Water problems in Ta'iz, Yemen

Water uses in rural area

Appendix

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Appendix 1: Qat

Qat is originated in Ethiopia and has been imported to southern Yemen in 1300. In the beginning only rich people chewed qat. In the present days almost everyone in Yemen chews qat and it has become part of the Yemeni way of life.

There are a lot of different types of qat, for each type of person a different type; it could be compared to the different types of French wine. All these different types of qat have got different quality and prices. But in all cases qat is a product that has to be marketed fresh within 24 hours. (Varisco, 1986)

Qat is an altitude crop; it only grows between 1000 and 2500 meter high and needs a rainfall of 500-1000 mm / year. In the 1970's the production of qat was limited, this because the area had to be rain fed or irrigated by run-off water, after the 1970's it become pump irrigated, which lead to a groundwater depletion. (Al Hamdi, 2000) By using pump irrigation there was cultivated more qat throughout the years.

In 1981 there was 40'000 hectare of qat, in the mid 1980's there was 60'000 hectare of qat and in the 1990's it has reached 90'000 hectare of qat. In some areas it has become the dominant crop.

The production of qat has some side affects ; qat is responsible for 30% of the use of water in Yemen, replacing other crops and the health effects. Recently the government has decided to take action against the growth of the qat habit.

The reason for the increase of land availability for qat use is because qat delivers more money than other cereals. It has also replaced almost all other form of relaxation and socializing in the Yemeni society.

The other effects on society are the health effects of qat. Liver and urinary problems are higher amongst chewer, low birth weights and gastric problems. The side effects of qat using are that it serves as an anorexic; no food is eaten during or after the chewed, difficulties to sleep.

The government has tried to reduce qat usage by implementing tax on qat and promotion against qat use. The tax is following the law 20%, but the government collects only 1%. The main obstacles for the taxation are the low salary of the tax collectors and lack of motivation of the tax collectors, lack of data on cultivated areas which makes it difficult to make good estimates of revenues and the lack of moral hazard. (Ward)

There are some NGO's who are against qat use, but they are not very visible in Yemen. They could have an influence if they are more visible. It could be compared with the anti-smoke lobby in the Netherlands and they have achieved a smoking prohibition in buildings.

Survey on water uses in rural area's

Guidelines

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Objectives

The purpose of this questioner is to demine how much water is used in the agricultural sector and the estimated added value of water.

For this there should be data collected by a survey:

- Farm size and areas irrigated and unirrigated
- Methods of irrigation use
- Sources of irrigation water
- Cropping patterns, crop intensity and crop calanders
- Crop budgets and farm revenues

The survey will be though meetings with key informant groups. There will be several meetings.

Data requirements

The questionnaire of this survey should obtain the following information:

- General information of the village
    - Farm infrastructure: Electricity; rural water supply
- Farming system
    - Identification of main farming system in the area
    - Relationship between water availability and cropping pattern.
    - Crop calendars
- Water resources and water use
    - Proportion of area irrigated by what sources (Surface water, groundwater, rainwater harvesting, tanker) by season.
    - Number of wells
    - Change in groundwater levels in the last 5 years
    - Cropping pattern in the last year
    - Changes in irrigation and land use in the last 5 years
    - The proportions of irrigated by various irrigation methods (Basin, Furrows, dirp and sprinkler)
    - Data of water use for each crop
        - The number of irrigation
        - Volume of water
    - Total cost of water use
- Cropping budget
    - For all crops the quantity and cost of all inputs
    - What are the costs of the land? (rent, etc)
    - Yield of each crop and in case of rented land, the percentage they have to share
    - The price, they receive for the crops sold

Questionnaire

Well number:

Location:

Farmer's name:

Share in the supplying well:

Total area of the farm:

Electricity: Yes/ no

Q1: Data of drilling ?

Q2: Total depth? ……meter

Q3: Depth to water level after drilling? ……meter

Q4: Depth to water level at the moment? ……..meter

Q5: What was the purpose of drilling the well?

a( )Irrigation
b( )Household use
c( )Water selling
d( )Other(specify) ……

Q6: What is the yield of the well now? (to be measured in the field) (liter/ sec)

Q7: Have you deepened the well since drilling? Yes/ No

If yes, fill the following table?

Data	Extra Depth	Reason for deeping	cost

Q8: If the levels continue to decline, will you deepen the well further? Yes/ No

Q9: What crops do you cultivate in your farm?

Crop	Area (hactare)	In case rented annual rent	Crop type		Reason for crop selection
			Past	Present	

Q10: Would you like to fill in the following table.

Crop	number of irrigations	average application time (plot area/hours)	Irrigation method

Q11:Why did you choose this irrigation method?

Q12: Do you think there are more efficient irrigation methods? And would you choose them?

Q13: In general what do you think is you major expenses?

a( ) Diesel
b( ) Oil
c( )maintenance
d( )Labor
e( ) Fertilizer
f( ) Pesticide
g( ) Other (specific) …….

Q14: What can you say about you profits from farming for the last five years?

a( ) Have been increasing for the last five years?
b( ) Have remained the same for the last five years?
c( ) Have continuously declined for the last five years?
d( ) Other (specify) …….

Q15: What did you to fore come some depletion?

Q16: What are willing to do against the depletion of the ground water table?

Q17: How will your irrigation water use change if diesel becomes more expensive?

a ( ) no change as long as farming is profitable

b( ) No change, but will raise the price of my crops
c( ) Change irriation methods to pump less water and thus save diesel.
d( ) Other (specify) ……..
e ( ) Don't know what to do

Q18: As you know groundwater level in the area is declining, what would be your reaction if the government took certain actions to limit water pumping for irrigation?

Govermental action	**Farmer reaction**
Charge for water	
Measure and limit the flow from well	
Raise the price of diesel	

Q19: As you may now the groundwater levels in the area have been declining since the 1980's. Who do you think is responsible for the declining?

a( ) NWSA
b( ) All well owners
c ( ) Neighboring well owners
c( ) Low rainfall
d( )Other (specify) ……

Q20: Who do you think owns the groundwater?

a( ) Owner of over laying land
b( ) The government
c( ) Only district residence
d( ) The total community
e( ) Other (specify) ……..

Q21: Do you think that you are careful (conservative) towards water use? Yes/ No

Q22: Has any official checked your well in the last five years? Yes/ No
If answer is yes, fill in the following table:

Official	Checked what	How often

Surveys output

- Cropping pattern
- Crop budget
- Farm budgets
- Water use
    - Estimated water use
    - Cost of water use farmers
- Return of water use
    - For each crops, an estimate of the financial return

Appendix 3: Images of the Harbeer fields

Figure 1: Harbeer 1: Qat farmers with Mr. Badri in front of the harbeer 1 pump.

Figure 2:Harbeer 1: Bullet holes in the diesel tank of the water pump Harbeer 1, which has been shot at

Figure 3: A qat farmer who is working on his land

Figure 4: Irrigation of the qat fields

Figure 5: The Harbeer 3 pump

Figure 6: The Harbeer 6 pump

How farmers make their private wells

Figure 7: At 30 meter dept someone is digging sand with his hands

Figure 8: The bucket with sand is going up

Figure 9: They are finished with pulling up the bucket

Figure 10: One full bucket is up, an empty bucket is going down.

Appendix 4: Irrigation methods

There are several irrigation methods; in this chapter the different irrigation methods are described. The benefits and disadvantage of each irrigation method will be investigated by doing a literature investigation. In the conclusion there will be looked which irrigation method is possible to implement in Yemen, so the water can be used more effective.

In the following paragraphs, the different irrigation methods will be described.

Irrigation methods

Flooding irrigation

Flooding irrigation is putting a land under a layer of water. By doing this all the crops will receive water. A major disadvantage of this method is that a lot of water evaporates without being used for the irrigation. Flooding irrigation is used mostly in the current situation.

Channel irrigation

The water is divided over the land by channels. By using this irrigation method, less water evaporates compared to flooding irrigation. The channel irrigation and flooding irrigation are used at the moment. Channel irrigation is currently promoted by the Yemini government to be used instead of flooding irrigation, because it uses less water compared to flooding irrigation to irrigate the same field.

Drip irrigation

Drip irrigation is an irrigation method where the crops will receive drips of water. By using this method only the crop will get water and a minimum of water will be spilled.

A drip irrigation system can be made easily with drip lines and a filter system for the water intake. So the drip lines don't get blocked of dirt. A test of this dripping system revealed water savings of 40-60 percents saving compared to flooding irrigation and an increase of the yield of the field (Polak, Nanes & Adhikari, 1997; Ayars, Phene, Hutmacher, Davis, Schoneman, Vail & Mead, 1998).

It is also possible to have a low cost drip irrigation system, farmers who are very poor can optimal divide the water and reduce the capital cost of the system further by using only one drip line and moving it more frequently.

Conclusion

A change on the irrigation system is possible, but there needs to be done a lot to change the irrigation method. It needs to be communicated that there are more efficient irrigation methods which can increase the yield of the field and reduce the groundwater depletion.

The main problem in Yemen is how to implement another irrigation method like drip irrigation. The people need to be aware of the benefits of drip irrigation and need to be able to buy a drip irrigation system.

Aside from those problems, the Yemeni government does not want to promote a new way of farming to qat farmers because the government is against qat use and doesn't want to involve them into any agricultural program while most of the water is used for qat producing.

The government could start a promotion campaign in the rural area for all farmers to reduce their use of water. So the declining of the groundwater will go slower and it takes a longer time till the water resources are exhausted.