

## Management of Groundwater by Local Organizations<sup>1</sup>

### Background

The overuse of groundwater in Yemen is a national security issue. Groundwater exploitation increased rapidly over the last four decades. It has boosted high value farming and created rural jobs, yet there are grave concerns whether agriculture is not bound for a potentially destabilizing setback. According to Al-Eryani et al (2011) groundwater-irrigated agriculture increased from 37,000 ha in 1970 to 400,000 ha in 2005. Where water balances have been estimated the deficit is huge: for Sana'a Basin abstraction of groundwater is estimated to be five times the amount of recharge for instance. The General Authority for Rural Water Supply Projects reports that it is becoming increasingly difficult to drill successful wells for the national rural water supply program: the number of failed drillings stands at more than 40%. Falling water tables are reported from each Governorate. The intense use of groundwater triggered among others the creation of a National Water Resources Authority and the enactment of the Water Law. The Law is a major break with the past in that it marked the beginning of the idea that groundwater is no longer for everybody to take, among others by requiring the licensing of wells.

### Research results

The responses to falling water tables have not been limited to government institutions only. In a substantial number of communities local informal rules have been developed among water users to regulate the use of groundwater. An inventory under the CoCooN-GP program based on discussion and desk survey yielded a long list of cases of local groundwater management, as given in table 1. This assessment is focused on the highland areas. It is assumed that there many more examples in Yemen, also in some of the lowland areas. It appears that since 2000 two new trends have emerged. First is that where earlier local conflicts on groundwater development were exceptional, they became more common. Second - either triggered by conflict or increased awareness - in many areas farmers have made local rules and regulations.



### Example 1: Wadi Sana'ah, Dhamar

Wadi Sana'ah is located 15 km west of Dhamar city. The catchment area of the wadi consists a part of Ga'a Jahran plateau. A number of old dams existed in the area, and remains of some of them are still in place. Wadi Sana'ah is characterized by fertile soil and good availability of groundwater. A variety of crops can be grown in the plateau but not qat: frost formation prevents this. Wells density in the plateau is comparatively low, with only 12 wells at distances varying between 500 to 1000 m. The depth of wells varies between 25 – 220 m, with most of wells having a depth between 70-120 m. The farmers respect a minimum distance of 500 meter between the wells rule, which is also the norm adopted by the NWRA branch in Dhamar for resolving disputes between farmers.

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Wadi Sana'ah contains many springs, though several springs disappeared after the earthquake that hit Dhamar area in 1982. The location of springs is identified by the light blue color of soil (called sa'a), indicating that it was frequently logged by water. To protect the springs, the farmers do not allow the drilling of tube wells in the wadi. Only, shallow dug wells (at a depth of 2-4 meter) are permitted in the neighbourhood of the springs.

Table 1: Cases of local groundwater management in Yemen

Place	Type of local rule
1 Hejraht al-Asham, Jabal al-Sharq- Dhamar	Restrict well drilling
2 Wadi Khalaka, Sana'a	Restrict well drilling, ban on tankers, well depth
3 Khrabat Muhyab, Bani Matar, Sana'a	Restrict well drilling, well spacing
4 Qarwa Beshar, Jahanah, Khawlan, Sana'a	Restrict well drilling
5 Hijrat al-Muntasir, Amran	Ban on new drilling
6 Wadi al Qarada, Bani Hushaish, Sana'a	Restrict well drilling, recharge weirs in wadi bed, well sharing
7 Wadi Akarem, Dhamar	Restrict deep drilling in the main wadi
8 Bani Garban, al-Kafr District, Ibb	Protection zone
9 Al-Gawaref, Ibb	Ban on <i>qat</i> irrigation
10 Wa'alah, Amran	Ban on water transport by tankers
11 Bait Sarhan and Alhammaly, Amran	Ban on water transport by tankers
12 Al Ma'akhad, Amran	Ban on water transport by tankers
13 Qa'a Al-Shams, Amran	Ban on water transport by tankers
14 Bani Maymoun, Amran	Tankers only within village
15 Wadi Dhela, Hamdan, Sana'a	Well spacing, well sharing, dam development
16 Wadi Al Zabaira in Qadas, Al Mawasit District, Taiz	Restrict/ban well drilling, closing disputed wells
17 Al Aroosi, Mehan, Sana'a	Closure disputed wells, agreement on reservoir operation
18 Al Mashra, Damar	Ban on drilling
19 Wadi Al-Har, Anss, Dhamar	New agricultural wells only if they serve drinking water too
20 <u>Mawia, Taiz</u>	Joint WUA to regulate new well development, replacement of <i>qat</i> in some area
21 Al-sinah, Almaafer, Taiz	Well distance, blocking out well development in sensitive areas, permission by NWRA only with consent of the cooperative
22 Wadi Sana'ah, Dhamar	Spring protection – zoning; distance rule
23 Hejrat al-a'asham, Jabal Al-sharq, Dhamar	Protection zone
24 Al-Wahda, Al-Maafir, Taiz	Ban on new wells, non-well owners to share in existing wells
25 Zubera, Wadi Siham, Hodeidah	Preventing new shallow development by referring cases to Local Council and NWRA
26 Ghayman, Sanhal District, Sana'a Governate	Replacement of <i>qat</i> by cactus fruits

Sources: Multiple (including field work), quoted in: van Steenberg, Bamaga, Al-Weshali (2011)

## Example 2: Khrabat Muhyab, Bani Matar, Sana'a

The main water source of the Khrabat Muhyab area is the run-off from Jebel Mountains. The run-off feeds springs and the aquifers. Over the years farmers have moved to groundwater irrigation, typically pumping water from 150 to 180 meter deep. The wells – if only because of their cost – are shared by many families. A typical well may have seventeen shares and ownership is between 25-30 families.

Following violent water conflict in a nearby area, farmers in Khrabat Muhyab decided to regulate the use of water in their area. They set up a Water Users Association – called 'Bled Agustan', that regulated the seven wells in Khrabat Muhyab village. Minimum rules were set on the distance between wells that irrigate 53 ha under fruits and staple crops (not qat). Wells were to be at least 500 meters apart – but dependent on the location the distance can be even larger. The minimum distance to a spring for instance is 2000 meter.



Whereas the WUA initially covered seven wells in two villages its usefulness was recognized and the area of work was expanded to covers the area of 58 wells in eight villages. The membership went up from 80 members to several hundred. The development of new wells in the area is not allowed unless a clear need for a new well (rather than getting water from an existing well) is proven and the minimum distance is observed.

## Conclusions

There are several observations to be made from these cases of local groundwater management:

- Groundwater is quite often collective. Wells in many cases are shared between a large number of shareholders – not the property of a single person. In some cases wells are connected by a shared pipeline.
- There is a high level of local management in several cases, often introduced rather recently. The local rules consist of very visible measures such as well spacing, closure of disputed wells, zoning and bans on sales to water tankers. There is often considerable local effort to improve groundwater recharge. It is easy to observe for everybody whether rules are applied or not and no special organizations is required to enforce the rules.
- The Water Law and the licensing procedures are important, but not necessarily in a direct way. The Water Law is generally taken serious and has set a signal that once cannot just develop a well and that restrictions should apply. This has given strength to local groundwater management.

The local rules and regulations concerns a broad range of measures. Their impact can be high and they are an important component in managing local water resources. It is in fact hard to see how groundwater use in Yemen can be regulated without it being built on a foundation of local acceptance and initiative.

## Recommendations

There is a need, however, to go beyond these principles and to strengthen local groundwater management at scale. Some possible steps and adjustment would go a long way:

- Promote local groundwater management on the basis of good practices – preferably from farmer to farmer and from community to community mode.
- Make sure the basic information is available for farmers to understand local hydrogeology and groundwater availability. Over the years a large number of groundwater studies have been undertaken and these need to be explained and shared by those most concerned, i.e. the farmers.
- Strengthen linkages between water users and Local Councils and the Branch Offices of NWRA. This has happened for instance in Sana’a and Taiz – with good results –, but should be systematically promoted.
- Strengthening local ground water management is important. At the same time there are many opportunities to improve the water productivity, so reducing water consumption does not have to lead to lower yields. There is a need to streamline groundwater management and improved agriculture in different water-related programs – the drinking water programs,, irrigation efficiency and watershed programs. Under all these investments Water User Groups, Water User Associations or Water Committees are formed – creating the basis for discussing local management.

The new proposed bylaw of the Water Law provides openings. It for instance describes the advisory functions of the WUAs to NWRA and provides for WUAs – provided they represent two-thirds of the water users – to make mandatory rules. Other clauses make the 500 meter distance rule and spring protection zones compulsory. There is however also still a degree of ambiguity in this new legislation on who is doing what and some clauses appear one-way: one clause describes a main function of the WUA as ‘to assist NWRA in implementing water rules through dealing with a single community based organization’. This does not do justice to the considerable self-organizing power of local communities and the large responsibility they have for their own sustainable future.

## References

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