

Wadi Zabid: the Case for Managing Water in a Basin¹

Background

Wadi Zabid is supplied by base flow and spate flows from the Wadi Zabid catchment. There have been drastic changes in the flow patterns over the last thirty years that need to be taken into account and require a rethinking of water management in this basin.

Of the 109 Mcm/year that is available on average (with wide fluctuations) in Wadi Zabid, about 70% is baseflow and around 30% is flood flow. There are indications that more water is intercepted in the upper catchment because of the development of small dams. A study under the Irrigation Improvement Project calculated that water capture in the upper catchment area has increased so that the percentage of rainfall that forms runoff (baseflow plus flood flow) has declined from around 7% to around 5%. This may have reduced the inflow into the Wadi Zabid system in the Tihama lowlands with as much as 30%.



There is another major change in the area. In 1979 the modernisation of the spate irrigation system was completed. The traditional systems of earthen spurs was replaced by five diversion structures and 123 km of canal distribution network serving a net area of about 15,200 ha. These new permanent structures made it much easier to control flood water in the upstream area. Whereas previously the earthen structures would break and would release water to the downstream areas, this is no longer the case: less flood water reaches the

lower parts of the river and there is less direct irrigation and less recharge of groundwater taking place in these areas.

The diversion weirs had another major effect: they blocked the subsurface flow: this is the water that is flowing below the surface in the river beds. As is clear from the above 70% of the water is perennial water. The diversion structures have blocked these subsurface flows. The results has been that the groundwater wells upstream of the weirs now have ample water – but downstream well are running dry, also because the spate flows don't reach the downstream areas anymore.

Another major change has been the enormous development of groundwater-based irrigation in Wadi Zabid: it is estimated that against the 15 to 16,000 hectares irrigated from spate irrigation, there is 50,000 hectares under groundwater irrigation.

¹ Contribution to the development of the Irrigation Sector Policy. Prepared by Adel Al-Weshaly, Wahib Al-Qubata, Abdullah Ibrahim and Frank van Steenberg. Information collected under the NWO CoCoon GP Project.

Research findings

The distribution of water over the upper, middle and lower section of the wadi is ruled by customary rights. The rules are based on time slots supposedly formulated by the religious scholar Al Jabarty more than six hundred years ago, although there is no actual historical record. The area is distributed into three groups (upstream; middle stream and downstream) and each group is entitled to water in a certain part of the year. During the modernisation of the system in the 1970's-1980's an effort was made to reconsider these rules – but this effort failed.

Group 1: Upstream

Weir 1 and Weir 2 receive all base and spate flow from Oct 19 to Aug 2 (288 days) with a mean water allocation of 79.93 Mcm for gross application of 1.85m, whereby water is allocated for a specified number of days to each canal, depending on the location of the intakes and is distributed according to the *Ala'ala Fala'ala* (upstream to downstream) rule.

Group 2: Middle stream

Weir 1 and Weir 2 receive all base and spate flow from Oct 19 to Aug 2 (288 days) with a mean water allocation of 79.93 Mcm for gross application of 1.85m, whereby water is allocated for a specified number of days to each canal, depending on the location of the intakes and is distributed according to the *Ala'ala Fala'ala* (upstream to downstream) rule.

Group 3: Downstream

Weir 5 and four *uqum* shall receive all spate flow from Sep 14 to Oct 18 (35 days) with a mean water allocation of 16.55 Mcm for a gross application of 0.96m, whereby 50% of the low flood is allocated to the upstream two intakes and the surplus is divided equally between the next lower two canals and when the floods fill the upper three canals, the surplus flows to the lowest intake.

Drought in the downstream block

As most floods occur from July to September the upstream and middle stream area are clearly far better off. Because of the modernized weirs they can better control the water. The downstream (block 3) however is very much deprived as a result and well do not get recharged for many years – affecting even drinking water availability.

Moreover, while these rules are in place, there are deviations. These deviations are biased towards the water supply of upstream landowners as well, who are already better off. The main digressions are that substantial area of under banana cultivation in the upstream area receives flood water, yet these lands are outside the area defined as being entitled to spate flows. There is the practice of some upstream farmers taking 3-4 spates flows for their banana farms in disregard of the *Ala'ala Fala'ala* rule.

Related to this as well is the excessive sedimentation in Wadi Zabid tail ends, which no longer receive water supplies – but even in the Upper Wadi 23% of farmers received no surface supplies.

Desertification beyond the tail area: Al Mujelis

Because of the interception of water in the upper catchment and because of the modernized diversion structures the downstream area is drying up and wells are used for drinking water do not fill up again. Some banana fields are removed as there is no water to feed them.

The most dramatic change is at the area downstream of the last diversion structures. This area was not entitled to flood water from the Wadi Zabid but that for centuries received occasional run away floods if the traditional structures were washed out in high floods. Al Mujelis village at the Tihama coast for instance used to get such occasional floods from the Wadi Zabid and Wadi Rima until the 1980's. These occasional floods recharged the groundwater. At that time groundwater was less than half of a meter deep. All this changed in the 1980's. After the diversion structures in the upper reaches of the river were 'improved' – more water was controlled upstream and floods no longer reached the area. The villagers of Al Mujelis never having travelled to the upstream areas were unaware of all these changes and ascribed the changes to a prolonged absence of rains, The water tables dropped in Al Mujelis and the natural soil moisture was lost.



Al Mujelis farmers developed wells to provide additional irrigation to their date palm orchards - causing groundwater to drop even more. As there is very little money in date palms the orchards were abandoned. The top soil moreover had dried out as the groundwater table had drooped. This was the time that sand dunes started to fast take over the area. Al Mujelis has five months of very heavy winds in the year. With the protection of the date orchards gone and the topsoil considerably drier sand dunes developed and

engulfed the area, burying houses and date palms. In the 1990's IFAD funded a project to control the desertification – making five deep wells that were to irrigate some protective plantations. With the project over however no one paid for the pumping costs and the wells were converted in rural water supply points.

There used to be 5000 people in Al Mujelis – now there are 1500, the others have moved away to nearby towns, such as Hodeidah, as environmental refugees. Those that have stayed behind eke a very meagre living from the remaining date palms and by engaging in some coastal fishery.

Recommendation and conclusions

There is a time to manage the water in the Wadi Zabid basin. There are three activities that should be considered:

- The Water Law of 2002 has provisions for Basin Committees. It is urgently required to start this up. In Wadi Zabid there is already an Irrigation Council. This Council is mainly concerned with water disputes and maintenance of water in the command area from the five diversion weirs. It should be enlarged to also look at the upstream and downstream water rights
- The age old water rights from the times of Al Jabarty should be reconsidered. The situation has dramatically changed – even in the Tihama groundwater is the main source of water and a few distribution of spate water is required to optimize the recharge for the wells in the larger area for the very productive farming it sustains. The subsurface flows should not be blocked from the weirs.
- There is scope and need to introduce far more efficient water application measures throughout the area. This can increase yields and 'free' water for redistribution and recharge.

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