THE PLACE OF ANCIENT AGRICULTURAL PRACTICES AND
TECHNIQUES IN YEMEN TODAY:
PROBLEMS AND PERSPECTIVES
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The spirit of cooperation in Yemeni agricultural practices -
successful cases from the past,
and their applicability for the present

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1. Summary

This paper argues that in irrigation systems throughout Yemen, social systems of negotiation, arbitration, and mutual agreement must be in place for the physical systems to be effective. Two examples from the past are cited here where this principle produced noticeably effective results. These are the famous irrigation systems at Marib, the origins of which go back to the 3rd millennium BCE, and the systems in the Wadi Zabid which operated from at least the 9th century until the present. In the case of both Marib and the Wadi Zabid we are dealing with communities that are utterly dependent upon control and successful management of the scarce water resources for their livelihoods, and it is argued here that operation of the irrigation systems would not have been effective without considerable social cohesion, to allow for distribution of water and maintenance of the system. The principle still applies today, that a prerequisite for sustaining the physical systems is sustaining the social systems.

2. Social implications of water distribution in the ancient oasis of Marib

It is not necessary to repeat here the obvious about the massive infrastructure of the so-called great dam of Marib and the sluice gates, which has already been stated so many times before. Instead, I would like to draw attention to some implications that these physical constructions had for the farming communities. The dam is, of course, not a dam in the strict sense, designed to store water in an artificial lake. Rather, its purpose was to block the flood and direct it immediately into the two main branch canals taking off on either side of it. Functionally speaking, the term to refer to it therefore is a «diversion barrage».

Looking at the construction technique of this barrage, it can be suggested that it was, in fact, designed to break. From the sophistication of the stone work contained in the north and south sluices I argue that the original builders could have built a more substantial dam, if they had wanted to. But the problem with a substantial dam is that if there is an exceptionally large flood, the rampaging water can cause havoc to the entire system.

This is even more so since in the course of its operation, due to many metres of sediments having accumulated on the fields as a result of centuries of irrigation with sediment-rich flood water, the diversion barrage had to be raised again and again, its main purpose now being to retain the water at...
A height that would still allow it to be diverted onto the elevated fields under gravitational flow. But there is an inherent danger with a large volume of water being retained at an unnatural height, because it will seek a way to cut a path to a lower level.

It is not surprising, therefore, that erosion gullies cutting through the deep sediment accumulations of the ancient field systems were a known phenomenon at least in later Sabaean times. This is in spite of the fact that extremely sophisticated provisions were made for the overflow of excessive water in the form of spillways, indicating that they could not deal with the volume from what we might call a century flood. In this case it would be preferable that the centre part of the main barrage would give way, leaving all the delicate distribution network intact. A breach may have been desirable from time to time for a second reason, namely to allow for the sediment accumulated behind the barrage to be washed away. Re-building the breach would be critical, but it would be a fairly simple earth-moving operation, not one of complicated engineering. The epigraphic evidence underlines the fact that, at least during the later Sabaean period, the dam had to be re-built regularly.

From the beginning of the 4th century CE until the beginning of the 7th century CE when the final breaking of the dam occurred which is described in the Koran, inscriptions specifically mention five incidents of the dam breaking: in the beginning of the 4th century CE, in the beginning of the second half of the 4th century CE, in the year 449 CE, again in 450 CE, and around 544 CE. From differences in the cross-bedding of the sediments, so-called discordances, which can be observed in the sediments behind the remains of the dam, Brunner concluded that a sixth breach occurred towards the end of the 6th century.

I would like to draw your attention to the inscription CII 541, which reports the events connected to the year 544 CE. In actual fact, although it mentions the dam breaking, the first third of the inscription deals with general social and political issues. The text refers to disturbances amongst tribes in the kingdom which forced the king to send a military contingent to settle them. Yet, as soon as the news spread that the dam in Marib was broken, the inscription simply states that the king sent - literally - not an order, but a simple request, to the tribes to participate in the repair work. The numerous activities involved and the enormous supplies that were spent are then listed in detail. But no mention is made of the army going out to conscript the people in a forceful way, and it is pretty obvious that the tribesmen must have realized that their own livelihoods depended entirely on the repair works: repairing the breach would be critical to the next growing season. This was, no doubt, a major reason for their willing participation and shared responsibility.

The communal cooperation is even more obvious when we look at the operation of the water distribution network. Distribution of the water to the individual fields was accomplished by way of branch canals and a network of smaller feeder channels. Because of the extremely limited duration of the spate, the trapping, diversion, and distribution of the flood water had to be completed as quickly and as efficiently as possible, so that the biggest possible extent of the cultivatable area could be irrigated. Sub-areas of the oasis, consisting of a number of individual fields, were thus irrigated as one unit respectively, by operating a distribution device along the canal branches. This presupposes a consensus on how this happened and that the individual farmers stuck to this agreement.

It may seem trivial to ask, who opened what sluice gate and when, why did nobody cheat and take more than they were entitled to. All too easily an individual could have come in the middle of the night and manipulated the field walls surrounding his property in order to receive an additional quantity of water. But individual disregard of the irrigation schedule would have had drastic consequences for the entire community: disruption causing reduced efficiency; overall loss of irrigated farmland; and fighting about it, resulting in breakdown of the entire system.

The farmers must have understood the danger of this principle, that in the end the benefit of any short-sighted individual advantage would be outweighed by the disadvantage caused to the community. Communal responsibility and cooperation form, in fact, the fundamental secret why the
system could remain effective for so long. Without them, there would simply be a remarkably impressive engineering scheme, but as useless as some of the grandiose development schemes that the modern world has observed. Marib would not have worked the way it did for so many centuries without the cooperation of its users. And the system was far too complex to work on the basis of force superimposed by the state.

When I published my dissertation dealing with the practical aspects of irrigation farming in the ancient oasis of Marib, as volume V of the German Archaeological Institute reports, I did not hold this position. I relied more on a model which envisaged strong state control in the ordering, maintenance, and operation of the system. I have modified my position since then and placed greater emphasis on the need for a community's willing participation because of my subsequent involvement in the Canadian Archaeological Mission's Zabid programme, which takes us into the Islamic period.

In the case of Zabid, due to the existence of numerous texts and the greater breadth of Islamic historiography, it is much easier to extract nuances about social interaction from the written sources and match them with the reality of the physical systems. By comparison for the Sabaeans period, only few epigraphers take the information contained in the inscriptions one step further, into detailed social history.

3. Water allocation rights in the medieval Wadi Zabid

For the Wadi Zabid one can find plenty of citations that refer directly to or imply the role of negotiation in matters of water distribution. I wish to present therefore an overview of the critical points for what we know about the possible beginnings of this practice.

The town of Zabid was founded in 820 CE. The earliest physical evidence for engineered irrigation systems in the Wadi Zabid stems from the 11th to 12th centuries. One may, however, assume that in order for the city to be fed, the Wadi Zabid was already being controlled for irrigated agriculture to a certain degree at least from the 9th century onwards.

Until recently, the earliest reference to the allocation rights of the water was connected to the name of Shaykh Isma'il al-Jabarti who, according to verbal traditional, is given credit for codifying the law before 1473, the year of his death. Serjeant already raised the possibility that al-Jabarti was only arbitrating, using the law, rather than formulating it.

In a recent MA thesis by Salameh, a new manuscript on the subject has been brought to light which gives us the priceless information that the unique Wadi Zabid water law was codified in response to violent disputes among the farmers of the Wadi Zabid over the water towards the end of the 14th century. These disputes happened under the term in office of Qadi Muwaffaq al-Din 'Ali ibn Abi Bakr al-Nashiri, who held the position of the qadi of Zabid from 1391 to at least 1400, that is under the reign of the seventh Rasulid sultan al-Malik al-Ashraf Isma'il bin al-'Abbas (1377-1400). The new water law replaced the allocation of spate water according to the Sharia principle of upstream priority. Instead, the new law followed the principles of customary law (urf) and allocated the water by prescribed calendar dates.

In other words, the 17 canals irrigating the fields in the Wadi Zabid are classified in 3 groups. Group I, consisting of 6 individual canals and irrigating the upper field systems, has the right to use the water between October 19th and August 2nd. The 7 canals of Group II which irrigate the middle field systems receive the water from August 3rd to September 13th, and the 4 canals of Group III have the allocation rights to the low lying field systems between September 14th and October 18th. Apparently it was felt that in this way, with the relative unpredictability of the floods, the risks as well as the bounty was spread equitably right across the system.

This was, however, not the end of the disputes among the farmers of the Wadi Zabid about allocation
of the flood water. The premiss that the system functioned smoothly from then on is false. While one might conclude that the legal disputes that are documented and the constant need for arbitration are evidence for the fact that there was no community consensus, I take it that the very fact that these cases were debated reflects in essence what we would call a democratic way of managing individual and communal rights. It reflects an established legal and socially accepted practice. The face of anarchy would look totally differently. In addition, this allocation right has been effective more or less unchanged until the present. Like the ancient oasis in Marib, the Wadi Zabid is a man-made landscape which bears the marked imprint of many centuries of successful irrigation farming.

These thoughts have been reinforced by my own involvement in studies conducted for international development agencies in Yemen.

4. Present developments

Yemen’s cultivatable lands and rural population have been dependent for generations on scarce and unreliable rainfall. As a result, Yemeni farmers have developed great skills in water harvesting, storage, and spate irrigation that I described before. Hand in hand with this went an excellent understanding of the ecological imperative of soil and water management for sustainable basic food production needs.

The rural communities are spread throughout the thousands of minor catchments linked to the major wadi systems throughout the country. Thus tens of thousands of local communities, in qary'a's (villages), mamza's (groups of villages under the non-formal authority of 'aqil's), and 'zel'a's (clusters of mamz'a linked within tribal networks, usually represented by a shaykh), have an immediate impact upon the greater wadi systems which tend to be what people focus upon in their studies of Yemen's irrigation systems.

Therefore throughout both the major arteries, as well as the branch areas there existed a network of group management and shared task allocations between men and women farmers, their village communities, and the tribal networks, all welded together in a shared ‘association of interests’ known as ta'awun - the local necessity for ‘a spirit of cooperation’. It was this non-formal, shared responsibility which formed the basis for the success of sustainable resource management in Yemen.

Many of the problems which are visible throughout the country today are related to a major ecological collapse. Beginning in the early 1970’s, extensive deforestation, abandonment and subsequent collapse of terracing systems, and overgrazing have increased surface run-off and triggered massive soil erosion. A general neglect of flood diversion structures in the wadis and the increasing over-extraction of ground water resources added to the problem. Sustainable natural resource management which was traditionally driven by practical community-based initiatives, had been abandoned, which happened as a consequence of various causes.

In the former north Yemen, a major reason was the exodus of large segments of the male population, especially to Saudi-Arabia and the Gulf, which left whole villages without work force. In many villages, the remaining communities consisted of women, children and the elderly. Natural resource management is men’s work, and their absence meant that the traditional rural networks responsible for the practical initiatives collapsed and that significant maintenance operations did not get done. In the past, the village women contributed to this work through their own activities, such as the important task of culling fire wood in a way that regular re-growth of the trees is guaranteed. Today, two factors play against this. The first is that due to increasing population growth more and more fire wood needs to be collected, forcing the women to go further and further afield into the marginal areas of their neighbourhoods, and being more ruthless in their practices. The second factor is increasing road building activity and access for four-wheel drive vehicles which allow greater volumes of wood to be cut for commercial use. In both cases basic economic pressure forced the community to ignore traditional safe-guards for the protection of their sustainable resources, and
develop more selfish measures instead.

In addition, the remittances from the men working abroad meant that the resident communities were no longer completely dependent upon their own productivity for survival which, in turn, enforced the tendency of making maintenance of the existing land-use systems less essential. For many years, returns had invested capital in cash generating schemes, such as installing pumps or generators. This was exacerbated in the 1990 Gulf War crisis when the need to reap a quick return on investment was perceived. Short-sighted individual activities such as well-drilling were multiplied, which contributed to the dramatic over-exploitation of the water resources.

In order to address and tackle the pressures of these inter-related ecological and agricultural problems of the present, a way must be found to revive the spirit of communal responsibility and cooperation. This was the starting point of a consultancy field mission in which I participated for the German Agency for Technical Cooperation (GTZ) in 1996 in the Ibb and Ta'izz Governorates. The amazing result was that there actually is a new movement of cooperation visible in Yemen's agricultural communities, which may be partly due to the farmers realizing that for the majority of them the individualistic approach has proven unsuccessful. What these new associations of interest need is encouragement, training in some practical and administrative skills, and attending professional advice, where needed.

I have therefore great confidence that if a productive relationship with funding donors could be established, then the crisis of ecological degradation could be reversed, and we would have an opportunity to modernize rural society around natural resource renewal.