhan (13.3%) below the ratio in Khawlan, Hamdan districts, by up to (6.7%) and from the sample studied had not noticed the presence of militarization in the districts of Bani-Mater Bani-Al Harith. Civilian post secondary source of revenue or increase in the district of Bani-Al Harith (13.3%), While the lowest are in their districts Sanhan, Hamdan, by up to (6.7%) and from the sample studied had not noticed the presence of civilian post in the districts of the Khawlan and Bani-Mater, while self-employment income as a secondary or increase in the district of Bani-Al Harith (20.0%) and the sample studied Did not notice the presence of self-employment in the districts of Sanhan, Khawlan, and Bani-Mater Hamdan.

Overall, the proportion of people dependent on agriculture income secondary (26.37%) is significantly less dependent on other sources of alternative income, amounting to the proportion (74.3%) which shows that agriculture does not represent a secondary source of income is the main source of income for the vast majority of Farmers.

Table (5) appear the number of beneficiaries of agriculture of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
1-50	Count	6	2	11	4	2	10	9	7	51
	% within district	100.0%	66.7%	91.7%	100.0%	100.0%	100.0%	100.0%	87.5%	94.4%
	% of Total	11.1%	3.7%	20.4%	7.4%	3.7%	18.5%	16.7%	13.0%	94.4%
51-100	Count	0	1	0	0	0	0	0	1	2
	% within district	.0%	33.3%	.0%	.0%	.0%	.0%	.0%	12.5%	3.7%
	% of Total	.0%	1.9%	.0%	.0%	.0%	.0%	.0%	1.9%	3.7%
>100	Count	0	0	1	0	0	0	0	0	1
	% within district	.0%	.0%	8.3%	.0%	.0%	.0%	.0%	.0%	1.9%
	% of Total	.0%	.0%	1.9%	.0%	.0%	.0%	.0%	.0%	1.9%
Total	Count	6	3	12	4	2	10	9	8	54
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.1%	5.6%	22.2%	7.4%	3.7%	18.5%	16.7%	14.8%	100.0%

Table shows that the number of beneficiaries of agriculture who less than fifty people increase their share of the District of Hamdan (20.4%), while the ratio is less in the districts of Alsabain and Nihm, up to (3.7%). while the beneficiaries of agriculture who's who of between fifty and hundred Increasing proportion of the District of Bani-Mater Alsabain and to (1.9%) and the sample studied had not noticed their presence in the districts of Sanhan, Hamdan, Arhab, Bani-Al Harith, Nihm Khawlan. while the beneficiaries of agriculture who's who more than a hundred increasing per capita in the district of Hamdan (1.9%) And the sample studied had not noticed their presence in the districts of Sanhan, Alsabain Arhab, Bani-Al Harith, Bani-Mater, and Khawlan Nihm.

Overall, the proportion (94.4%) of those included in the questionnaire within Sana'a basin are the beneficiaries of agriculture and those who are not more than fifty people indicating that the economic returns of agriculture covers only a small number compared to the cultivated plots, population density and water depleted the purpose of irrigation .

Table (6) appear the source of irrigation water of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Wells	Count	5	3	14	4	2	4	9	6	47
	% within district	83.3%	100.0%	100.0%	100.0%	66.7%	40.0%	90.0%	85.7%	82.5%
	% of Total	8.8%	5.3%	24.6%	7.0%	3.5%	7.0%	15.8%	10.5%	82.5%
Rains	Count	1	0	0	0	0	0	0	0	1
	% within district	16.7%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	1.8%
	% of Total	1.8%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	1.8%
Sewage water	Count	0	0	0	0	0	0	1	0	1
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	10.0%	.0%	1.8%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	1.8%	.0%	1.8%
Wells, Rains	Count	0	0	0	0	0	5	0	1	6
	% within district	.0%	.0%	.0%	.0%	.0%	50.0%	.0%	14.3%	10.5%
	% of Total	.0%	.0%	.0%	.0%	.0%	8.8%	.0%	1.8%	10.5%
Wells, Springs	Count	0	0	0	0	0	1	0	0	1
	% within district	.0%	.0%	.0%	.0%	.0%	10.0%	.0%	.0%	1.8%
	% of Total	.0%	.0%	.0%	.0%	.0%	1.8%	.0%	.0%	1.8%
Dams, Wells	Count	0	0	0	0	1	0	0	0	1
	% within district	.0%	.0%	.0%	.0%	33.3%	.0%	.0%	.0%	1.8%
	% of Total	.0%	.0%	.0%	.0%	1.8%	.0%	.0%	.0%	1.8%
Total	Count	6	3	14	4	3	10	10	7	57
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.5%	5.3%	24.6%	7.0%	5.3%	17.5%	17.5%	12.3%	100.0%

Table shows that the wells a source of irrigation water rate increase in the district of Hamdan (24.6%), while the ratio is less at the District of Nihm and up to (3.5%), while those who rely on rain for irrigation source reaching their highest in Sanhan by the District (1.8%) It is thought the sample had not noticed the presence of rain in the rest of the districts, while those who depend on the source of sewage per processor increase in the district by Bani-Al Harith (1.8%) and from the sample studied had not noticed the presence of sewage treated in other districts, while the dependence on rainfall and wells Increase in the district or by up to Khawlan (8.8%), while the ratio is less at the District of Bani-Mater is the sample studied had not noticed the presence of rain and the rest of districts wells, the source of boreholes and hand over or at the District of Khawlan reaching as high (1.8%) and the sample studied had not noticed The eyes of wells in the rest of the district, the source of water dams and wells greater than in Nihm

District reaching as high (1.8%) and from the sample studied had not noticed the presence of dams and wells in other divisions.

Overall, the percentage is higher for farmers who depend on irrigation wells, amounting to represent (82.5%) is much higher than those who rely on other sources of irrigation wells and the side who reached the proportion (17.5%), which indicates that it did not have to now Alternative sources for irrigation, threatening groundwater depletion in the short term as farmers and the rationalization of irrigation water are almost non-existent.

Table (7) appear the number of wells owned of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
One	Count	4	3	6	1	1	1	7	4	27
	% within district	80.0%	100.0%	42.9%	25.0%	33.3%	10.0%	77.8%	57.1%	49.1%
	% of Total	7.3%	5.5%	10.9%	1.8%	1.8%	1.8%	12.7%	7.3%	49.1%
Tow	Count	1	0	4	1	1	5	2	1	15
	% within district	20.0%	.0%	28.6%	25.0%	33.3%	50.0%	22.2%	14.3%	27.3%
	% of Total	1.8%	.0%	7.3%	1.8%	1.8%	9.1%	3.6%	1.8%	27.3%
More	Count	0	0	4	2	1	4	0	2	13
	% within district	.0%	.0%	28.6%	50.0%	33.3%	40.0%	.0%	28.6%	23.6%
	% of Total	.0%	.0%	7.3%	3.6%	1.8%	7.3%	.0%	3.6%	23.6%
Total	Count	5	3	14	4	3	10	9	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.1%	5.5%	25.5%	7.3%	5.5%	18.2%	16.4%	12.7%	100.0%

Table shows that those who have more than one well per the District Bani-Al Harith (12.7%), while the ratio is less in the districts, Khawlan Nihm, up to (1.8%), while those with two wells reaching their highest in the district and by Khawlan (9.1%) While the ratio is less and up to (1.8%) in the districts of both Sanhan, Arhab, Nihm Bani-Mater and the sample is not considered the presence of those who have two wells in the District of Alsabain, those who have three more wells in the districts of increasing the proportion of Hamdan and Khawlan reaching as high (7.3%). While the figure is less in the district of Nihm and up to (1.8%) and from the sample studied had not noticed the presence of those who have three more wells in the districts of Sanhan, Alsabain Bani-Al Harith.

Overall, the proportion of people who have one well higher (49.1%) than those who have more than well (23.6%) (27.3%) individual which indicates that farmers no longer able to have more than well because of poor physical condition and lack of water and the increase in population.

Table (8) appear the type of ownership of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani-Al Harith	Bani-Mater	
partnership	Count	5	0	14	3	2	2	7	5	38
	% within district	100.0%	.0%	100.0%	75.0%	66.7%	20.0%	77.8%	71.4%	69.1%
	% of Total	9.1%	.0%	25.5%	5.5%	3.6%	3.6%	12.7%	9.1%	69.1%
Owned	Count	0	3	0	1	0	1	0	1	6
	% within district	.0%	100.0%	.0%	25.0%	.0%	10.0%	.0%	14.3%	10.9%
	% of Total	.0%	5.5%	.0%	1.8%	.0%	1.8%	.0%	1.8%	10.9%
Owned, Partnership	Count	0	0	0	0	1	7	2	1	11
	% within district	.0%	.0%	.0%	.0%	33.3%	70.0%	22.2%	14.3%	20.0%
	% of Total	.0%	.0%	.0%	.0%	1.8%	12.7%	3.6%	1.8%	20.0%
Total	Count	5	3	14	4	3	10	9	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.1%	5.5%	25.5%	7.3%	5.5%	18.2%	16.4%	12.7%	100.0%

Table shows that those who have wells partnership more numerous in the district of Hamdan (25.5%), while the ratio is less in the districts of the Khawlan and Nihm up to (3.6%) and from the sample studied had not noticed the presence of well partnership in District of Alsabain Those who have owned wells reaching the highest Alsabain them in the district and by (5.5%), while the ratio is less and up to (1.8%) in each of the districts, Khawlan and Bani-Mater is the sample studied had not noticed the presence of districts wells King Sanhan, Hamdan, Bani-Al Harith Nihm and those who have wells partnership, King exceeds the Khawlan percentage in the district reaching as high (12.7%). While the ratio is less and up to (1.8%) in the districts of Nihm Bani-Mater is the sample studied had not noticed the presence of wells partnership, in the districts of Sanhan king, Alsabain Hamdan, Arhab.

Overall proportion of people who have wells is a partnership (69.1%), the highest of those who have wells King (10.9%), which demonstrates the ability of farmers to acquire wells become weak and this encourages the principle of participation and the rationalization of water by farmers.

Table (9) appear the deep wells of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
1-100	Count	0	0	0	0	0	0	0	2	2
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	.0%	25.0%	3.6%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	.0%	3.6%	3.6%
101-300	Count	3	0	8	1	1	3	7	5	28
	% within district	60.0%	.0%	57.1%	25.0%	33.3%	30.0%	87.5%	62.5%	50.9%
	% of Total	5.5%	.0%	14.5%	1.8%	1.8%	5.5%	12.7%	9.1%	50.9%
>300	Count	2	3	6	3	2	7	1	1	25
	% within district	40.0%	100.0%	42.9%	75.0%	66.7%	70.0%	12.5%	12.5%	45.5%
	% of Total	3.6%	5.5%	10.9%	5.5%	3.6%	12.7%	1.8%	1.8%	45.5%
Total	Count	5	3	14	4	3	10	8	8	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.1%	5.5%	25.5%	7.3%	5.5%	18.2%	14.5%	14.5%	100.0%

Table shows that wells up from the depths exceeding 100 m in the District of Bani-Mater (3.6%) was observed in the rest of its divisions. While the heart of wells that between 100, 300 m or so increase in the district of Hamdan (14.5%) and lower percentage in the districts of Nihm Arhab, and up to (1.8%) and the sample studied had not noticed its presence in the Director Alsabain. While the wells exceeding 300 m or so increase in the district of Khawlan rate (12.7%) and lower percentage in the districts of Bani-Mater, Bani-Al Harith rate (1.8%)

Overall, the proportion (50.9%) of those included in the questionnaire within Sana'a basin deep wells ranging between 100, 300 m deep wells who, while more than 300 m their proportion (45.5%) and the proportion of people deep wells does not exceed 100 per m (3.6%) which shows that farmers Depth disembark procreate large for the purpose of access to water and wells, the surface also become almost non-existent or dry or unhelpful.

Table (10) appear the water levels in wells of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
1-100	Count	2	0	0	0	1	0	0	4	7
	% within district	40.0%	.0%	.0%	.0%	33.3%	.0%	.0%	50.0%	13.0%
	% of Total	3.7%	.0%	.0%	.0%	1.9%	.0%	.0%	7.4%	13.0%
101-300	Count	2	3	13	1	1	6	8	3	37
	% within district	40.0%	100.0%	92.9%	33.3%	33.3%	60.0%	100.0%	37.5%	68.5%
	% of Total	3.7%	5.6%	24.1%	1.9%	1.9%	11.1%	14.8%	5.6%	68.5%
>300	Count	1	0	1	2	1	4	0	1	10
	% within district	20.0%	.0%	7.1%	66.7%	33.3%	40.0%	.0%	12.5%	18.5%
	% of Total	1.9%	.0%	1.9%	3.7%	1.9%	7.4%	.0%	1.9%	18.5%
Total	Count	5	3	14	3	3	10	8	8	54
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.3%	5.6%	25.9%	5.6%	5.6%	18.5%	14.8%	14.8%	100.0%

Table shows that water levels in wells, which more than 100 meters or more in the district and by Bani-Mater (7.4%) and lower percentage in the district and by Nihm (1.9%). and from the sample studied had not noticed the presence in the districts and Khawlan and Bani-Al Harith Hamdan, Arhab and Alsabain. While the level-between 100, 300 m or so increase in the district of Hamdan, by (24.1%) and the ratio is less districts and Nihm Arhab, by (1.9%), while the level-of more than 300 m or so increase in the district of Khawlan rate (7.4%) and lower percentage in the districts of Bani-Mater Nihm Hamdan and Sanhan and did not observe its presence in the districts of Bani-Al Harith and Alsabain.

Overall, the proportion (68.5%) account for water levels ranging between 100, 300 m, while the proportion (18%) represent the water levels in excess of 300 m, while the proportion (13%) represent the water levels of less than 100 meters. Which shows the water became deep and there is no rationalization of the farmers had reached deep water to more than 300 meters. This portends a disaster we have become in terms of agriculture and deep-water up to (87%).

Table (11) show the type of well of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Borehole	Count	4	3	13	4	3	4	7	6	44
	% within district	80.0%	100.0%	92.9%	100.0%	100.0%	40.0%	87.5%	75.0%	80.0%
	% of Total	7.3%	5.5%	23.6%	7.3%	5.5%	7.3%	12.7%	10.9%	80.0%
Dug-Bore	Count	1	0	1	0	0	3	1	1	7
	% within district	20.0%	.0%	7.1%	.0%	.0%	30.0%	12.5%	12.5%	12.7%
	% of Total	1.8%	.0%	1.8%	.0%	.0%	5.5%	1.8%	1.8%	12.7%
Dug	Count	0	0	0	0	0	0	0	1	1
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	.0%	12.5%	1.8%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	.0%	1.8%	1.8%
Borehole, Dug-Bore	Count	0	0	0	0	0	3	0	0	3
	% within district	.0%	.0%	.0%	.0%	.0%	30.0%	.0%	.0%	5.5%
	% of Total	.0%	.0%	.0%	.0%	.0%	5.5%	.0%	.0%	5.5%
Total	Count	5	3	14	4	3	10	8	8	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.1%	5.5%	25.5%	7.3%	5.5%	18.2%	14.5%	14.5%	100.0%

Table shows that the rate of well over in vitro in the District of Hamdan, reaching as high (23.6%), while the ratio is less in the districts of Sanhan, Alsabain and Nihm and up to (5.5%). The hand-wells, tubes reaching the highest in the district and by Khawlan (5.5%), while the ratio is less in the districts of Sanhan, Hamdan, Bani-Al Harith and Bani-Mater, by up to (1.8%) and from the sample studied had not noticed the presence of wells by hand, pipe in the districts of Alsabain, Nihm and Arhab. The manual wells increasing proportions in the District of Bani-Mater, up to (1.8%) and from the sample studied had not noticed the presence of districts wells manual Sanhan, Hamdan, Alsabain, Nihm, Khawlan, Arhab and Bani-Al Harith, while tubular wells, pipe in hand and higher than the District of up to Khawlan (5.5%) and from the sample studied had not noticed the presence of well pipe, pipe in hand Sanhan districts, Alsabain Hamdan, Nihm Arhab, Bani-Al Harith and Bani-Mater.

Overall, deep wells or the grenade and deepened into a deep acquired greater percentage (93.65%), while the wells may not hand over (8.15), which indicates the end of the so-called surface water in most areas of wells and hand and greater reliance on Deep wells to obtain water for irrigation farmers and the rationalization of groundwater and alarming large.

Table (12) show did you get enough amount of water of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	4	3	10	2	2	4	3	4	32
	% within district	66.7%	100.0%	71.4%	50.0%	66.7%	40.0%	33.3%	50.0%	56.1%
	% of Total	7.0%	5.3%	17.5%	3.5%	3.5%	7.0%	5.3%	7.0%	56.1%
No	Count	2	0	4	2	1	6	6	4	25
	% within district	33.3%	.0%	28.6%	50.0%	33.3%	60.0%	66.7%	50.0%	43.9%
	% of Total	3.5%	.0%	7.0%	3.5%	1.8%	10.5%	10.5%	7.0%	43.9%
Total	Count	6	3	14	4	3	10	9	8	57
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.5%	5.3%	24.6%	7.0%	5.3%	17.5%	15.8%	14.0%	100.0%

Table shows that the areas which receive more than adequate quantity of water or in the District of Hamdan, reaching as high (17.5%) and lower percentage in the district of Arhab and Nihm and ratios of up to (3.6%), while areas that do not receive sufficient quantity of water or more in the districts of the Khawlan Bani-Al Harith reaching as high (10.5%) and lower percentage in the district of Nihm reaching as high (1.8%).

Overall, the proportion who said their access to a sufficient quantity for irrigation (56.1%) is higher than the proportion of people who said no amount of access to adequate water for irrigation (43.9%), Which shows that farmers, so long as they do not know what enough sufficiency, where he had flooded the ground water and is friendly enough to account without enough that the plant is for the actual requirement of water and this also indicates a lack of rationalization of water and farmland preservation.

Table (13) shows did you Deepings your well if you don't get enough water the sample studied

		District							Total
		Sanhan	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	3	7	2	0	6	4	2	24
	% within district	75.0%	77.8%	50.0%	.0%	60.0%	44.4%	33.3%	54.5%
	% of Total	6.8%	15.9%	4.5%	.0%	13.6%	9.1%	4.5%	54.5%
No	Count	1	2	2	2	4	5	4	20
	% within district	25.0%	22.2%	50.0%	100.0%	40.0%	55.6%	66.7%	45.5%
	% of Total	2.3%	4.5%	4.5%	4.5%	9.1%	11.4%	9.1%	45.5%
Total	Count	4	9	4	2	10	9	6	44
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.1%	20.5%	9.1%	4.5%	22.7%	20.5%	13.6%	100.0%

Table shows that those who prefer to deepen the well in the event that insufficient water to the highest in the district of Hamdan up to n (15.9%) and lower percentage in the districts of Bani-Mater Arhab and reaching as high (4.5%) and from the sample studied had not noticed the presence of preferred deepen well Nihm at the District, while those who do not prefer to deepen the well in the case of insufficient increase to the highest proportion in the district of

Bani-Al Harith reaching as high (11.4%) and lower percentage in the district of Sanhan reaching as high (2.3%).

Overall, the proportion of people who prefer to deepen the well in the case of insufficient (54.5%) and the proportion of people who do not prefer to deepen the well in the case of insufficient (45.5%), which indicates a failure to take alternative measures for farmers digging and deepening and if sufficient water to existing and rationalization Enough without resorting to deepening.

Table (14) shows did you drilling new well if you don't get enough water of the sample studied

		District							Total
		Sanhan	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	2	1	4	2	6	3	1	19
	% within district	50.0%	11.1%	100.0%	100.0%	60.0%	33.3%	16.7%	43.2%
	% of Total	4.5%	2.3%	9.1%	4.5%	13.6%	6.8%	2.3%	43.2%
No	Count	2	8	0	0	4	6	5	25
	% within district	50.0%	88.9%	.0%	.0%	40.0%	66.7%	83.3%	56.8%
	% of Total	4.5%	18.2%	.0%	.0%	9.1%	13.6%	11.4%	56.8%
Total	Count	4	9	4	2	10	9	6	44
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.1%	20.5%	9.1%	4.5%	22.7%	20.5%	13.6%	100.0%

Table shows that those who prefer to dig new wells in the case of insufficient increase in the proportion of tidal Khawlan reaching as high (13.6%) and lower percentage in the districts of Hamdan, Bani-Mater, reaching as high (2.3%). While those who do not prefer digging new wells in the case of insufficient increase in the proportion of the District of Hamdan, reaching as high (18.2%) and lower percentage in the district of Sanhan reaching as high (4.5%) and the sample studied had not noticed there who do not prefer to dig new wells in the districts Nihm, Arhab.

Overall, the proportion of people who do not prefer digging new wells in the case of insufficient high (56.8%) and the proportion of people who prefer to dig new wells in the case of insufficient low (43.2%), which indicates that it is not awareness and rationalization of water and it is deterrent Weak physical condition of the farmers and preventing them from drilling new wells.

Table (15) shows did you reduce the cultivated area if you don't get enough water of the sample studied

		District							Total
		Sanhan	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	5	5	1	2	9	5	6	33
	% within district	100.0%	50.0%	25.0%	100.0%	90.0%	55.6%	100.0%	71.7%
	% of Total	10.9%	10.9%	2.2%	4.3%	19.6%	10.9%	13.0%	71.7%
No	Count	0	5	3	0	1	4	0	13
	% within district	.0%	50.0%	75.0%	.0%	10.0%	44.4%	.0%	28.3%
	% of Total	.0%	10.9%	6.5%	.0%	2.2%	8.7%	.0%	28.3%
Total	Count	5	10	4	2	10	9	6	46
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	21.7%	8.7%	4.3%	21.7%	19.6%	13.0%	100.0%

Table shows that those who prefer to reduce the area under cultivation due to lack of water have the highest rate in the district of the Khawlan (19.6%). While the lowest rate in the District (2.2%). Those who do not prefer to reduce the cultivated area reaching their highest in the district of Hamdan and by (10.9%), while the ratio is less and up to (2.2%) in the District Khawlan sample is not considered the presence of those who do not prefer to reduce the area planted in the districts of Sanhan, Nihm Bani-Mater.

Overall, the proportion of people who prefer to reduce the cultivated area (71.7%) and the proportion of people prefer to reduce the cultivated area (28.3%), which indicates the cause of reducing the cultivated area is the lack of water and not before rationalization water from farmers as if they were available for expanded water in the area Even if it was planted at the expense of water.

Table (16) shows did you cultivated crop low water requirement if you don't get enough water of the sample studied

		District							Total
		Sanhan	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	1	3	0	1	1	5	3	14
	% within district	33.3%	33.3%	.0%	50.0%	10.0%	62.5%	50.0%	35.0%
	% of Total	2.5%	7.5%	.0%	2.5%	2.5%	12.5%	7.5%	35.0%
No	Count	2	6	2	1	9	3	3	26
	% within district	66.7%	66.7%	100.0%	50.0%	90.0%	37.5%	50.0%	65.0%
	% of Total	5.0%	15.0%	5.0%	2.5%	22.5%	7.5%	7.5%	65.0%
Total	Count	3	9	2	2	10	8	6	40
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	7.5%	22.5%	5.0%	5.0%	25.0%	20.0%	15.0%	100.0%

Table shows that those who prefer to crop water requirement little more than their share of the District Bani-Al Harith (12.5%), while the figure is less in the districts of Sanhan, Khawlan Nihm, up to (2.5%) and from the sample studied had not noticed the presence of those who prefer to crop water requirement in the district of a small Arhab. Those who do not prefer to crop it needs little water reaching their highest in the district and by Khawlan (22.5%), while the ratio is less and up to (2.5%) in the District of Nihm.

Overall, those who prefer to crop water requirement few descent (35.0%) and the proportion of people who do not prefer crop water requirement few (65.0%), which indicates that most farms are profit, not the rationalization of the farmers and water conservation.

Table (17) shows did you buy water from near well if you don't get enough water of the sample studied

		District							Total
		Sanhan	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	3	6	3	1	9	4	2	28
	% within district	75.0%	60.0%	75.0%	50.0%	100.0%	44.4%	28.6%	62.2%
	% of Total	6.7%	13.3%	6.7%	2.2%	20.0%	8.9%	4.4%	62.2%
No	Count	1	4	1	1	0	5	5	17
	% within district	25.0%	40.0%	25.0%	50.0%	.0%	55.6%	71.4%	37.8%
	% of Total	2.2%	8.9%	2.2%	2.2%	.0%	11.1%	11.1%	37.8%
Total	Count	4	10	4	2	9	9	7	45
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	8.9%	22.2%	8.9%	4.4%	20.0%	20.0%	15.6%	100.0%

Table shows that those who buy water from nearby wells more than their share of the Khawlan managers (20.0%), while the ratio is less at the District of Nihm and up to (2.2%). Those who do not prefer to buy from nearby wells reaching their highest Districts Bani-Al Harith and Bani-Mater and by (11.1%), while the ratio is less and up to (2.2%) in the districts of both Sanhan, Nihm Arhab and the sample is not considered the presence of those who do not prefer buying From wells in neighboring Khawlan District.

Overall, the proportion of people who prefer to buy from nearby wells high (62.2%) and the proportion of people prefer to buy from nearby wells low (37.8%), indicating the search for alternative sources of farmers in the event of inadequate water and that because of the rationalization of farmers of water in wells Which led to a lack of water and increase the burden on the water in other areas and this is only transfer the problem from one area to another.

Table (18) show did you purchase water for irrigation of the sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	4	0	6	2	2	8	7	2	31
	% within district	66.7%	.0%	46.2%	50.0%	66.7%	80.0%	77.8%	28.6%	56.4%
	% of Total	7.3%	.0%	10.9%	3.6%	3.6%	14.5%	%١٢,٧	3.6%	56.4%
No	Count	2	3	7	2	1	2	2	5	24
	% within district	33.3%	100.0%	53.8%	50.0%	33.3%	20.0%	22.2%	71.4%	43.6%
	% of Total	3.6%	5.5%	12.7%	3.6%	1.8%	3.6%	3.6%	9.1%	43.6%
Total	Count	6	3	13	4	3	10	9	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	23.6%	7.3%	5.5%	18.2%	16.4%	12.7%	100.0%

Table shows that those who buy water to irrigate more than their share of the District Khawlan by (14.5%), while the ratio is less in the districts of Arhab, Nihm Bani-Mater, as much (3.6%) and from the sample studied had not noticed the presence of those who buy water for irrigation in the District of Alsabain, those who do not Buy water for irrigation amounted to the highest in

the district of Hamdan and by (12.7%) and lower percentage in the district of Nihm and up to (1.8%).

Overall percentage of those who buy water for irrigation (56%) is higher than the proportion of people who do not buy water for irrigation (43.6%) This indicates an increase farmland and lack of water and the rationalization of farmers of water in their possession and went on to solve the water problem to buy even remote areas.

Table (19) show those who buy water for irrigation of the sample studied

		District							Total
		Sanhan	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Transport	Count	2	0	1	1	2	0	0	6
	% within district	50.0%	.0%	50.0%	50.0%	28.6%	.0%	.0%	20.7%
	% of Total	6.9%	.0%	3.4%	3.4%	6.9%	.0%	.0%	20.7%
Nearby wells	Count	2	5	1	1	3	5	2	19
	% within district	50.0%	100.0%	50.0%	50.0%	42.9%	83.3%	66.7%	65.5%
	% of Total	6.9%	17.2%	3.4%	3.4%	10.3%	17.2%	6.9%	65.5%
Nearby wells ، Transport	Count	0	0	0	0	2	1	1	4
	% within district	.0%	.0%	.0%	.0%	28.6%	16.7%	33.3%	13.8%
	% of Total	.0%	.0%	.0%	.0%	6.9%	3.4%	3.4%	13.8%
Total	Count	4	5	2	2	7	6	3	29
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	13.8%	17.2%	6.9%	6.9%	24.1%	20.7%	10.3%	100.0%

Table shows that those who buy water for irrigation by more than their share of the transportation districts and Sanhan Khawlan (6.9%), while the figure is less in the districts of Arhab and Nihm and up to (3.4%) and from the sample studied had not noticed the presence of those who buy water for irrigation by means of transport in the districts of Hamdan, Bani-Al Harith and Bani-Mater, who buy from nearby wells reaching their highest in the districts and Bani-Al Harith Hamdan and by (17.2%), while the ratio is less and up to (3.4%) in the districts of Arhab and Nihm, who bought the neighboring wells and transport to increase the proportion (6.9%) In the District Khawlan while the ratio is less and up to (3.4%) in the districts of Bani-Mater Bani-Al Harith is the sample studied had not noticed the presence of nearby wells and transport districts Sanhan, Hamdan, Arhab Nihm.

Overall, the proportion of people who buy from wells neighboring the highest (65.5%) than those who buy from nearby wells and transport (34.5%) and that the problem is not solved, but are expanding to include neighboring wells and also indicates a lack of rationalization of farmers alternatives to provide water and reduce water use in Irrigation.

4.2 Crop pattern and water management in the field

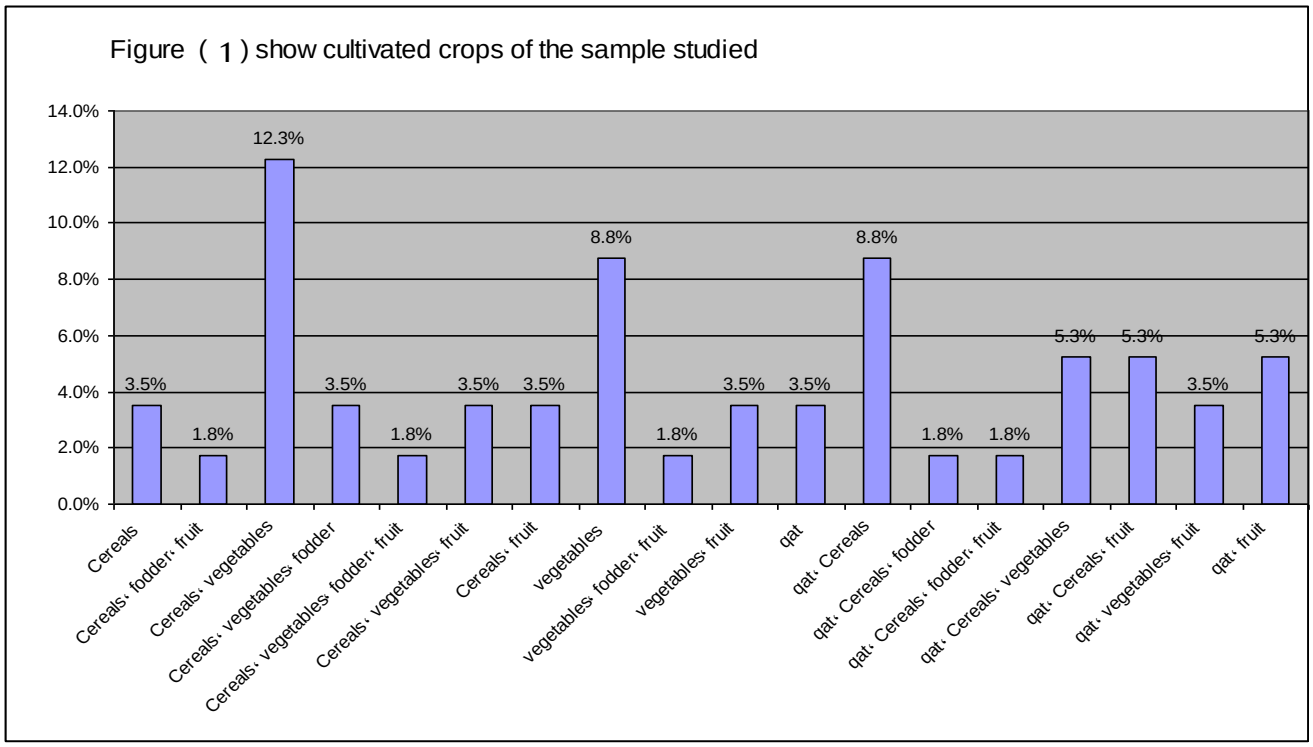


Figure show cultivated crops where we see the dominant crops cultivated is cereals, vegetables, fodder, qat and fruit. But the problem of this is that these crops consumed a lot of water and the farmers not stopping cultivated this crops where this crops represent cash crops. So, this causes lost irrigation water.

Table (20) show type of irrigation of a sample studies

		District								
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani-Al Harith	Bani-Mater	Total
Irrigated	Count	2	2	9	4	2	0	8	2	29
	% within district	50.0%	100.0%	81.8%	100.0%	100.0%	.0%	100.0%	50.0%	64.4%
	% of Total	4.4%	4.4%	20.0%	8.9%	4.4%	.0%	17.8%	4.4%	64.4%
Rained	Count	1	0	0	0	0	0	0	2	3
	% within district	25.0%	.0%	.0%	.0%	.0%	.0%	.0%	50.0%	6.7%
	% of Total	2.2%	.0%	.0%	.0%	.0%	.0%	.0%	4.4%	6.7%
Supplementary	Count	1	0	2	0	0	10	0	0	13
	% within district	25.0%	.0%	18.2%	.0%	.0%	100.0%	.0%	.0%	28.9%
	% of Total	2.2%	.0%	4.4%	.0%	.0%	22.2%	.0%	.0%	28.9%
Total	Count	4	2	11	4	2	10	8	4	45
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	8.9%	4.4%	24.4%	8.9%	4.4%	22.2%	17.8%	8.9%	100.0%

Table shows the type of irrigation used in agriculture (Reported) more than in the District Hamdan (20.0%), while the ratio is less in the district s of Sanhan, Alsabain, and Bani Matar Nihm by as much (4.4%). While the type and rain, reaching the highest rate of increase in the proportion of the District of Bani-matar by up to (4.4%), while the ratio is less at the District of Sanhan (2.2%) is producing the sample had been found and facilitated a way of irrigation districts in the irrigated both Alsabain Hamdan, Arhab the Khawlan, and Bani- Al Harith Nihm. While such supplementary taken over or at the District of Khawlan rates (22.2%) and lower percentage in the district of Sanhan (2.2%) and from the sample studied had not noticed the presence of supplementary irrigation districts in each of the Alsabain, Arhab Nihm, Bani Matar Bani- Al Harith.

Overall, irrigation irrigated (64.4%) is the highest proportion of the rest used other types of irrigation indicates a greater reliance on underground water without looking for other types of irrigation water and maintain guided by the farmers.

Table (21) show irrigation methods of a sample studies

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Inundation	Count	2	0	11	4	2	9	8	2	38
	% within district	50.0%	.0%	100.0%	100.0%	100.0%	90.0%	100.0%	100.0%	88.4%
	% of Total	4.7%	.0%	25.6%	9.3%	4.7%	20.9%	18.6%	4.7%	88.4%
Drip	Count	1	1	0	0	0	0	0	0	2
	% within district	25.0%	50.0%	.0%	.0%	.0%	.0%	.0%	.0%	4.7%
	% of Total	2.3%	2.3%	.0%	.0%	.0%	.0%	.0%	.0%	4.7%
Distillation , inundation	Count	1	1	0	0	0	0	0	0	2
	% within district	25.0%	50.0%	.0%	.0%	.0%	.0%	.0%	.0%	4.7%
	% of Total	2.3%	2.3%	.0%	.0%	.0%	.0%	.0%	.0%	4.7%
Lines, inundation	Count	0	0	0	0	0	1	0	0	1
	% within district	.0%	.0%	.0%	.0%	.0%	10.0%	.0%	.0%	2.3%
	% of Total	.0%	.0%	.0%	.0%	.0%	2.3%	.0%	.0%	2.3%
Total	Count	4	2	11	4	2	10	8	2	43
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.3%	4.7%	25.6%	9.3%	4.7%	23.3%	18.6%	4.7%	100.0%

Table shows that the method of irrigation used in agriculture (inundation) or increase in the district of Hamdan (25.6%), while the ratio is less in the district s of Sanhan, Bani Matar, Nihm and up to (4.7%) more than the drip method or reaching the highest in Sanhan district s And Alsabain per (2.3%) is producing the sample had been found and facilitated a way punctuation in the district s of both Hamdan, Arhab, Khawlan, Nihm, and Bani Matar Bani - Al Harith. While method submergence and drip rate increase in the district s and Alsabain per Sanhan (2.3%) is producing the sample had been found and facilitated a way immersion and punctuation in the district s of both Hamdan, Khawlan, Arhab Nihm, Bani Matar Bani - Al Harith, and how inundation lines greater than in District Khawlan up to (2.3%) and from the

sample studied had not noticed inundation lines at the District of Sanhan, Alsabain Hamdan, Arhab Nihm, Bani Matar Bani - Al Harith.

Overall, the highest proportion of the irrigation method used in agriculture boarding (88.4%), which shows the weakness or lack of rationalization of the water used for irrigation by farmers following
the methods may provide water and to maintain sustainability.

Table (22) show practices of agriculture and reasons	
Practices	Reasons
1- Tillage 2- Settlement 3- Irrigation at night 4- Organic fertilizer added 5- Modern Irrigation	1- decrease evaporation 2- save soil humidity 3- increase capacity storage 4- decrease water requirement for crops 5- expanded between irrigation

Table (23) show the source of irrigation is far away from the farm of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Mater	
Yes	Count	3	2	9	2	3	5	6	4	34
	% within district	50.0%	66.7%	64.3%	50.0%	100.0%	50.0%	66.7%	57.1%	60.7%
	% of Total	5.4%	3.6%	16.1%	3.6%	5.4%	8.9%	10.7%	7.1%	60.7%
No	Count	3	1	5	2	0	5	3	3	22
	% within district	50.0%	33.3%	35.7%	50.0%	.0%	50.0%	33.3%	42.9%	39.3%
	% of Total	5.4%	1.8%	8.9%	3.6%	.0%	8.9%	5.4%	5.4%	39.3%
Total	Count	6	3	14	4	3	10	9	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	7.1%	5.4%	17.9%	16.1%	12.5%	100.0%

Table shows that the source of irrigation away from the farm more than their share of the District of Hamdan (16.1%), while the ratio is less Arhab in the district s and Alsabain (3.6%). The source who is not far from the farm irrigation often reaching their highest in Sanhan districts, Hamdan and Khawlan and by (8.9%), while the ratio is less and up to (1.8%) in the District of the Alsabain -trained and facilitated from the sample had not noticed the presence of a source who is not far irrigation Many of Nihm farm in the district.

Overall, the proportion of people away from the farm irrigation source (60.7%) and the proportion of people not far from the source of many farm irrigation (39.3%) and this indicates that the source of irrigation drain near the farm, which necessitated the search for new sites, even if the remote access to water for irrigation .

Table (24) show the distance between the farm and source of irrigation water of a sample studied

		district								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
1-100	Count	1	0	3	0	0	0	0	1	5
	% within district	16.7%	.0%	21.4%	.0%	.0%	.0%	.0%	20.0%	9.6%
	% of Total	1.9%	.0%	5.8%	.0%	.0%	.0%	.0%	1.9%	9.6%
101-500	Count	3	1	6	2	0	6	5	2	25
	% within district	50.0%	33.3%	42.9%	50.0%	.0%	60.0%	71.4%	40.0%	48.1%
	% of Total	5.8%	1.9%	11.5%	3.8%	.0%	11.5%	9.6%	3.8%	48.1%
501-1000	Count	1	2	4	2	1	3	2	1	16
	% within district	16.7%	66.7%	28.6%	50.0%	33.3%	30.0%	28.6%	20.0%	30.8%
	% of Total	1.9%	3.8%	7.7%	3.8%	1.9%	5.8%	3.8%	1.9%	30.8%
>1000	Count	1	0	1	0	2	1	0	1	6
	% within district	16.7%	.0%	7.1%	.0%	66.7%	10.0%	.0%	20.0%	11.5%
	% of Total	1.9%	.0%	1.9%	.0%	3.8%	1.9%	.0%	1.9%	11.5%
Total	Count	6	3	14	4	3	10	7	5	52
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.5%	5.8%	26.9%	7.7%	5.8%	19.2%	13.5%	9.6%	100.0%

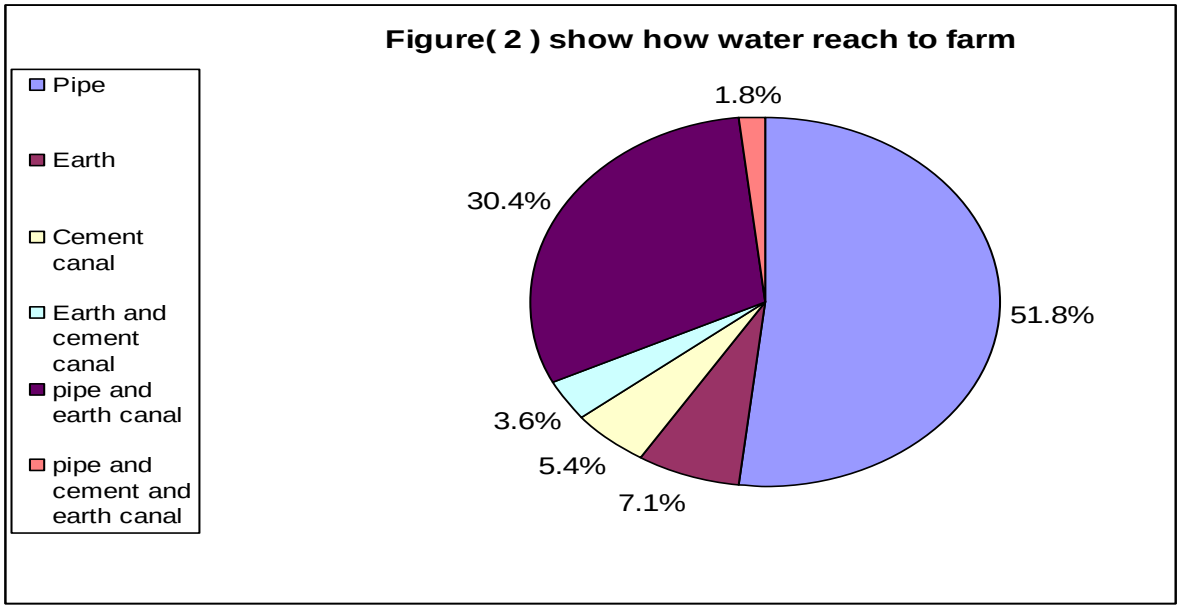
Table shows that those away from the source of irrigation farms up to a distance of 100 meters more than their share of the District of Hamdan, by (5.8%) and lower percentage in the district s of Bani Matar and Sanhan rate (1.9%) and the sample studied had not noticed their presence in the district s of Bani Harith , Khawlan Nihm Arhab and Alsabain. While those away from the source of irrigation farms distance ranging from 100, 500 m in the district s of increasing the proportion Khawlan Hamdan, and by (11.5%) and the ratio is less and up to (1.9%) in the District of Alsabain and did not notice its presence in the District of Nihm. While the distance between people from 500, 1000 and so increase their share of the District of Hamdan, by (7.7%) and lower percentage in the district s of Bani Matar, Nihm and Sanhan by as much (1.9%). While those away from the source of irrigation farms distance of more than 1000 and so increase their share of the District of Nihm and to reach (3.8%) and lower percentage in the district s of Bani Matar and Khawlan and Hamdan and Sanhan rate (1.9%) was observed and their presence in the district s of Bani-AlHarith, Arhab and Alsabain.

Overall, the source away from the irrigation source for irrigation of their farms from 100 to 500 m (48.1%), while those away from the source of irrigation farms from 500 to 1000 per (30.8%), while those away from the source of irrigation farms distance of more than 1000 per (11.5%) And lowest for those who are away from the source of irrigation farms distance not exceeding 100 m (9.6%) this is indication of the problems of waste water is the source after irrigation farms and farmers to follow modern methods for the delivery of irrigation water to their farms without water loss by evaporation or leakage, even if the Farms far.

4.2.1 Water reaches to the farmers of the samples studies by the following:

1- earth canal
2- metal pipe
3- plastic pipe
4- cement canal
5- steal pipe
6- lines

from the figure(2) we show how farmers doing to reach the irrigation water to the farm and percentage of this methods of a sample studied.



4.3 Economic incentives

Table (25) show type of used pump of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani-Al Harith	Bani-Mater	
	Count	0	0	0	0	0	0	2	0	2
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	22.2%	.0%	3.5%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	3.5%	.0%	3.5%
Diesel	Count	4	3	10	1	3	8	7	8	44
	% within district	66.7%	100.0%	71.4%	25.0%	100.0%	80.0%	77.8%	100.0%	77.2%
	% of Total	7.0%	5.3%	17.5%	1.8%	5.3%	14.0%	12.3%	14.0%	77.2%
Diesel and electric	Count	0	0	0	1	0	2	0	0	3
	% within district	.0%	.0%	.0%	25.0%	.0%	20.0%	.0%	.0%	5.3%
	% of Total	.0%	.0%	.0%	1.8%	.0%	3.5%	.0%	.0%	5.3%
Electric	Count	2	0	4	2	0	0	0	0	8
	% within district	33.3%	.0%	28.6%	50.0%	.0%	.0%	.0%	.0%	14.0%
	% of Total	3.5%	.0%	7.0%	3.5%	.0%	.0%	.0%	.0%	14.0%
Total	Count	6	3	14	4	3	10	9	8	57
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.5%	5.3%	24.6%	7.0%	5.3%	17.5%	15.8%	14.0%	100.0%

Table shows that those who use diesel pumps more than their share of the District of Hamdan, by (17.5%) and the ratio is less Arhab in the district and by (1.8%). While using diesel and electric pumps more than their share of the District Khawlan by as much (3.5%) and the ratio is less Arhab in the district and by (1.8) did not observe its presence in the district s of Bani Matar, Bani -AlHarith, Nihm, Hamdan, Alsabain Sanhan. While using electric pumps increasing proportion of the District of Hamdan, by (7%) and the ratio is less Arhab in the district s and Sanhan reaching as high (3.5%) and from the sample studied had not noticed presence in the district s of Bani-Matar, Bani -AlHarith, Nihm, Khawlan, Alsabain.

Overall, the proportion (77.2%) using fossil fuel pumps (diesel), while (14%) rely on electric-powered pumps. While (5.3%) use both. Which indicates that the vast majority still rely on subsidized fuel from the state and this does not encourage the farmer to save water in irrigation and also appeared to use electric pumps because of the considerable depth of the water pumps need to be strong and this also indicates a lack of rationalization.

Table (26) show Pump and reasons of using of the sample studies

	Pump		
	Diesel	Electric-Diesel	Electric
Reasons	➢ water is close ➢ Economic ➢ Cheap ➢ Water deep ➢ low electric power ➢ appropriate for discontinuous ➢ water low ➢ water deep is big and far	➢ Water is close, ➢ economic, ➢ cheap ➢ Water deep ➢ Increase water deep ➢ For increase pumping	➢ High cost of diesel ➢ High discharge ➢ Cheap ➢ Water deep ➢ Water deep is high

Table (27) show with increase of irrigation water heighten the crop of a sample of studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	4	0	5	1	2	2	2	5	21
	% within district	66.7%	.0%	35.7%	33.3%	66.7%	20.0%	22.2%	62.5%	37.5%
	% of Total	7.1%	.0%	8.9%	1.8%	3.6%	3.6%	3.6%	8.9%	37.5%
No	Count	2	3	9	2	1	8	7	3	35
	% within district	33.3%	100.0%	64.3%	66.7%	33.3%	80.0%	77.8%	37.5%	62.5%
	% of Total	3.6%	5.4%	16.1%	3.6%	1.8%	14.3%	12.5%	5.4%	62.5%
Total	Count	6	3	14	3	3	10	9	8	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	16.1%	14.3%	100.0%

Table shows that those who believe that the increase of crop irrigation water more numerous than in the district s of Hamdan and Bani Matar by (8.9%), while the ratio is less Arhab in the district and by up to (1.8%) and from the sample studied had not noticed the presence of those who believe that an increase of more than irrigation water In the district of crop Alsabain. Those who do not believe that the increase of crop irrigation water over them reaching the highest in the district of Hamdan and by (16.1%) and lower percentage in the District of Nihm by as much (1.8%).

Overall, the proportion of people who do not believe that the increase of crop irrigation water over high (62.5%) and the proportion of people who believe that the increase of irrigation water over the crop (37.5%) This indicates a low awareness of the farm to this point has not been translated in practice through the following methods to guide the use of Water and irrigation as already noted that the flood irrigation that is prevailing.

Table (28) show you using irrigation modern methods of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	1	3	1	0	0	0	0	1	6
	% within district	16.7%	100.0%	7.1%	.0%	.0%	.0%	.0%	14.3%	10.7%
	% of Total	1.8%	5.4%	1.8%	.0%	.0%	.0%	.0%	1.8%	10.7%
No	Count	5	0	13	3	3	10	10	6	50
	% within district	83.3%	.0%	92.9%	100.0%	100.0%	100.0%	100.0%	85.7%	89.3%
	% of Total	8.9%	.0%	23.2%	5.4%	5.4%	17.9%	17.9%	10.7%	89.3%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that the areas that use modern irrigation methods or increase in the district to Alsabain (5.4%), while the ratio is less in the district s of Sanhan, Hamdan and Bani Matar, a rate of up to (1.8%) is producing the sample had been found and facilitated a means of using modern irrigation Districts Arhab Nihm, and Bani -AlHarith Khawlan regions which do not use modern irrigation methods, reaching the highest proportion of them in the district of Hamdan, by (23.2%), while the ratio is less Arhab in the district s of Nihm and up to (5.4%) and the sample has not facilitated the trainers there who Do not use modern irrigation methods in the district of Alsabain.

Overall, the proportion who do not use modern irrigation methods are (89.3%) is higher than the proportion of people using modern irrigation methods (10.7%) and this shows that the proportion of farmers who were telling in the use of water is much less by those who are not telling the use of water and also that There are many areas not yet aware of the rationalization of water to keep them from degradation and depletion.

Table (29) show Modern irrigation methods using of Sample studied

		District				Total
		Sanhan	Alsabain	Hamdan	Bani-Mater	
Distillation	Count	1	1	0	0	2
	% within district	100.0%	33.3%	.0%	.0%	33.3%
	% of Total	16.7%	16.7%	.0%	.0%	33.3%
Dripping	Count	0	2	1	0	3
	% within district	.0%	66.7%	100.0%	.0%	50.0%
	% of Total	.0%	33.3%	16.7%	.0%	50.0%
Bubbly	Count	0	0	0	1	1
	% within district	.0%	.0%	.0%	100.0%	16.7%
	% of Total	.0%	.0%	.0%	16.7%	16.7%
Total	Count	1	3	1	1	6
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	16.7%	50.0%	16.7%	16.7%	100.0%

Table shows that those who prefer to use modern irrigation methods and increase the proportion of distillation in the departments of Sanhan and Alsabain up to (16.7%) and the sample studied had not noticed the existence of a distillery in the departments of Hamdan and Bani Harith. Those who prefer to use a drip reaching their highest in the department of the Alsabain reaching as high (33.3%) and less in the department of Hamdan, by (16.7%) and the sample studied had not noticed the existence of a drip in the departments of Bani Matar and

Sanhan. For those who prefer to use their percentage increase In the District of Bani Matar, up to (16.7%) and the sample studied had not noticed the existence of a Bubbly in the departments of Sanhan, Alsabain and Hamdan.

Overall, the proportion of people who prefer to use modern means of drip irrigation the highest (50.0%) than that of modern irrigation methods Bubbly (16.7%) compared with the science that all up (10%) of respondents indicated that the questionnaire and the non-proliferation of modern irrigation methods in most areas Basin and wait for farmers to those who support them without such methods of decision-making themselves to water conservation and rationalization.

4.3.1 Reasons which delay using modern irrigation methods

1- Routine
2- Technical experience
3- Subsidies
4- Water quality
5- Water scarcity
6- Unavailable
7- Unsuitable for some crops
8- Small and scatter farm
9- Lack of information
10- High cost

Table (30) show are there any intend to used other modern irrigation methods unused currently of sample studied

		District						Total
		Sanhan	Alsabain	Hamdan	Arhab	Bani- Al Harith	Bani-Mater	
Yes	Count	1	1	5	1	1	2	11
	% within district	100.0%	33.3%	100.0%	100.0%	20.0%	66.7%	61.1%
	% of Total	5.6%	5.6%	27.8%	5.6%	5.6%	11.1%	61.1%
No	Count	0	2	0	0	4	1	7
	% within district	.0%	66.7%	.0%	.0%	80.0%	33.3%	38.9%
	% of Total	.0%	11.1%	.0%	.0%	22.2%	5.6%	38.9%
Total	Count	1	3	5	1	5	3	18
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	5.6%	16.7%	27.8%	5.6%	27.8%	16.7%	100.0%

Table shows that those who intend to use modern irrigation methods, which are greater than currently used in the department of Hamdan, by (27.8%) and lower percentage in the departments of Sanhan, seventy, I, Bani Harith reaching as high (5.6%), while those who do not intend to use modern irrigation methods However, currently used by more than in the District of Bani Harith (22.2%) and lower percentage in the District of Bani Matar, reaching as high (5.6%) and the sample studied had not noticed there who do not intend to use modern irrigation methods, which are currently used in the another district.

Overall, the proportion of Lennon, who use modern irrigation methods currently used by non-high (61.1%) than those who do not intend to use modern irrigation methods other than those currently used (38.9%), which indicates the beginning of interest in the rationalization of water use by farmers and if the initial.

4.3.2 Reasons of unchanged the modern irrigation methods which used currently of sample studied

1- high cost

2- the following methods is the best for the cultivated

3- water isn't found

4- no subsidies

5- crops is not trees and the drip irrigation is not suitable

6- Wells is not found

Table (31) show the another methods which be using of samples studies

		District			Total
		Sanhan	Alsabain	Hamdan	
Spray	Count	1	1	0	2
	% within district	100.0%	100.0%	.0%	40.0%
	% of Total	20.0%	20.0%	.0%	40.0%
Dripping	Count	0	0	3	3
	% within district	.0%	.0%	100.0%	60.0%
	% of Total	.0%	.0%	60.0%	60.0%
Total	Count	1	1	3	5
	% within district	100.0%	100.0%	100.0%	100.0%
	% of Total	20.0%	20.0%	60.0%	100.0%

Table shows that Lennon farmers who use modern irrigation methods, which are currently used spray more numerous in the departments of Sanhan and Alsabain(20.0%) and the sample studied had not noticed the existence of a modern irrigation spray in the Department of Hamdan, as well as increase the rate of punctuation in the department of Hamdan (60.0%) And the sample studied had not noticed the existence of a modern irrigation (drip) in the departments of the Alsabain and Sanhan.

Overall, the proportion of farmers who Lennon use of modern irrigation, which are currently used spray (40.0%) and the proportion of farmers who Lennon use of modern irrigation, which are currently used dropping (60.0), because, drip irrigation irrigate roots, which works directly on the rationalization of water and shows the awareness of farmers on modern methods of irrigation.

4.3.3 Reasons of used another irrigation methods of the samples studies

1- increase in saving water

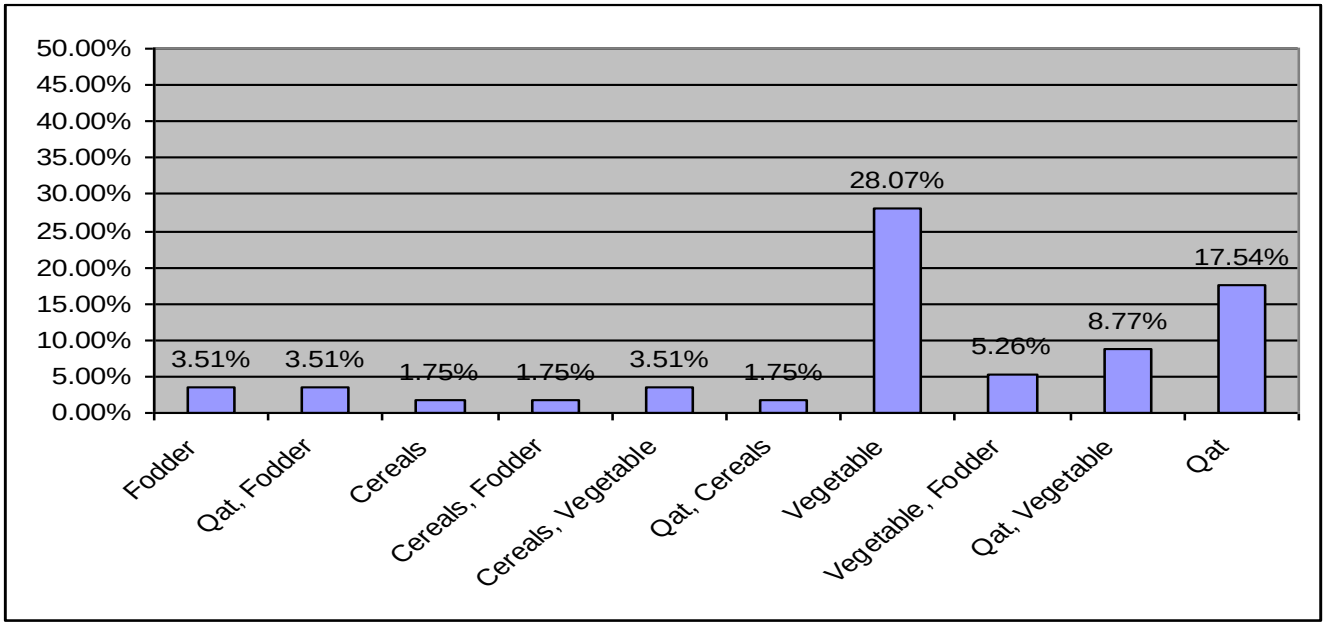
2- to reduced the water used for irrigation

3- water supply

4- reduce cost

5- For the provision of water

Figure (3) show Crops need more water irrigation of the sample studies



We note that the proportion of vegetables obtained 27.08% of the most consuming crops for water, as the experience of farmers, followed by qat (17.5%). This indicate that farmers are aware of crops that consume more water, but they do not take appropriate measures to reduce the amount of water required by the crop yield, or whether to change the use of modern irrigation

Table (32) show are you cultivated crops that need more water of a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Mater	
Yes	Count	4	2	10	3	2	10	8	1	40
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	25.0%	93.0%
	% of Total	9.3%	4.7%	23.3%	7.0%	4.7%	23.3%	18.6%	2.3%	93.0%
No	Count	0	0	0	0	0	0	0	3	3
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	.0%	75.0%	7.0%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	.0%	7.0%	7.0%
Total	Count	4	2	10	3	2	10	8	4	43
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.3%	4.7%	23.3%	7.0%	4.7%	23.3%	18.6%	9.3%	100.0%

Table shows that those who wish to crops that need to increase the amount of water accounted for the largest districts in Hamdan and Khawlan and by (23.3%), while the ratio is less at the District of Bani-Matar and by (2.3%). Those who do not want in the cultivation of these crops reaching their highest in the district of Bani-Matar and by (7.0%) and the sample studied had not noticed there who do not wish in the cultivation of these crops in the departments of Sanhan, Mohammed Hamdan, Ali Ahmed, Khawlan and Bani-Matar.

Overall, those who wish to cultivate these crops accounted for (93.0%), a higher proportion of those who do not want in the cultivation of such crops and their proportion (7.0%), which indicates that the main concern for farmers is profit and not a rationalization of water and conservation.

4.3.4 Reasons of cultivated crops need more water

1- Self-sufficiency
2- Good income and produce
3- Easy cultivated
4- Foe sale
5- No alternative

Table (33) show are there any marketing problems of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	4	2	11	1	3	5	9	4	39
	% within district	66.7%	66.7%	78.6%	33.3%	100.0%	50.0%	90.0%	57.1%	69.6%
	% of Total	7.1%	3.6%	19.6%	1.8%	5.4%	8.9%	16.1%	7.1%	69.6%
No	Count	2	1	3	2	0	5	1	3	17
	% within district	33.3%	33.3%	21.4%	66.7%	.0%	50.0%	10.0%	42.9%	30.4%
	% of Total	3.6%	1.8%	5.4%	3.6%	.0%	8.9%	1.8%	5.4%	30.4%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that those who are more numerous marketing problems in the district of Hamdan, by (19.6%), while the ratio is less Arhab in the district and by up to (1.8%). Those who do not face marketing problems reaching their highest in the district and by Khawlan (8.9%) and lower percentage in the district of Alsabain -Bani- Al Harith and built as much (1.8%) and the sample has not facilitated the trainers there who do not face problems in the district of marketing Nihm

Overall, the proportion of people who are facing marketing problems (69.6%) higher than the proportion of people who are facing marketing problems (30.4%), which indicates that the market economy could put the loss of farm and non-use of the revenues of agriculture, so we have wasted water used for irrigation water without the expense of its Value.

4.3.5 Problems of marketing of a sample studies

1- low profit
2- no care from responsible
3- monopoly
4- transport
5- no marketing

Table (34) show did you hear with problems of increase cost of cereals of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows the extent of the designated farms and what is happening around him during the hearing problem of high grain prices as the highest proportion of people that were heard in the district of Hamdan, by (25.0%) and lower percentage in the district of Alsabain, Arhab Nihm and reaching as high (5.4%) .

Overall, all of them aware of the problem the problem of rising grain prices hit percentage (100%.) Indicating that the citizen aware of what is happening around him and felt all of the problems affecting the magnitude and source of income

Table (35) show intend of farms to exploitation conditions ascension conditions of high price of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	5	2	9	2	3	5	9	6	41
	% within district	83.3%	66.7%	64.3%	66.7%	100.0%	50.0%	90.0%	85.7%	73.2%
	% of Total	8.9%	3.6%	16.1%	3.6%	5.4%	8.9%	16.1%	10.7%	73.2%
No	Count	1	1	5	1	0	5	1	1	15
	% within district	16.7%	33.3%	35.7%	33.3%	.0%	50.0%	10.0%	14.3%	26.8%
	% of Total	1.8%	1.8%	8.9%	1.8%	.0%	8.9%	1.8%	1.8%	26.8%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that those who intended to exploit the high price conditions in the cultivation of grain more numerous in the districts of Hamdan and Bani- Al Harith (16.1%), while the ratio is less in the districts and Alsabain, Arhab by as much (3.6%) Those who did not intend to

exploit the high price conditions in the cultivation of grain amounted Have the highest proportion in the districts of Hamdan , Khawlan and up to (8.9%) and lower percentage in the district s of Sanhan, Alsabain, Arhab Bani Matar Bani- Al Harith (1.8%) and the sample has not facilitated the trainers there who does not intend to exploit the conditions in the cultivation of high price Grain in the district of Nihm.

Overall percentage of those who intended to exploit the high price conditions in the cultivation of grain to (73.2%) is higher than the proportion of people who did not intend to exploit the high price conditions in the cultivation of grain (26.8%) which shows that three-quarters of comprise questionnaire about who will go to exploit the high time Grain prices and planted either for profit or self-sufficiency or both together, which will lead to the consumption of water and rationalizing the process if unstudied properly.

Table (36) appear the purpose from agriculture of cereals of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
For self-consumption	Count	3	1	5	2	2	5	1	4	23
	% within district	60.0%	50.0%	55.6%	100.0%	66.7%	100.0%	11.1%	66.7%	56.1%
	% of Total	7.3%	2.4%	12.2%	4.9%	4.9%	12.2%	2.4%	9.8%	56.1%
Sale	Count	1	0	0	0	0	0	1	0	2
	% within district	20.0%	.0%	.0%	.0%	.0%	.0%	11.1%	.0%	4.9%
	% of Total	2.4%	.0%	.0%	.0%	.0%	.0%	2.4%	.0%	4.9%
For self-consumption, sale	Count	1	1	4	0	1	0	7	2	16
	% within district	20.0%	50.0%	44.4%	.0%	33.3%	.0%	77.8%	33.3%	39.0%
	% of Total	2.4%	2.4%	9.8%	.0%	2.4%	.0%	17.1%	4.9%	39.0%
Total	Count	5	2	9	2	3	5	9	6	41
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	12.2%	4.9%	22.0%	4.9%	7.3%	12.2%	22.0%	14.6%	100.0%

Table shows that those who exploit Lennon higher crop conditions for self-consumption increase rate in the districts of Hamdan, and Bani Matar Khawlan (12.2%), while the ratio is less in the district s of the Alsabain - Bani- Al Harith and built up to (2.4%). Those who exploit Lennon higher crop conditions for the purpose of selling them reaching the highest in Sanhan district s and Bani- Al Harith rates (2.4%). and from the sample studied had not noticed the sale of notes in the districts of both Alsabain, Hamdan, Arhab, Nihm, Bani Matar. Those who exploit Lennon higher crop conditions for self-consumption and increasing the proportion of sales in the district of Bani- Al Harith reaching as high (17.1%). While the ratio is less and up to (2.4%) in the district s of Sanhan, Alsabain, Nihm , and trainers facilitated the sample had not noticed the presence of self-consumption and sale in the district of Arhab and Khawlan.

Overall Those who exploit the high crop conditions for the purpose of self-consumption rate (56.1%) higher than the proportion of sales (4.9%).

4.4 Social awareness

Table (37) show is your region suffers from a lack of water of sample studied .

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	6	2	13	2	3	9	10	7	52
	% within district	100.0%	66.7%	92.9%	66.7%	100.0%	100.0%	100.0%	100.0%	94.5%
	% of Total	10.9%	3.6%	23.6%	3.6%	5.5%	16.4%	18.2%	12.7%	94.5%
No	Count	0	1	1	1	0	0	0	0	3
	% within district	.0%	33.3%	7.1%	33.3%	.0%	.0%	.0%	.0%	5.5%
	% of Total	.0%	1.8%	1.8%	1.8%	.0%	.0%	.0%	.0%	5.5%
Total	Count	6	3	14	3	3	9	10	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	16.4%	18.2%	12.7%	100.0%

Table shows that the areas affected by water shortages more than their share of the District of Hamdan (23.6%), while the ratio is less in the districts of Alsabain, Arhab and up to (3.6%) and those who do not suffer from the problem of water shortage is up to the highest in the districts of Alsabain Hamdan, and Arhab by (1.8%) and the sample has not facilitated the trainers there who do not suffer from the problem of water shortage in the district of Sanhan, Nihm , Khawlan, Bani Matar and Bani- Al Harith .

Overall, the proportion of areas that suffer from the problem of water shortage the highest (94.5%) of the proportion of people suffering from the problem of water shortage (5.5%), which indicates the growing problem of water and not to take measures to guide farmers to water and keep it.

Table (38) show are people aware the problem of lack of water of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	6	2	12	2	3	10	9	7	51
	% within district	100.0%	66.7%	85.7%	66.7%	100.0%	100.0%	90.0%	100.0%	91.1%
	% of Total	10.7%	3.6%	21.4%	3.6%	5.4%	17.9%	16.1%	12.5%	91.1%
No	Count	0	1	2	1	0	0	1	0	5
	% within district	.0%	33.3%	14.3%	33.3%	.0%	.0%	10.0%	.0%	8.9%
	% of Total	.0%	1.8%	3.6%	1.8%	.0%	.0%	1.8%	.0%	8.9%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that those who recognize the existence of the problem of water shortage in more than accounted for by the District of Hamdan (21.4%), while the ratio is less in the district and up to Alsabain (3.6%). Those who are not aware of the existence of the problem of water shortage is up to the highest in the district of Hamdan and by (3.6%) and lower percentage in

the districts of Alsabain, Arhab, Bani- Al Harith (1.8%) and the sample has not facilitated the trainers there who are not aware of the existence of the problem of water shortage in Sanhan districts, appetite, and Bani Matar Khawlan, Nihm.

Overall, the proportion of people aware of the existence of the problem of water shortage the highest (91.1%) than those who are not aware of the existence of the problem of water shortage (8.9%) This shows an awareness of the problem but the farm did not take appropriate action to save water and maintenance.

Table (39) show are there suffer from the problem of salinity of irrigation water of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	3	0	3	1	3	9	10	1	30
	% within district	50.0%	.0%	21.4%	33.3%	100.0%	100.0%	100.0%	14.3%	54.5%
	% of Total	5.5%	.0%	5.5%	1.8%	5.5%	16.4%	18.2%	1.8%	54.5%
No	Count	3	3	11	2	0	0	0	6	25
	% within district	50.0%	100.0%	78.6%	66.7%	.0%	.0%	.0%	85.7%	45.5%
	% of Total	5.5%	5.5%	20.0%	3.6%	.0%	.0%	.0%	10.9%	45.5%
Total	Count	6	3	14	3	3	9	10	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	16.4%	18.2%	12.7%	100.0%

Table shows that those who suffer from the problem of salinity of irrigation water more numerous in the district of Bani- Al Harith (18.2%), while the ratio is less Arhab in the districts of Bani- Matar and up to (1.8%) and those who do not suffer from the problem of salinity of irrigation water reaching their highest And by the District of Hamdan (20.0%), while the ratio is less and up to (3.6%) in the District of Arhab and trainers facilitated the sample did not notice there who do not suffer from the problem of salinity of irrigation water in the districts of the Khawlan, and Bani- Al Harith Nihm.

Overall, the proportion of people suffering from the problem of high salinity of irrigation water (54.5%) higher than the proportion of people suffering from the problem of salinity of irrigation water (45.5%), which indicates that the problem of the rationalization of irrigation water by farmers had been reflected on the quality of water in a few more The rate of water where the elements leading to Stalinization.

Table (40) show are people aware the existence of the problem of salinity of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	3	0	3	1	3	10	10	1	31
	% within district	50.0%	.0%	23.1%	33.3%	100.0%	100.0%	100.0%	14.3%	56.4%
	% of Total	5.5%	.0%	5.5%	1.8%	5.5%	18.2%	18.2%	1.8%	56.4%
No	Count	3	3	10	2	0	0	0	6	24
	% within district	50.0%	100.0%	76.9%	66.7%	.0%	.0%	.0%	85.7%	43.6%
	% of Total	5.5%	5.5%	18.2%	3.6%	.0%	.0%	.0%	10.9%	43.6%
Total	Count	6	3	13	3	3	10	10	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	23.6%	5.5%	5.5%	18.2%	18.2%	12.7%	100.0%

Table shows that those who recognize the existence of the problem of salinity in irrigation water more than accounted for in the districts of the Khawlan, Bani- Al Harith (18.2%), while the ratio is less Arhab in the districts of Bani - Matar and as much (1.8%) Those who are not aware of the existence of the problem of salinity in irrigation water reaching the highest The proportion of them in the district of Hamdan and by (18.2%) and the ratio is less Arhab in the district and by up to (3.6%) and the sample has not facilitated the trainers there who are not aware of the existence of the problem of salinity in irrigation water in the districts of Nihm, Khawlan, Bani- Al Harith.

Overall, the proportion of people aware of the existence of the problem of salinity in the water (56.4%) is higher than the proportion of people who are not aware of the existence of the problem of salinity in the water (43.6%) and this shows that farmers have begun aware of the importance of rationalization of irrigation water to avoid salinity.

Table (41) show is yemen used the treatment sewage of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	1	1	7	3	2	9	10	4	37
	% within district	16.7%	33.3%	58.3%	100.0%	100.0%	90.0%	100.0%	66.7%	71.2%
	% of Total	1.9%	1.9%	13.5%	5.8%	3.8%	17.3%	19.2%	7.7%	71.2%
No	Count	5	2	5	0	0	1	0	2	15
	% within district	83.3%	66.7%	41.7%	.0%	.0%	10.0%	.0%	33.3%	28.8%
	% of Total	9.6%	3.8%	9.6%	.0%	.0%	1.9%	.0%	3.8%	28.8%
Total	Count	6	3	12	3	2	10	10	6	52
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.5%	5.8%	23.1%	5.8%	3.8%	19.2%	19.2%	11.5%	100.0%

Table shows that those who have the knowledge that his use of sewage treated in irrigation increase in the proportion of the District of Bani- Al Harith reaching as high (19.2%) and lower percentage in the district s of Sanhan, Alsabain,-reaching as high (1.9%), while those who do not have to know that the advantage of Yemen Treated wastewater for irrigation more numerous in the district s of Sanhan and Hamdan, reaching as high (9.6%) and lower ratio in Khawlan District reaching as high (1.9%) and the sample has not facilitated the trainers there who have no knowledge that his use of sewage treated In irrigation districts in each of Nihm , Arhab , Bani- Al Harith.

Overall, the proportion of people with knowledge that his use of sewage treated in irrigation high (71.2%) and the proportion of people who have no knowledge that his use of sewage treated in irrigation is low (28.8%) and this indicates a lack of knowledge and conviction of the importance of farmers sewage Alternative to maintain the water and rationalizing it

Table (42) show the exploitation of sewage in your house of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	0	0	1	0	0	0	1	1	3
	% within district	.0%	.0%	8.3%	.0%	.0%	.0%	10.0%	16.7%	5.8%
	% of Total	.0%	.0%	1.9%	.0%	.0%	.0%	1.9%	1.9%	5.8%
No	Count	6	3	11	3	2	10	9	5	49
	% within district	100.0%	100.0%	91.7%	100.0%	100.0%	100.0%	90.0%	83.3%	94.2%
	% of Total	11.5%	5.8%	21.2%	5.8%	3.8%	19.2%	17.3%	9.6%	94.2%
Total	Count	6	3	12	3	2	10	10	6	52
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.5%	5.8%	23.1%	5.8%	3.8%	19.2%	19.2%	11.5%	100.0%

Table shows that the areas exploited sewage per household than in the district s of Hamdan, Bani- Al Harith Bani Matar and reaching as high (1.9%) and the sample has not facilitated the trainers there who are using sewage water in houses in the districts, Sanhan Alsabain , Arhab, Nihm , Khawlan and those who are not using sewage water in their homes, reaching the highest in the District of Hamdan and by (21.2%), while the ratio is less at the District of Nihm by as much (3.8%).

Overall, the proportion of people who did not take advantage of sewage is high (94.2%) and the proportion of people who used the sewage (5.8%) low, which indicates the lack of awareness on this wasted water and use treated.

Table (43) show wherewith the exploitation of sewage in your house of sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
not use	Count	6	3	13	4	3	10	9	6	54
	% within district	100.0%	100.0%	92.9%	100.0%	100.0%	100.0%	90.0%	85.7%	94.7%
	% of Total	10.5%	5.3%	22.8%	7.0%	5.3%	17.5%	15.8%	10.5%	94.7%
Agriculture	Count	0	0	0	0	0	0	1	0	1
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	10.0%	.0%	1.8%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	1.8%	.0%	1.8%
Basil	Count	0	0	0	0	0	0	0	1	1
	% within district	.0%	.0%	.0%	.0%	.0%	.0%	.0%	14.3%	1.8%
	% of Total	.0%	.0%	.0%	.0%	.0%	.0%	.0%	1.8%	1.8%
Trees watering	Count	0	0	1	0	0	0	0	0	1
	% within district	.0%	.0%	7.1%	.0%	.0%	.0%	.0%	.0%	1.8%
	% of Total	.0%	.0%	1.8%	.0%	.0%	.0%	.0%	.0%	1.8%
Total	Count	6	3	14	4	3	10	10	7	57
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.5%	5.3%	24.6%	7.0%	5.3%	17.5%	17.5%	12.3%	100.0%

We note from the table areas which do not use domestic sewage in anything be high (94.7%) or who used in agriculture, watering basil, and Trees watering (1.8), which shows the waste of potable water to farmers in part of the work Gardens and irrigate some crops and non-exploitation and conservation as the best on the water altogether.

Table (44) show Is there associations in your area to maintain water conservation of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	2	3	3	0	2	0	2	1	13
	% within district	33.3%	100.0%	21.4%	.0%	66.7%	.0%	20.0%	14.3%	23.2%
	% of Total	3.6%	5.4%	5.4%	.0%	3.6%	.0%	3.6%	1.8%	23.2%
No	Count	4	0	11	3	1	10	8	6	43
	% within district	66.7%	.0%	78.6%	100.0%	33.3%	100.0%	80.0%	85.7%	76.8%
	% of Total	7.1%	.0%	19.6%	5.4%	1.8%	17.9%	14.3%	10.7%	76.8%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that areas with associations working on water conservation districts in more than Alsabain per Hamdan and reaching as high (5.4%) and lower percentage in the District of Bani Matar, reaching as high (1.8%) and from the sample studied had not noticed the existence of organizations that work to Water conservation in the Khawlan district sand Arhab and regions that do not maintain the associations of water or more in the District of Hamdan reaching as

high (19.6%) and lower percentage in the District of Nihm reaching as high (1.8%) and trainers facilitated the sample had not noticed the presence of areas No associations maintain the water at the District of Alsabain.

Overall, the proportion of areas where no associations maintain high water (76.8%) and the proportion of areas with associations to maintain the low water (23.2%), which indicates the lack of awareness of cooperation between farmers to rationalize water use.

Table (45) show subsidies of association of a sample studied

		District						Total
		Sanhan	Alsabain	Hamdan	Nihm	Bani- Al Harith	Bani- Matar	
Modern methods of irrigation	Count	0	2	0	0	0	0	2
	% within district	.0%	66.7%	.0%	.0%	.0%	.0%	16.7%
	% of Total	.0%	16.7%	.0%	.0%	.0%	.0%	16.7%
Offering advice	Count	0	0	0	1	0	1	2
	% within district	.0%	.0%	.0%	50.0%	.0%	100.0%	16.7%
	% of Total	.0%	.0%	.0%	8.3%	.0%	8.3%	16.7%
Modern methods of irrigation, offering advice	Count	1	1	2	1	2	0	7
	% within district	50.0%	33.3%	100.0%	50.0%	100.0%	.0%	58.3%
	% of Total	8.3%	8.3%	16.7%	8.3%	16.7%	.0%	58.3%
Other cooperative	Count	1	0	0	0	0	0	1
	% within district	50.0%	.0%	.0%	.0%	.0%	.0%	8.3%
	% of Total	8.3%	.0%	.0%	.0%	.0%	.0%	8.3%
Total	Count	2	3	2	2	2	1	12
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	16.7%	25.0%	16.7%	16.7%	16.7%	8.3%	100.0%

Table shows the means to support the farmers associations in the region to conserve water so that the support of modern methods of irrigation in the district exceeding Alsabain (16.7%) and from the sample studied had not noticed support the existence of modern irrigation methods in the districts of Sanhan, Hamdan, Bani- Al Harith , Bani Matar, Nihm and to provide support or advice over Nihm in the districts of Bani Matar (8.3) sample is not trained and facilitated the provision of support and advice in the district s of Sanhan, Alsabain , Hamdan and , Bani- Al Harith , while support by modern irrigation and provide advice or increase in the districts of Hamdan and , Bani- Al Harith (16.7), while the ratio is less in the district s of Sanhan, Alsabain -up by Nihm and to (8.3) and the sample Facilitated the trainers did not support the existence of modern means of irrigation and provide advice in the District of Bani Matar, and support the work of other cooperative or increasing in the Department of Sanhan (8.3) and from the sample studied had not noticed the work and support of other cooperative in the district s of Alsabain, Hamdan, Nihm Bani Matar, Bani- Al Harith .

Overall, the proportion of support to provide advice, modern irrigation methods represented the highest proportion (58.3%) and the proportion of the work of other cooperative means a lower (8.3%), which indicates that the role of associations seemed to take its course so that civil society began work on the rationalization of water consumption through the support of farmers Advice and modern irrigation methods, however, that this role is still limited to some areas and not the total basin.

Table (46) show existence of water users associations of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	1	3	2	0	1	1	3	0	11
	% within district	16.7%	100.0%	14.3%	.0%	33.3%	10.0%	30.0%	.0%	20.0%
	% of Total	1.8%	5.5%	3.6%	.0%	1.8%	1.8%	5.5%	.0%	20.0%
No	Count	5	0	12	3	2	9	7	6	44
	% within district	83.3%	.0%	85.7%	100.0%	66.7%	90.0%	70.0%	100.0%	80.0%
	% of Total	9.1%	.0%	21.8%	5.5%	3.6%	16.4%	12.7%	10.9%	80.0%
Total	Count	6	3	14	3	3	10	10	6	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	18.2%	18.2%	10.9%	100.0%

Table shows that the areas of water users associations in the districts of greater than Alsabain, Bani- Al Harith and the proportion (5.5%) and lower percentage in the district s of Sanhan, Nihm and Khawlan reaching as high (1.8%) and from the sample studied had not noticed the existence of water users associations In the district s of Bani Matar, Arhab and, while areas with no water users associations or increase in the district of Hamdan, up to (21.8%) and lower percentage in the District of Nihm reaching as high (3.6%) and from the sample studied had not noticed the existence of areas that do not exist Water users associations in the District of Alsabain.

Overall, the proportion of areas with no water users associations (80.0%), which is far higher than the areas of water users associations (20.0%) and this shows that the awareness of the importance of farm water users associations is still weak and the role played By the government to guide farmers to the importance of the establishment of water users associations which in turn weak and farms did not have full awareness of the role played by the association in water conservation and preservation.

Table (47) show are you members in WUA of a sample Studied

		District						Total
		Sanhan	Alsabain	Hamdan	Nihm	Khawlan	Bani- Al Harith	
Yes	Count	1	3	2	1	0	1	8
	% within district	100.0%	100.0%	100.0%	100.0%	.0%	100.0%	88.9%
	% of Total	11.1%	33.3%	22.2%	11.1%	.0%	11.1%	88.9%
No	Count	0	0	0	0	1	0	1
	% within district	.0%	.0%	.0%	.0%	100.0%	.0%	11.1%
	% of Total	.0%	.0%	.0%	.0%	11.1%	.0%	11.1%
Total	Count	1	3	2	1	1	1	9
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.1%	33.3%	22.2%	11.1%	11.1%	11.1%	100.0%

Table shows that those who are members of the Assembly of water users in the district of more than Alsabain per reaching as high (33.3%), while the ratio is less in the district s of Sanhan, Nihm and Bani- Al Harith, a rate (11.1%) and the sample has not facilitated the trainers there who are members of the Assembly Water users in the district of Khawlan, but who are not members of the Assembly of water users, reaching their highest in the department and by Khawlan (11.1%)) and the sample has not facilitated the trainers there who are not members of the Assembly of water users in the district s of Sanhan, Alsabain , Hamdan, Bani- Al Harith, Nihm.

Overall, those who are members of the Assembly of water users the highest proportion (88.9%) of those who are not members of the Assembly of water users (11.1%) and the high proportion of those members of the water users associations, however, the small number of associations shows that those who are members of In association rate when compared to a few farmers and the general pelvic This shows a lack of stakeholders in the formation of such associations and their importance in the definition of farmers conserve water.

Table (48) show are you intend affiliation to WUA of a sample Studied

		District		Total
		Khawlan	Bani- Al Harith	
Yes	Count	1	2	3
	% within district	100.0%	100.0%	100.0%
	% of Total	33.3%	66.7%	100.0%
Total	Count	1	2	3
	% within district	100.0%	100.0%	100.0%
	% of Total	33.3%	66.7%	100.0%

Table shows that the proportion of people who belong to associations Lennon more than their share of the District of Bani- Al Harith up to (66.7%) and lower ratio in Khawlan District and to reach (33.3%).
Overall, the proportion of people who belong to associations Lennon high (100.0) and this shows that there is segment Large farmers need much support and awareness so that they can contribute to water conservation and preservation.

4.4.1 Reasons of non existence of WUA

- ❑ Awareness is absence
- ❑ Illiteracy
- ❑ Mistrust
- ❑ Aware around problem is lately.
- ❑ Useless
- ❑ The absence governmental role.
- ❑ No agreement between the farmers themselves.
- ❑ Interest conflicts

4.4.2 Goals of WUA of a sample studied

1. Rationing water used by using modern irrigation Methods
2. Guidance farmers to use modern irrigation Methods, non expended in area of cultivation and no flooding
3. Water saving
4. Awareness and advice
5. Subsidence and entering modern irrigation Methods

Table (49) show are you receive advices in maintaining the water of a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	4	3	9	1	3	10	10	3	43
	% within district	66.7%	100.0%	69.2%	33.3%	100.0%	100.0%	100.0%	42.9%	78.2%
	% of Total	7.3%	5.5%	16.4%	1.8%	5.5%	18.2%	18.2%	5.5%	78.2%
No	Count	2	0	4	2	0	0	0	4	12
	% within district	33.3%	.0%	30.8%	66.7%	.0%	.0%	.0%	57.1%	21.8%
	% of Total	3.6%	.0%	7.3%	3.6%	.0%	.0%	.0%	7.3%	21.8%
Total	Count	6	3	13	3	3	10	10	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	23.6%	5.5%	5.5%	18.2%	18.2%	12.7%	100.0%

Table shows that the number of people received advice in maintaining the water rate increase in the district s of the Khawlan , Bani- Al Harith (18.2%), while the ratio is less Arhab in the district reaching as high (1.8%). Those who did not receive advice on water conservation, reaching the highest in the district s of Hamdan and Bani Matar and by (7.3%), while the ratio is less and in districts Sanhan, Arhab by as much (3.6%) and the sample has not facilitated the trainers there who did not receive advice in Water conservation in the district s of the Alsabain, Nihm and Bani –AlHarith Khawlan.

Overall, who receive advice in water conservation proportion (78.2%), the highest of those who did not receive advice (21.8%) and this shows that the farmers aware of the importance of water conservation but these tips do not work because the single biggest concern for them is even at the expense of profit Water.

Table (50) show are you received advices in use of modern irrigation of a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	3	3	9	1	3	9	9	4	41
	% within district	50.0%	100.0%	69.2%	33.3%	100.0%	100.0%	90.0%	57.1%	75.9%
	% of Total	5.6%	5.6%	16.7%	1.9%	5.6%	16.7%	16.7%	7.4%	75.9%
No	Count	3	0	4	2	0	0	1	3	13
	% within district	50.0%	.0%	30.8%	66.7%	.0%	.0%	10.0%	42.9%	24.1%
	% of Total	5.6%	.0%	7.4%	3.7%	.0%	.0%	1.9%	5.6%	24.1%
Total	Count	6	3	13	3	3	9	10	7	54
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.1%	5.6%	24.1%	5.6%	5.6%	16.7%	18.5%	13.0%	100.0%

Table shows that the proportion of people who received the advice of the use of modern irrigation methods and more numerous in the district s of Hamdan, Khawlan Bani-Al Harith (16.7%), while the ratio is less Arhab in the district and by up to (1.9%) Those who did not receive advice in the use of modern irrigation, reaching the highest In the District of Hamdan and by (7.4%) and lower percentage in the district of Bani-Al Harith, a rate of up to (1.9%) and the sample has not facilitated the trainers there who did not receive advice in the use of modern irrigation in the district s of Alsabain, and Khawlan Nihm.

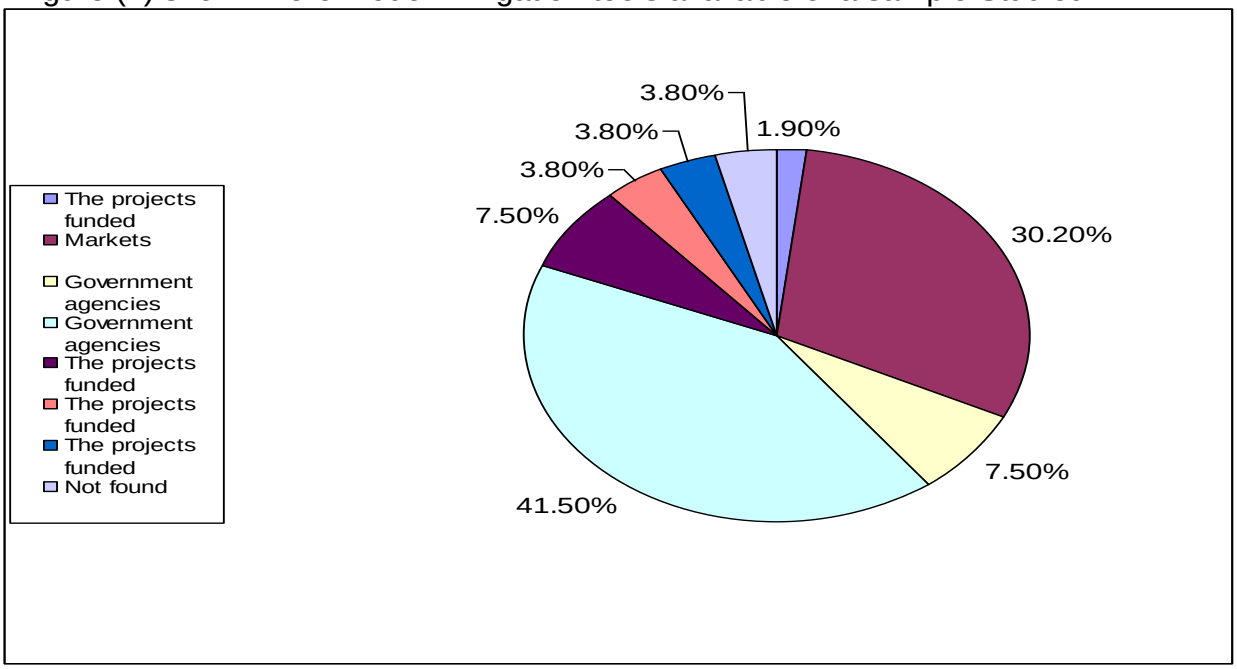
Overall, the proportion who received advice and the use of modern irrigation methods are (75.9%), while the proportion of people who did not receive advice in the use of modern

irrigation methods and low (24.1%) and this shows that most farmers have knowledge of modern irrigation methods and their importance to water conservation and rationalization

4.4.3 Opinion of farmers for advices of using modern irrigation methods of sample studied

- Save water
- Important for decrease water lost
- Solve water problems
- Wise water
- Decreases water depletion
- Save foul
- Help farmers
- Decreases cost
- Advantageous
- Decreases effort

Figure (4) show where modern irrigation tools available of a sample Studied



4.5 Institutional efforts

Table (51) show are their any support for using modern irrigation methods of a sample of farmers Studied

		district								Total
		Sanhan	Al-sabain	Hamdan	Arhab	Nihm	Khawlan	Bani-alharith	Bani-mater	
Yes	Count	1	3	4	0	1	0	1	0	10
	% within district	16.7%	100.0%	28.6%	.0%	33.3%	.0%	11.1%	.0%	18.2%
	% of Total	1.8%	5.5%	7.3%	.0%	1.8%	.0%	1.8%	.0%	18.2%
NO	Count	5	0	10	3	2	9	8	8	45
	% within district	83.3%	.0%	71.4%	100.0%	66.7%	100.0%	88.9%	100.0%	81.8%
	% of Total	9.1%	.0%	18.2%	5.5%	3.6%	16.4%	14.5%	14.5%	81.8%
Total	Count	6	3	14	3	3	9	9	8	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	16.4%	16.4%	14.5%	100.0%

From the table we show that the high percentage was for whose say no support for modern irrigation (81.8%) where low percentage was for say yes (18.2%). This indicate that the farmers ready to used modern irrigation methods but the support is not enough.

Table (52) show Do you have continued with them for procurement the modern irrigation equipment a sample Studied

		District							Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	
Yes	Count	1	3	3	0	1	0	0	8
	% within district	100.0%	100.0%	37.5%	.0%	100.0%	.0%	.0%	47.1%
	% of Total	5.9%	17.6%	17.6%	.0%	5.9%	.0%	.0%	47.1%
No	Count	0	0	5	1	0	1	2	9
	% within district	.0%	.0%	62.5%	100.0%	.0%	100.0%	100.0%	52.9%
	% of Total	.0%	.0%	29.4%	5.9%	.0%	5.9%	11.8%	52.9%
Total	Count	1	3	8	1	1	1	2	17
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	5.9%	17.6%	47.1%	5.9%	5.9%	5.9%	11.8%	100.0%

Table shows who you will continue with the concerned parties to obtain the means of modern irrigation, where more than Alsabain per district s in Hamdan, and by (17.6%), while the ratio is less in the districts of Sanhan and Nihm (5.9%) and had not noticed their presence in the district s of Arhab, Khawlan, Bani-AlHarith. While the percentage who did not engage in the District of Hamdan, by (29.4%) and the ratio is less Arhab in the district s and Khawlan rate (5.9%) and had not noticed their presence in the districts and Alsabain -Sanhan Nihm.

Overall percentage of those who responded negatively (52.9%) is more than the proportion who answered yes (47.1%), which indicates that it is still a lack of interest by farmers to have access to modern irrigation methods for the rational use of water.

Table (53) show attendant problems with the use of modern methods at irrigation a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	3	2	4	0	1	0	5	0	15
	% within district	60.0%	66.7%	36.4%	.0%	33.3%	.0%	55.6%	.0%	33.3%
	% of Total	6.7%	4.4%	8.9%	.0%	2.2%	.0%	11.1%	.0%	33.3%
No	Count	2	1	6	2	1	2	3	2	19
	% within district	40.0%	33.3%	54.5%	66.7%	33.3%	22.2%	33.3%	100.0%	42.2%
	% of Total	4.4%	2.2%	13.3%	4.4%	2.2%	4.4%	6.7%	4.4%	42.2%
Do not know	Count	0	0	1	1	1	7	1	0	11
	% within district	.0%	.0%	9.1%	33.3%	33.3%	77.8%	11.1%	.0%	24.4%
	% of Total	.0%	.0%	2.2%	2.2%	2.2%	15.6%	2.2%	.0%	24.4%
Total	Count	5	3	11	3	3	9	9	2	45
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.1%	6.7%	24.4%	6.7%	6.7%	20.0%	20.0%	4.4%	100.0%

Table shows that those who suffer from problems accompany the use of modern methods of irrigation or increase in the district of Bani- AlHarith reaching as high (11.1%) and lower percentage in the District of Nihm up to the ratios (2.2%) and the sample has not facilitated the trainers there who suffer from the problems accompanying The use of modern methods of irrigation in the district s of Arhab and Khawlan, while those who do not suffer from problems that accompany the use of modern methods of irrigation or increase in the district of Hamdan, reaching as high (13.3%) and lower percentage in the district s and Alsabain Nihm reaching as high (2.2%) , But those who do not know about the problems with the highest proportion in the district of the Khawlan (15.6%) and less in the district s of Hamdan, Arhab Nihm and Bani-Al Harith reaching as high (2.2%) and the sample has not facilitated the trainers there who do not know about the problems associated with the use of modern methods In irrigation districts Sanhan, Alsabain -Bani Matar.

Overall, the proportion who said that no problems accompany the use of modern methods of irrigation (42.2%) higher than the proportion who said these problems (33.3%) or do not know them (24.4%) and this indicates a lack of complete awareness and knowledge among farmers and the importance of irrigation Modern water supply.

4.5.1 Problems accompanying using modern irrigation methods

- Blockage
- Design difficulties
- Unsuitable for big tree
- Expensive
- Bad quality
- Lack of instructions
- Tilling
- Scattering of frame parts
- Low yield
- Change crops
- Long distance between farm and well

Table (54) show Is there institutional awareness with the importance of using modern irrigation methods of a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	2	3	6	0	2	2	3	1	19
	% within district	33.3%	100.0%	42.9%	.0%	66.7%	20.0%	30.0%	16.7%	34.5%
	% of Total	3.6%	5.5%	10.9%	.0%	3.6%	3.6%	5.5%	1.8%	34.5%
No	Count	4	0	8	3	1	8	7	5	36
	% within district	66.7%	.0%	57.1%	100.0%	33.3%	80.0%	70.0%	83.3%	65.5%
	% of Total	7.3%	.0%	14.5%	5.5%	1.8%	14.5%	12.7%	9.1%	65.5%
Total	Count	6	3	14	3	3	10	10	6	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	18.2%	18.2%	10.9%	100.0%

Table shows that those who educate the importance of using modern irrigation techniques more numerous in the district of Hamdan, reaching as high (10.9%) and lower percentage in the District of Bani Matar, reaching as high (1.8%) and from the sample studied had not noticed by the presence of sensitizing the importance of using irrigation methods Arhab talk in the district, while those who did not educate the importance of using modern irrigation techniques more numerous in the district s of Hamdan and Khawlan reaching as high (14.5%) and lower percentage in the District of Nihm reaching as high (1.8%) and from the sample studied had not noticed the presence of those Did not educate the importance of using modern irrigation methods in the district of Alsabain.

Overall, the proportion who said they would put the existence of points of the sensitizing them the importance of using modern irrigation methods low (34.5%) compared with those who admit that there are no points of the sensitizing them the importance of using modern irrigation methods low (65.5%) and this shows That the role played by educating farmers on the importance of using modern methods of irrigation water rationing is still a minor and did not reach the desired goal.

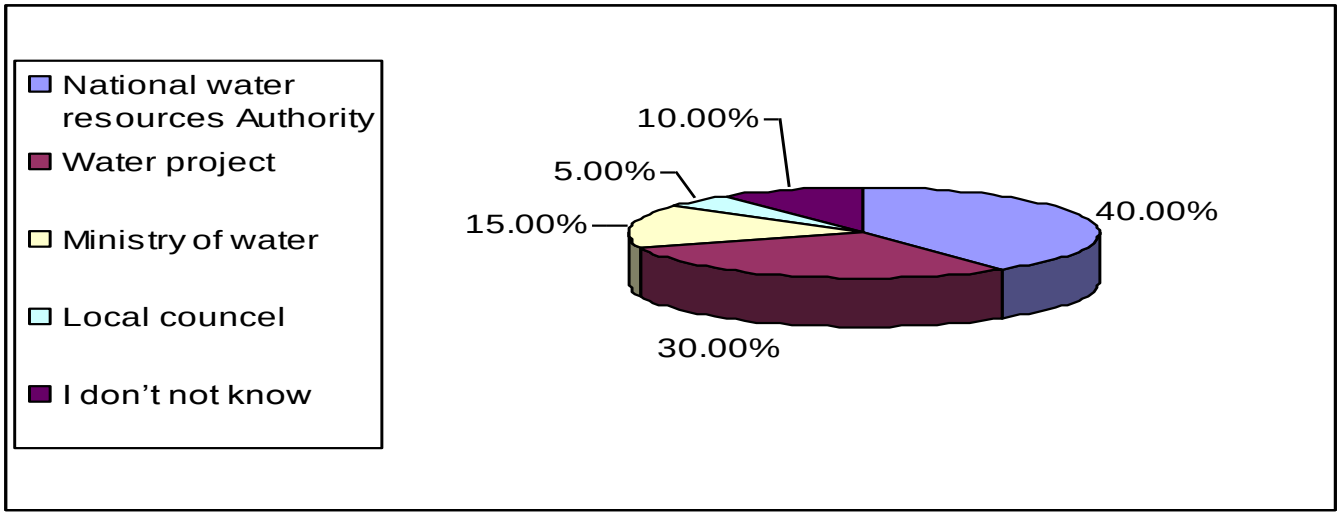
Table (55) show are their institutional give permits to drilling wells a sample of farmers Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	1	3	9	0	1	0	8	2	24
	% within district	16.7%	100.0%	64.3%	.0%	33.3%	.0%	88.9%	28.6%	43.6%
	% of Total	1.8%	5.5%	16.4%	.0%	1.8%	.0%	14.5%	3.6%	43.6%
No	Count	5	0	5	3	2	10	1	5	31
	% within district	83.3%	.0%	35.7%	100.0%	66.7%	100.0%	11.1%	71.4%	56.4%
	% of Total	9.1%	.0%	9.1%	5.5%	3.6%	18.2%	1.8%	9.1%	56.4%
Total	Count	6	3	14	3	3	10	9	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	18.2%	16.4%	12.7%	100.0%

Table shows that those who said that there are points awarded licenses drilling wells more than their share of the District of Hamdan and Bani –Al Harith reaching as high (4 .16%) and lower percentage in the district s of Sanhan, Nihm reaching as high (1.8%) and from the sample studied had not noticed by the presence of Granting permits to dig wells in the district s of Arhab and Khawlan, while the proportion who said there are no points awarded permits to dig wells in the district of more than Khawlan reaching as high (18.2%) and lower percentage in the District of Nihm reaching as high (1.8%) and from the sample studied had not noticed who said there are no points awarded permits to dig wells in the District of Alsabain.

Overall, those who said the presence of such proportion to the amount (43.6%) is higher than the proportion of people who said that the existence of such actors, as the proportion (56.4%) and this indicates the lack of knowledge of the existence of the so-called farmers dig wells and licenses as well as the Issued in order to conserve water, rationalizing and this is inadequate in these areas and also the application of the law under which issued the licenses.

figure (5) show the institutional whose give permits of drilling wells of a sample Studied



From the previous figure we show (40%) of a sample studied know that the NWRA is the institutional whose given permits where (60%) they didn't know. This indicate no efforts to aware farmers about the licenses and importance of it to water save and management.

Table (56) show registered owners of the wells to obtain the water rights of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	3	1	7	2	1	1	1	0	16
	% within district	50.0%	33.3%	50.0%	66.7%	33.3%	10.0%	12.5%	.0%	29.6%
	% of Total	5.6%	1.9%	13.0%	3.7%	1.9%	1.9%	1.9%	.0%	29.6%
No	Count	3	2	7	1	2	9	7	7	38
	% within district	50.0%	66.7%	50.0%	33.3%	66.7%	90.0%	87.5%	100.0%	70.4%
	% of Total	5.6%	3.7%	13.0%	1.9%	3.7%	16.7%	13.0%	13.0%	70.4%
Total	Count	6	3	14	3	3	10	8	7	54
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.1%	5.6%	25.9%	5.6%	5.6%	18.5%	14.8%	13.0%	100.0%

Table shows that those who registered with the concerned wells for water rights more than their share of the District of Hamdan, reaching as high (13.0%) and lower percentage in the district s of the Alsabain Nihm, Khawlan Bani-Al Harith and ratios of up to (1.9%) and from the sample studied had not noticed the presence of To register with the concerned wells for water rights in the District of Bani Matar, while those who did not register with the concerned wells for water rights more than their share of the District Khawlan reaching as high (16.7%) and the ratio is less Arhab in the district reaching as high (1.9%).

Overall, the proportion who have not registered with the concerned wells for water rights (70.4%) is higher than the proportion of people registered with the concerned wells for water rights (29.6%) This indicates that the majority of wells in the basin of Sana'a currently not supported by law as It did not get what position to benefit from water rights.

4.5.2 Reasons of non registration

- They didn't know
- No awareness
- No responsible institutional
- No body coming

4.6 Laws, legislations and conflicts

Table (57) show the laws and legislation governing the use of water a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	3	2	3	0	0	0	0	0	8
	% within district	50.0%	66.7%	23.1%	.0%	.0%	.0%	.0%	.0%	15.7%
	% of Total	5.9%	3.9%	5.9%	.0%	.0%	.0%	.0%	.0%	15.7%
No	Count	3	1	10	2	3	10	8	6	43
	% within district	50.0%	33.3%	76.9%	100.0%	100.0%	100.0%	100.0%	100.0%	84.3%
	% of Total	5.9%	2.0%	19.6%	3.9%	5.9%	19.6%	15.7%	11.8%	84.3%
Total	Count	6	3	13	2	3	10	8	6	51
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	11.8%	5.9%	25.5%	3.9%	5.9%	19.6%	15.7%	11.8%	100.0%

Table shows that those who have knowledge of the existence of laws and legislations to regulate the use of water in the basin more numerous in the district s of Hamdan and Sanhan reaching as high (5.9%) and lower percentage in the district of the Alsabain-reaching as high (3.9%) and from the sample studied had not noticed the presence of those who have Aware of the existence of laws and legislations to regulate the use of water in the basin in the district s of Arhab to Nihm, Khawlan, Bani Matar Bani-Al Harith, while those who are not aware of the existence of laws and legislations to regulate the use of water in the basin increase in the proportion of the moderators of Hamdan and Khawlan reaching as high (19.6%) And the ratio is less in the district of the Alsabain -reaching as high (2.0%).

Overall, the proportion who are not aware of the existence of laws and legislations to regulate water use is high (84.3%), while those who have aware of the existence of laws and legislations to regulate water use low (15.7%) and this indicates a failure to move on to inform the beneficiaries of the water this legislation And laws and their importance to water conservation.

Table (58) show hear about the law of water of a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani-Matar	
Yes	Count	2	2	1	0	1	3	0	0	9
	% within district	33.3%	66.7%	7.1%	.0%	33.3%	30.0%	.0%	.0%	16.1%
	% of Total	3.6%	3.6%	1.8%	.0%	1.8%	5.4%	.0%	.0%	16.1%
No	Count	4	1	13	3	2	7	10	7	47
	% within district	66.7%	33.3%	92.9%	100.0%	66.7%	70.0%	100.0%	100.0%	83.9%
	% of Total	7.1%	1.8%	23.2%	5.4%	3.6%	12.5%	17.9%	12.5%	83.9%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that those who have heard of the Water Act more than their share of the District Khawlan reaching as high (5.4%) and lower percentage in the district s of Hamdan, Nihm reaching as high (1.8%) and the sample has not facilitated the trainers there who have heard of water law in the district s of Arhab, Bani -Al Harith Bani Matar, while those who had not heard of the Water Act more than their share of the District of Hamdan, reaching as high

(23.2%) and lower percentage in the district of the Alsabain-reaching as high (1.8%). Overall, the proportion of people who had not heard of the Water Act (83.9%) is higher than the proportion of people who heard about the Water Law (16.1%) indicating that the concerned authorities has failed in its duty by raising farm tariffs and the importance of water law in water conservation and rationalization.

Table (59) show tools of hearing about the law of water of a sample studied

		District					Total
		Sanhan	Alsabain	Hamdan	Nihm	Khawlan	
Almqil	Count	1	1	0	0	0	2
	% within district	50.0%	50.0%	.0%	.0%	.0%	22.2%
	% of Total	11.1%	11.1%	.0%	.0%	.0%	22.2%
Water management projects of Sana'a Basin And water Environment center	Count	0	1	0	0	0	1
	% within district	.0%	50.0%	.0%	.0%	.0%	11.1%
	% of Total	.0%	11.1%	.0%	.0%	.0%	11.1%
Awareness campaigns	Count	0	0	0	1	0	1
	% within district	.0%	.0%	.0%	100.0%	.0%	11.1%
	% of Total	.0%	.0%	.0%	11.1%	.0%	11.1%
Television, the associations	Count	1	0	0	0	1	2
	% within district	50.0%	.0%	.0%	.0%	33.3%	22.2%
	% of Total	11.1%	.0%	.0%	.0%	11.1%	22.2%
Television	Count	0	0	1	0	2	3
	% within district	.0%	.0%	100.0%	.0%	66.7%	33.3%
	% of Total	.0%	.0%	11.1%	.0%	22.2%	33.3%
Total	Count	2	2	1	1	3	9
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	22.2%	22.2%	11.1%	11.1%	33.3%	100.0%

The table shows the proportion of people who heard about the water law through Almqil more numerous in the district s of Sanhan Alsabain (11.1%) and from the sample studied had not noticed the existence of a hearing on the law of water (Almqil) in the district s of Hamdan, Nihm and Khawlan The proportion of people who heard about the law Water by attending to the draft water management or the status of Sana'a Basin Water and Environment District increase in the proportion of Alsabain (11.1%) and from the sample studied had not noticed the existence of a hearing on the law of water (water management project or the status of Sana'a Basin Water and Environment) and in the district s of Sanhan , Hamdan, and Khawlan Nihm, and the proportion of people who heard about the water law through awareness campaigns more numerous in the district of Alsabain (11.1%) and the sample
Trainers did not notice facilitated the existence of a hearing on the law of water (campaigns) in the district s of Sanhan, Hamdan, and Alsabain Khawlan, and the proportion of people who heard about the water law through television, more numerous associations in the district s and Sanhan Khawlan (11.1%) and generating sample Facilitated did not notice the existence of a hearing on the law of water (television, associations) in the district s of Hamdan, Alsabain Nihm, while the proportion of people who heard about the water law through television only more numerous in the district of the Khawlan (22.2%) and lower percentage in the district of Hamdan, the ratio of up to (11.1) and from the sample studied had not noticed the existence of a hearing on the law of water (television) in the district s of the Alsabain Sanhan Nihm.

Overall, the proportion of people who heard about the water law through television (33.3%) is higher than the rest of the means mentioned individual (11.1%) and this shows the role played by the television media as a way to reach the largest segment of the farmers of the importance

of the definition of the law and to maintain Water while not forgetting the importance of the role of the rest in other media.

Table (60) show are you Reading the Water Law of a sample Studied

		District				Total
		Sanhan	Alsabain	Nihm	Khawlan	
Yes	Count	0	1	0	0	1
	% within district	.0%	100.0%	.0%	.0%	16.7%
	% of Total	.0%	16.7%	.0%	.0%	16.7%
No	Count	0	0	1	2	3
	% within district	.0%	.0%	100.0%	66.7%	50.0%
	% of Total	.0%	.0%	16.7%	33.3%	50.0%
Intends to consult it	Count	1	0	0	1	2
	% within district	100.0%	.0%	.0%	33.3%	33.3%
	% of Total	16.7%	.0%	.0%	16.7%	33.3%
Total	Count	1	1	1	3	6
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	16.7%	16.7%	16.7%	50.0%	100.0%

Table shows that those who had decide law more numerous in the district and by Alsabain (16.7%) and the sample has not facilitated the trainers there who may decide Sanhan law in the districts, Khawlan Nihm and, while those who did not read the law more than their share of the districts and Sanhan Khawlan and figure To (33.3%) and lower percentage in the District of Nihm reaching as high (16.7%) and the sample has not facilitated the trainers there who have not read the law in the district of Alsabain, while Lennon, who found the law more numerous in the district s and Sanhan Khawlan reaching as high (16.7 %) and from the sample studied had not noticed the presence of Lennon, who found in the district s of law and Alsabain Nihm.

Overall, the proportion who have not read the law (50.0%) is equal to the proportion of people who had decide law or intend to read together (50%), which shows that the beneficiaries of water from farmers and others still larger segment aspire not know the law and its importance in maintaining the Water and safeguard their rights from it.

Table (61) show Disadvantages of the law of a sample of Studied

		District	Total
		Alsabain	
Enforcement Law	Count	1	1
	% within district	100.0%	100.0%
	% of Total	100.0%	100.0%
Total	Count	1	1
	% within district	100.0%	100.0%
	% of Total	100.0%	100.0%

Table shows that the majority did not know the evils of the law because they have not seen it reading did not even know the advantages and negative but said that the disadvantages of non-law enforcement and reaching as high (100%) in the District of Alsabain

Overall, the non-application of the law is the biggest disadvantages because you do not know negative However, once implemented and this shows that the water law has been applied so far.

Table(62) show are there customs and traditions governing the exploitation of water of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	5	1	12	3	2	10	4	6	43
	% within district	83.3%	33.3%	85.7%	100.0%	66.7%	100.0%	44.4%	85.7%	78.2%
	% of Total	9.1%	1.8%	21.8%	5.5%	3.6%	18.2%	7.3%	10.9%	78.2%
No	Count	1	2	2	0	1	0	5	1	12
	% within district	16.7%	66.7%	14.3%	.0%	33.3%	.0%	55.6%	14.3%	21.8%
	% of Total	1.8%	3.6%	3.6%	.0%	1.8%	.0%	9.1%	1.8%	21.8%
Total	Count	6	3	14	3	3	10	9	7	55
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.9%	5.5%	25.5%	5.5%	5.5%	18.2%	16.4%	12.7%	100.0%

Table shows that there are areas of customs and traditions governing the exploitation of water rate increase in the district of Hamdan, reaching as high (21.8%) and lower percentage in the district of the Alsabain -reaching as high (1.8%) While areas that do not have customs and traditions to regulate the use of water or more in the District of Bani –Al Harith reaching as high (9.1%) and lower percentage in the district s of Sanhan, and Bani Matar Nihm reaching as high (1.8%) and from the sample studied had not noticed the presence of customs and traditions governing Water use in the district s of the Khawlan, Arhab.

Overall, the proportion of the areas of the customs and traditions governing the exploitation of water (78.2%) higher than that of areas not the customs and traditions to regulate the use of water (21.8%) which shows that customs and traditions still prevail and that the law is still absent With the law based on custom as a source of legislation and does not conflict with the law as long as the practice does not harm the public interest.

4.6.1 Traditions and Customs

- Distance between wells
- Arbitration
- Shaike guidelines
- Public and private rights
- Documents
- al-ala fl al-ala
- Contribution of Payment
- Priorities upon farm size

Table (63) show did there any water conflicts of a sample Studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani- Al Harith	Bani- Matar	
Yes	Count	5	0	5	2	1	10	8	5	36
	% within district	83.3%	.0%	35.7%	66.7%	33.3%	100.0%	80.0%	71.4%	64.3%
	% of Total	8.9%	.0%	8.9%	3.6%	1.8%	17.9%	14.3%	8.9%	64.3%
No	Count	1	3	9	1	2	0	2	2	20
	% within district	16.7%	100.0%	64.3%	33.3%	66.7%	.0%	20.0%	28.6%	35.7%
	% of Total	1.8%	5.4%	16.1%	1.8%	3.6%	.0%	3.6%	3.6%	35.7%
Total	Count	6	3	14	3	3	10	10	7	56
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	10.7%	5.4%	25.0%	5.4%	5.4%	17.9%	17.9%	12.5%	100.0%

Table shows that the areas suffering from water-related problems in the district exceeding Khawlan reaching as high (17.9%) and lower percentage in the District of Nihm reaching as high (1.8%) and the sample has not facilitated the trainers there who suffer from water-related problems in the district of Alsabain, While areas that are experiencing problems with water or increase in the district of Hamdan, reaching as high (16.1%) and lower percentage in the district s of Sanhan Arhab and reaching as high (1.8%) and the sample has not facilitated the trainers there who are suffering from water-related problems In the district of Khawlan .

Overall, the proportion of areas suffering from water-related problems (64.3%) and a high proportion of areas that are suffering from water-related problems (35.7%) low, which indicates that the worsening water problems and need care and attention with the emergence of science drought in some areas This basin will lead to the emergence of new problems if it does not pay attention and lead farmers to use water.

4.6.2 Water conflicts of a sample studied

- Partnerships problems
- Random drilling
- Short distance between wells
- Water Transfer by Tankers
- Irrigation schedule
- allocations

Table (64) show how to solve conflicts of water of a sample studied

		District								Total
		Sanhan	Alsabain	Hamdan	Arhab	Nihm	Khawlan	Bani-Al Harith	Bani-Matar	
Customs and traditions	Count	0	1	6	2	2	3	5	6	25
	% within district	.0%	100.0%	54.5%	66.7%	66.7%	30.0%	83.3%	85.7%	55.6%
	% of Total	.0%	2.2%	13.3%	4.4%	4.4%	6.7%	11.1%	13.3%	55.6%
Customs and traditions, Sheikh	Count	1	0	3	0	0	1	0	1	6
	% within district	25.0%	.0%	27.3%	.0%	.0%	10.0%	.0%	14.3%	13.3%
	% of Total	2.2%	.0%	6.7%	.0%	.0%	2.2%	.0%	2.2%	13.3%
Customs and traditions and the law	Count	3	0	1	1	1	4	0	0	10
	% within district	75.0%	.0%	9.1%	33.3%	33.3%	40.0%	.0%	.0%	22.2%
	% of Total	6.7%	.0%	2.2%	2.2%	2.2%	8.9%	.0%	.0%	22.2%
Customs and traditions and the law, Sheikh	Count	0	0	0	0	0	2	0	0	2
	% within district	.0%	.0%	.0%	.0%	.0%	20.0%	.0%	.0%	4.4%
	% of Total	.0%	.0%	.0%	.0%	.0%	4.4%	.0%	.0%	4.4%
Law	Count	0	0	1	0	0	0	1	0	2
	% within district	.0%	.0%	9.1%	.0%	.0%	.0%	16.7%	.0%	4.4%
	% of Total	.0%	.0%	2.2%	.0%	.0%	.0%	2.2%	.0%	4.4%
Total	Count	4	1	11	3	3	10	6	7	45
	% within district	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	8.9%	2.2%	24.4%	6.7%	6.7%	22.2%	13.3%	15.6%	100.0%

Table shows that the owners of wells and water wells users who take the problems of water through (customs and traditions) or more in the district s of Hamdan and Bani-Matar and by (13.3%), while the ratio is less in the district of Alsabain-up to (2.2%) and from the sample studied had not noticed the presence of customs and traditions in the district of Sanhan, and through the customs and traditions, Sheikh reaching the highest in the District of Hamdan and by (6.7%), while the ratio is less and up to (2.2%) in the district s of both Sanhan, and Bani-Matar Khawlan is Trainers facilitated the sample had not noticed the presence of customs and traditions, in the district s of the Alsabain -Sheikh, Arhab, and Bani-Al Harith Nihm, but by law, customs and traditions highest rate of the District Khawlan rate (8.9%), while the ratio is less and up to (2.2%) In the district s of both Arhab Nihm and Hamdan in sample is not Notes the existence law, customs and traditions the district s of Alsabain, and Bani-Matar, Bani- Al Harith reaching the customs and traditions and the law and increase per-Sheikh in the District of up to Khawlan (4.4%) and from the sample studied had not noticed the existence of customs and traditions and the law and in the district s of Sheikh Sanhan, Alsabain, Hamdan, Arhab Nihm, Bani-Matar Bani -Al Harith, while the rate of increase through the law in the districts of Hamdan and Bani -Al Harith reaching as high (2.2%) and from the sample studied had not noticed the existence of law in the district s of Sanhan, Alsabain, Arhab Nihm, and Bani-Matar Khawlan.

Overall, the proportion of solving problems through (customs and traditions) was higher (55.6%), the highest rate of the rest of the roads including the law which indicates that the solution to such problems through traditional means, without recourse to the law and based on scientific studies which will maintain the water Damage to water and maintain them.

5 Conclusions

- Awareness of the importance of the rationalization of irrigation water is non-existent and that the weakness and lack of education, years of experience, we can not be invested in the rationalization of water consumption.
- Agriculture is the major source of income for the majority of farmers, despite the fact that the economic returns of agriculture does not include only a small number of non-causing ability to acquire more than one well, which promotes the principle of participation and the rationalization of water by farmers.
- Irrigation approach is irrigated and this shows that the greater reliance on ground water without taking the other alternative to maintain water and irrigation methods are also used in agriculture, which shows the inundation of non-use of irrigation used in agriculture as well as the lack of follow for the use of modern methods of delivery of irrigation water to the farm without a loss of water.
- State support for the diesel that does not encourage farmers in the rationalization of irrigation water and also the belief that the increase of water over the crop resulting in a lack of rationalization in the water.
- Modern methods of irrigation in most parts of the basin, however, and farmers are waiting to give them the support of these methods, despite the emergence of signs that they Lennon use of modern irrigation, but the farms are profit or non-self-sufficiency and the rationalization of water
- Old problem of water shortages and farmers not to take action to conserve water has led to a deterioration in water quality.
- Lack of awareness of farmers to waste water after treatment without any exploitation.
- The lack of cooperation between farmers and associations that maintain the water, although the association's role is limited to certain areas of the basin, where you do not educate farmers in the use of modern irrigation methods and did not properly reach the desired goal.
- High cost of modern irrigation equipment, one of the factors to be used in spite of the farmers to learn these techniques and their significance.
- Lack of knowledge of the existence of the so-called permits farmers dig wells and that the granting of such permits for water conservation and rationalization, and that these wells are not supported by law.
- The lack of awareness of the importance of farmers to the law and its role in water conservation and, where farmers mostly, if not all of them have not seen the law, which indicates a lack of application of customs and traditions that still prevailed and the law is

absent, although the law is based on the customary source of legislation and the problems are solved by customs and traditions without reference to the law which will lead to water damage and degradation because the customs and traditions are not based on the technical aspects of the solution to the problem of worsening water quantity or quality of care and satisfaction of the parties in conflict, without paying heed to water.

- From the reality of water in the Sana'a basin, there is evidence of the absence of water users associations are sufficient to support the rational use of water and rationalization in the light of the integrated management of water resources.

6 Recommendation

- Raise awareness of water-saving through activating the role of associations that will educate agricultural farms in the selection of crops that provide a high economic return.
- To encourage the Government of the educated farmers and their work sessions in the use and maintenance of modern irrigation methods and even correct the wrong concept (an increase of more than crop irrigation water).
- The removal of subsidies on diesel by the State so as not to encourage the farmer not to rationalize the water used for irrigation.
- To encourage the investment of the farmers to find new alternatives to substitute for agriculture and use of the revenues of agriculture in creating employment opportunities and also to maintain the water used for irrigation
- The government aid to farmers of modern irrigation tools so that they can profit and the rationalization of water.
- The prevention of those who grant licenses for the drilling of wells for the purpose of agriculture so that we can maintain the inventory and the underground looking for alternatives.
- The use of means to transport water from the source to the farm without a loss.
- The work of workshops to activate the role of water law and the definition of the farmers.
- Use strict with offenders both in the random digging of wells or depletion or pollution of groundwater and surface water
- The need to update previous studies of water and updated to serve by the integrated management of water resources
- Develop plans in line with the current status of water and community involvement in the preparation of these plans, which ultimately lead to integrated water resources management and conservation.
- Awareness of the importance of cooperation with farmers on both sides to make statements on the right side of the farm or to allow their views on the work of scientific studies and practical in their data collection to serve the good of the situation and the agricultural and water at the base, which is in the interest of the integrated management of water resources.
- To raise awareness of the importance of farmers, water harvesting

- Educate farmers damaged waste water treatment of others, whether human or the environment surrounding.
- Draw the attention of the importance of farmers to use treated wastewater for alternative water source in agriculture metered.
- To speed up the formation of water users associations in areas where the spread of agriculture and education of farmers in particular the importance of.

7 Summary

Sana'a basin located in high land of west of yemen and depended on rainfall and groundwater which storage since thousands years. Agriculture consumed more quantity of groundwater than another sectors like domestic and industrial. So, Sana'a in the future will sufferer a big problems in agriculture activities especially and another sectors generally. Integrated water resource management (IWRM) is the best option to solve water problems (quantity and quality). Increases population led to increase demand on water for irrigation especially that the people in Sana'a basin do not have any source of income except agriculture where the agriculture represent source of income for more than 55% of labor force. In the filed we note that the farmers did not care by saving water of irrigation especially that the high percentage of them (89.3%) not used modern irrigation method. Most of the farmers have low education level (80%) and this represent obstacle in any awareness campaign doing to save irrigation water among farmers.
All farmers already to use modern irrigation methods but they need help and subsidies to get and use modern irrigation methods. The awareness campaign is very important currently and in the future the awareness the farmers around the problems of water and how managing the irrigation water to save the groundwater which start deterioration (quantity and quality) where more than (90%) aware

8 References

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2) Water and Environmental Center, January 2004, Sana'a basin study, final report.
3) The technical secretary of the high water council, July 1992, water resource management options in Sana'a basin, final report, volume IX.

9 Appendix

Questionnaire of farmers behavior toward irrigated water management

Government :

No. of questionnaire:

Name of researcher:

Signature:

Date:

Farmers Behavior Toward Irrigated Water Management

A- General questions:

Governorate…….district…….center……..village…….experience…….education level……..basic income……secondary income……..……

Individuals benefiting from the farm……..

Water depletion

1- source of irrigation water? Rains( ) springs( ) dams( ) wells( )

2- If the source water wells. How many wells owned? One( ) two( ) more( )

3- Is it: own( ) partnership ( ) other ( ) e.g. .....

3- Average depth of wells ..... m, the water level ..... m

4- Type well: dug( ) borehole( ) dug/bore( ) artesian( )

5- Are you getting enough water? Yes( ) no ( )

6- In the case that water is not enough. Why work? Yes ( ) no ( )

- **deepen the well? Yes ( ) no ( )**
- **drilling a new well? Yes ( ) no ( )**
- **Reduce the area planted? Yes ( ) no ( )**
- **Cultivated crop low water requirement? Yes ( ) no ( )**
- **Purchase water from near wells? Yes ( ) no ( )**
- **Other? Yes ( ) no (**

7- Do you buy water for irrigation? Yes ( ) no ( )

8- If the answer is yes. From where buy water for irrigation? Neighboring wells ( ) transferred ( ) Other( ) mention

.....

B- Crop pattern and water management at the farm level:

1- What are the crops that are cultivated?

No.	Crop type	Rain	Supplementary	Irrigated	Irrigation methods	No. of irrigated / month	
						Summery	Winter
1							
2							

3							
4							
5							
6							

2- What are the agricultural operations that provide water for irrigation?

No.	Procedure	Goal
1		
2		
3		
4		
5		
6		

3- Is often a source of irrigation for the farm?

Yes( ) no( ). how far? .....m

4- Irrigation water to reach the farm by:

earth channels( ) , cement-lined channels ( ) , iron pipes( ) , plastic tubes( ).

C- Economic incentives

1- What kind of pump used in the well? Why did you choose this type?

No.	Type	Reason
1		
2		
3		
4		
5		
6		

2- Is an increase of irrigation water increase the crop?

yes( ) , no ( )

3- Do you use modern means of irrigation?

Yes ( ) , No ( ). If the answer is yes. Remember?

1)……..2)……..3)……

4- If the answer is no. mention the reason?

1……..……..2…….3……..……

…

5- If the answer is yes. Do you intend to use and modern irrigation methods other than those currently used? Yes ( ) No ( )

6 If the answer is I do not recall the reason?

1 ..... 2 .... 3 .....

7- If the answer is yes. Remember? Why?

No.	Means	Reason
١		
٢		
٣		
٤		

8- What are the crops that require more amounts of water?

No.	**Crop**	**Does planting it?**		**Reason**
		Yes	**No**	
1				
2				
3				
4				
5				
6				

9- When you want to sell them Do you face problems specific marketing?

yes ( ) No ( )

10- If the answer is yes. What are these problems?

1).....

2).....

3).....

11- Do you hear about the problem of high grain prices?

yes( ) no ( )

12- Do you intend to exploit the conditions of the price rise in the cultivation of these crops?

Yes ( ) no ( )

13- If the answer is yes, Is it because:

1) sales ( )

2) For self-consumption ( )

D- Social awareness

1. Do you have your problem of water shortage?

Yes( ) no( )

2- Are all the people in your area aware of the existence of this problem?

Yes( ) no( )

3- Is there a problem of salinity of irrigation water in your area?

Yes( ) no( )

4- Are all the people in your area aware of the existence of this problem?

Yes( ) no( )

5- Many countries use the treated sewage water for irrigation. Is Yemen use this water?

Yes( ) no( )

6- Do you use the sewage in your home?

Yes( ) no( )

7- If the answer is yes. Used in?

1)..... 2) .... 3)..... .....

8- Recommend to our religion in the work of cooperation and good land. Is Society / Societies in your area to conserve water? Yes ( ) no ( )

9- If the answer is yes. In what?

1- the provision of advice ( ) 2- you do indeed modern irrigation methods ( ) 3- the work of other cooperative( ) as ....

....

10- Is there a water user associations in the village.

Yes ( ) no ( )

11- If the answer is yes. Are you a member ( ) intended ( ) to the association?

Yes ( ) no ( )

12- If the answer is no. Why? ....

....

13- If the answer is yes. What are the objectives of this Assembly?

1 -..... 2 .... 3 ....

14- Did you receive advice on:

1) water conservation Yes ( ) no ( )

2) the use of modern irrigation Yes ( ) no ( )

15- What do you think of these tips? ....

.....

E – institutional efforts

1. Is the modern means of irrigation are available in the ( ) market ( ) government agencies ( ) projects financed

2- Are there views you do indeed modern methods of irrigation?

Yes ( ) no ( )

3- If the answer is yes. Did you communicate with them for modern irrigation equipment?

Yes ( ) no ( )

4- Are there problems accompany the use of these techniques in irrigation?

Yes ( ) no ( )

5- If the answer is yes. What is it?

1) ..... 2 ..... 3 .....

6- Will the responsibles awareness with the importance of using modern methods of irrigation in the maintenance of the water and reduce irrigation water?

Yes ( ) no ( )

7- Are there points of well-drilling permits granted

Yes( ) no ( )

8- If the answer is yes. Who are these actors?

1) ..... 2 .... 3 ....

9- Are records of the wells in your area concerned with the wells to obtain water rights?

Yes( ) no ( )

10- If the answer is no. Why?

1 ..... 2 ..... 3.....

F- Low, Legislations and Conflicts

1. Are there laws and legislation governing the use of water in the tub? Yes) (no) (

2- Have you heard of the Water Act? Yes) (no) (

3- If the answer is yes. By what?

1 ..... 2 .. .. 3..... Other .....

4- if the answer is yes. Do you read? Yes( ) no ( ) intended to be visited) (

5- Your comments on the law, if any,

No.	Advantage	Disadvantage
١		
٢		

٣		
٤		

6- Are there any customs and traditions governing the use of water in your area?

Yes ( ) no ( )

7- If the answer is yes. What is it?

1 .....

2 ....

3 ....

8- Are there problems with the water in your area?

Yes( ) no ( )

9- If the answer is yes. What are these problems?

1.....

2.....

3 .. ..

10- How to solve these problems?

By law( ), customs and traditions ( ) Other ( ) such as

....