A network of traditional knowledge: the intangible heritage of water distribution in Bahrain

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ABSTRACT

Traditional knowledge of the system of water distribution to farmlands sharing the same scarce fresh water resources has created relationships which are based on justice and equal rights among members of the farming communities of Bahrain. Over the centuries, the need to manage water irrigation led to the development of customary codes which regulated schedules of irrigation, the division of water resources and their equitable distribution. This framework was informed by both pre-Islamic customary oral traditions and Islamic ethics, and was transmitted from generation to generation. The inherited intangible heritage of irrigation law is complex and remained in use until the 1960s.

In more recent times, individual farmers using water pumps and networks of pipelines of government treated sewage effluent (TSE) were not motivated to maintain traditional water management customs and have consequently stopped attending communal gatherings and disregarded the customary laws which regulated notions of fairness among them for centuries. The resulting uncontrolled usage of the underground aquifers by those digging their own wells has in many areas, led to over-exploitation of water resources and to the increased salinisation of the underground water reservoirs. At present, initiatives are being set up to raise awareness of the importance of the customary irrigation laws in ensuring the fair distribution and sustainability of a rare resource on the island. Fortunately, a number of Bahraini farmers continue to follow the traditional codes and have become valuable knowledge bearers who are encouraged to share their wisdom and skills with their colleagues.

In this article, the authors document aspects of the sophisticated intangible heritage of customary water irrigation law in Bahrain, covering its features, key players, and the cross-generational transmission as part of an oral knowledge system, which in parts survived and in other parts ceased to exist. They further highlight how this ancient knowledge can become a basis for sustainable water resource management in Bahrain, as well as playing a role in disseminating notions of fairness, equity and consent, public deliberation and conflict resolution in a local context.

Keywords

Bahrain, customary irrigation law, ethics, knowledge bearers, cross-generational transmission, sustainable water management, *majlis,* conflict resolution.

The traditional irrigation system of Bahrain

For several millennia the Isles of Bahrain were known for their natural fresh-water springs (Al-Jamri; 2009a, p. 7). Bahrain is assumed to have had over thirty of these natural springs (Al-Jamri; 2012a) which were the key factors in supporting agrarian communities on the island. Most of the springs surface as small fountains caused by subterranean water pressure in the multi-layered underground aquifers. This pressure, as well as the flow of water at ground level, is said to be influenced by the lunar cycle, and the gently sloping land surface assists in distributing the spring water for farm irrigation before surplus water runs off into the sea (al-Shabani; 2013).

To irrigate the agricultural lands, Bahraini farmers constructed a sophisticated network of channels of different sizes and depths to assist the regular distribution and continuous flow of water. Each spring is first channelled into a grand irrigation channel called an *al-sāqiyah al-kabīra,* which can be very deep and at times several metres wide. [Plate1] Some of these main irrigation streams have been referred to as rivers (*nahar*) (Al-Jamri; 2009), because they extend over several kilometres. Another network of slightly smaller channels, secondary irrigation channels called *al-sāqiyah al-saghīrah*, distributes the water to the farm complexes. Once there, the water is diverted into tertiary channels, or ditches, the most common irrigation channels, which are called *sāb*. This categorisation into levels is significant in customary irrigation law as each level permits different types of public or private access.

While the two initial categories are predominantly considered to be public irrigation channels, the tertiary system is private and lies within a specific farm complex. To prevent trespassing into private waterways, farmers designated a tertiary channel with a specific name indicating its private character. For instance, they would use *nahrah* (pl. *anhār*) for privately owned irrigation channels and *shammah* (pl. *shammāt*) for the tiny branches diverting from these, which include the terminal ends of the irrigation system (Haji-Ahmad; Feb. 2013, please refer to the biographical note at the end of this paper). Irrigation takes place according to a carefully established schedule which is identified and regulated by the customary irrigation law discussed below, and is effected by simply opening or closing the side channels to divert water from a main irrigation channel to a private network or sub-network, either mechanically or – more often – by placing old textiles in the channel to stop the flow of water (Haji-Abu-Husain; Dec. 2013, please refer to the biographical note at the end of this paper). [Plate 2]



Plate 1
A farmer shows water flowing into the general reservoir from which distribution begins. Photo: Think Heritage! 2014.



Plate 2
A farm worker redirects the flow of water by closing off a channel with old rags. Photo: Think Heritage! 2014.

Customary irrigation schedules

The inherited custom of irrigation law is complex and remained the only system in use until the 1960s. It is based on two methods for calculating the shares of each farm (*waḍh*). One system related to the five Muslim *adhān* (calls for prayer). In this system the 24 hours of the day were divided into three time segments: from the *Sabāh* (morning) *adhān* to the *Dhuhir* (noon) *adhān*, from the *Dhuhir* (noon) *adhān* to the *Maghrib* (sunset) *adhān*, and from the *'Isha* (night) *adhān* to the morning *adhān*. Farms were divided into groups and the farmers would meet in public to discuss the irrigation schedule. This would relate to which farms were close together. Farms on the same grand irrigation channel of the water spring (*al-sāqiyah al-kabīra*) or farms on the same secondary irrigation channel (*al-sāqiyah al-saghīrah*) would be assigned one of the three *adhān* periods (Haji-Abu-Husain; 2013). The time slot allocated to each group was never permanent but would alternate over time. At regular predetermined intervals, the community would reallocate the irrigation schedule. Sundial sticks – although no longer in use - are a physical reminder of these traditions; they were often placed in public places outside the farm territories near the *al-midwar* or *al-'iskār* (the points where the smaller water channels branched off the main channel) so that each farmer of that group could follow the shadow cast onto a surface and calculate the time. All the farmers would agree to use the same reference points to determine when their times started and ended. During the night, however, a village *falakī* (amateur astronomer) would have taught the farmers how to tell the time by the stars. As the demand for irrigation peaks during the time of *al-sarqah* (the dry period, from the time the palm trees begin to fruit to the time the fruit is fully ripe) frequent regular meetings were held in the farming community to ensure that the irrigation schedules were fair for all members of the group.

Judicial sources for customary irrigation

Irrigation channels to distribute the water from natural springs and surface wells were the physical infra-structure for the irrigation of productive farmlands. The administration of the distribution was regulated by complex customary codes which constitute a traditional knowledge system. The authors define such a system following Parotta and Trosper as:

... a complex relationship of historical trends and contemporary practices which create a system applying traditional environment-related knowledge for the maintenance of cultural values and combine traditional and formal scientific understanding with respect to natural resource management (Parotta and Trosper; 2012, p.4).

It is important to point out that knowledge systems in this context are not limited to aspects of environmental and resource management, but also include models for conflict resolution and strengthen social relationships within the community.

In Bahrain, groups or small clusters of farms of different sizes and shapes share water from a single source; this has to be distributed fairly according to the size of the individual farms and the specific water requirements of particular crops. The desire for equal, but crop-specific distribution led to the development of customary codes which regulated the schedules of irrigation and the equitable division and distribution of water. This framework was informed by both Islamic and pre-Islamic customary oral tradition handed down from the pre-oil generations of Bahrain (Al-Jamri; 2009, p.7). The customary codes also included a scheme for the resolution of local disputes which is still recognised today.

In a variety of different contexts all over the Arab world, Islamic jurisdiction has retained pre-Islamic customary laws where these did not contradict Islamic principles or challenge Islamic ethics (Shah; 2009, p.51: Abu-Zahra; 2002, pp. 42 and 353). Already during the early years of the establishment of a Muslim society, the Quranic verse: *O Prophet: pursue forgiveness, command what is known* (good, customary) *and turn away from the ignorant* (Qur'an, Surat al-'A'rāf [7]; p.199) was considered explicit recognition of the wisdom of pre-Islamic customs if these promoted the concepts of justice and good practice. Accordingly, ancient customs and heritage are an acknowledged source of *sharī'ah* (Islamic law) in at least two different schools of law, the *fiqh al-Ḥanafī* (*Ḥanafī* school of jurisprudence) and later in the *fiqh al-Mālikī* (*Mālikī* school of jurisprudence) (Shah; 2009, p.50: Fīghū; 1993). In line with this doctrine and as a result of a shortage of political administrators among the scholars of the young religion of Islam, the early Islamic state recruited administrators with pre-Islamic traditional knowledge and training (Al-Jawziyyah; 1907, p.27:

Al-Jābirī; 2009, p.68). Hence the pre-Islamic customary law familiar to the administrators became firmly interwoven with the newly established Islamic laws (Al-Jābirī; 2009, p.68), particularly for the administration of farming and agriculture. Bahrainis have therefore inherited oral traditions and knowledge from the ancient Dilmun, Phoenician, Babylonian, and Sumerian civilisations. These ancient knowledge systems merged with Islamic jurisprudence to create the knowledge system and customs used to manage water distribution among the farming communities of Bahrain that we are studying here. (Al-Jamri; 2009, p. 7).

The knowledge bearers of customary irrigation law

According to the definition of the 2003 *Convention for the Safeguarding of Intangible Cultural Heritage*, intangible heritage encompasses *knowledge and practices concerning nature and the universe* as part of what communities and groups recognise as their intangible cultural heritage (UNESCO; 2003, Article 2 (d)).

Such knowledge and practices are carried and transmitted by individuals who often actively collected this knowledge and who have learned to cherish it as a precious resource (Gurvitch; 1971, p.21). The authors agree with Taylor et al. who, in their reflection on the power of knowledge, emphasised the importance of the communal structure in which the individual knowledge bearers interact. Hence the production of intangible cultural heritage knowledge systems is *…a communicative activity rarely created in isolation* (Taylor et al.; 2005, p.155) and it is the agreement of a plurality of voices on shared codes and standards which is the key characteristic of traditional oral knowledge systems.

In Bahrain, farmers in some of the northern and western villages continue to practise such systems of traditional knowledge when administrating and observing pre-modern irrigation techniques. These customs contain a number of different roles and the level of knowledge of the various tradition bearers depends on the ability and educational background of the particular individuals, but also on their specific talents. In analysing this specific knowledge system, we can identify a number of levels of access to information and related sub-systems of depth of knowledge and involvement. These will briefly be introduced below as they provide a basis for the different groups and roles of knowledge bearers and knowledge transmitters discussed in later parts of this article.

Access to the knowledge system

The first level is made up of individuals who are informed about the general principles of customary irrigation law operating in the northern and western villages of Bahrain, but who would be unable to administer the system of water distribution. While this is certainly the level of least information it is at the same time the most widespread, and applies to the great majority of farmers today. The second level includes individuals who are knowledgeable about the local application of irrigation law as it applies to one specific cluster of farmers who share the same water well or irrigation channel network. This level of knowledge would allow the individual to assist in water distribution at this particular location but would not enable him to help with water distribution in another area where he is not a resident. Individuals, with the highest level of knowledge, combine not only theoretical knowledge or familiarity with the customary codes and principal rules of water distribution, but also know how they are applied in various specific local contexts. In the past, these individuals were key to designing the distribution systems – which were often established by several such knowledgeable individuals – and communicated the established model to those concerned with implementing it in each cluster of farms sharing a water resource. These coordinators were assisted by several other knowledge bearers who had knowledge and expertise in auxiliary fields. Such people were important in the past but are no longer needed today because modern technology allows us to measure time accurately. They included individuals well-versed in astronomy who were able to use stellar observation to divide night time watering periods into equal segments, those knowledgeable in reading sundials who were able to divide up the time during the day, and individuals able to identify the five daily prayer times and their changing rhythm.

Apart from the time-keepers, additional assistance was, and at times is still provided by individuals skilled in conflict resolution procedures related to water distribution, who are again divided into those steering closed group deliberations about water management, those negotiating between different clusters of farms and

other groups of interest, and those who, because of their skill or professional position, are capable of communicating with the state judicial system. However, all these different roles are strongly interrelated and interdependent (Gurvitch; 1971, pp. 45-70) and relate to, as well as determine, local customs and communities (Bandura; 2001, pp.121 and 137-138). Such customs define not only the villagers' notions of justice and space, but establish their patterns of communication, world views and cultural identities.

Communities and networks of knowledge

To fully understand the everyday reality of these systems one has to consider the interdependence of macro and micro levels; i.e. how the elements of the universe and the individual farmer contribute to the fertility and produce of a particular field. Explanatory models have been handed down in cross-generational transmission of the customs and their safeguarding by the communities concerned. In the past, the knowledge of water distribution customs was vital for farmers both economically and ethically, and at any point in time there had to be a sufficient number of knowledge bearers to ensure that the system survived. Despite that, the knowledge was not fully accessible to everybody, and a comprehensive knowledge of the system was restricted to those taught - and were allowed - to take the positions of administrator, mediator and judge. Parallel to the three groups with different levels of knowledge, one can distinguish three groups with different levels of access to the customary oral system. These groups can be divided into closed communities, communities of conditional access, and open groups (Gurvitch; 1971, p.60). Each of the three groups fulfills functions in the community of customary practice and is determined by boundaries, cross-boundary participation and the ability to communicate, social networks and the flow of knowledge (Snyder and Wenger; 2010, p.108: Bandura; 2001, pp.147-8). The specific group roles and functions are described in more detail below and draw on data collected in the northern farmlands of Bahrain.

Closed groups of farm owners

Farm owners or tenants, who share water from a single water source, form a closed group. This group traditionally met on a weekly or bi-monthly basis because water was scarce and it was vital to ensure its distribution was well managed. Haji-Abu-Hussain who has been farming in northern Bahrain since the 1950s, explained that farmers met frequently because most issues that required discussion, or even conflict resolution, occurred at regular intervals. Fewer meetings would have allowed problems to fester (Haji-Abu-Hussain; Dec 2013). During those ordinary - or in rare cases, extraordinary – meetings, the men would gather in one of the farms in a location not far from the shared water source. Few such closed groups still exist and meet these days.

Within these closed communities of customary practice, members are expected to have a thorough knowledge of their own customary irrigation laws. It means each farmer should be able to defend his rights if they are challenged by unfair water allocations. However, to focus only on self-interest while ignoring the interests of others is unacceptable in such a community, and could not only lead to individual conflicts, but could potentially disrupt the whole community because their knowledge system relies on ideas of justice and mutual interest. On further investigation, it seems that this kind of *majlis* (traditional gathering or place where gathering occurs) requires specific communication skills which are rooted in the logic of customary deliberations about water distribution. Haji-Ahmad explains:

Allah has instructed His beloved Prophet to 'shawirhum' (consult them) *to engage His companions in His decision making. For this we 'natashawar'* (consult each other) to *take water distribution related decisions and actions. After all, the individual well-being is part of the collective well-being and vice versa.* (Haji-Ahmad; Feb. 2013).

At such a level of moral reasoning, group approval of an extraordinary demand for additional water by a certain farmer might be seen as legitimate because it serves the broader good of the community. Every such request is usually deliberated by the community as a matter of community concern, and at times these debates may demonstrate remarkable competence and skill with reference to the customary irrigation law. In other words, being well aware of the customary rights is an essential pre-condition for presenting a request, or arguing for or against a request within the closed group. In such deliberations, moral codes and ethics are translated into actions through self-regulatory mechanisms, and at

times, self-sanctions are imposed as a result of the same process. So while the wealth of water could be a source of conflict, the customary irrigation law turns it into a source of co-operation and social cohesion. [Plate 3]

Groups of conditional access

The next generation

Transferring knowledge to successive generations requires them to be allowed access to important considerations and deliberations so that younger farmers will acquire a wealth of knowledge about precedents and learn to argue logically. Haji-Ahmad explained that farmers might bring along a younger brother or a son to attend meetings. Through this practice they gain experience in identifying problems, learn about the standard system of distribution, and understand how to respond to demands for extra water, as well as beginning to establish social relationships between successive generations of the small community in which they live reducing the risk of its dissolution in the future (Haji-Ahmad; 2013).

Advice of the astronomer

In the past, astronomy was essential to many aspects of Muslims' everyday life. All Islamic schools of jurisprudence considered that learning to calculate the movement of celestial bodies to determine the beginning of months was an obligatory science (Shah; 2009, p.74). They considered the presence of an astronomer, able to calculate and recognise celestial movements, was indispensable to every Muslim community in order to determine the prayer times, the direction of the *Qiblah* (the direction of prayer), and the beginning and end of the fasting month of Ramadhān (Shah; 2009, p.75).

The people of the Isles of Bahrain have an ancient and scientific connection with astronomy even beyond the requirements of Islam (Al-Shamlān; 1995, p.24). For hundreds of years the pearl fishers and sea traders needed to know about astronomy. Indeed, the first book that was printed in Bahrain on a modern printing press in 1923 was a sea navigation manual based on astronomy (Al-Binʿalī; 1923). However, astronomy in Bahrain was, and is not only disseminated for religious and navigational purposes, farmers also use astronomy to calculate the best days to plant seasonal vegetables and fruits (Al-Nāṣir and Ghiyāth; 2005) and the best times to water them. All the farmers interviewed for this project reported that they regularly sought the help of a village *falakī* (a local amateur astronomer) to find out which were the ideal days and times for their various annual farming activities (Haji-Ahmad; 2013). A village *falakī* would also have been invited to the closed farmers' meeting to assist in calculating times based on the movement of the stars to create a timetable for distributing water at night, and to identify the best reference points in decision making (Haji-Abu-Husain; 2013). It might seem surprising that in an era when every



Plate 3
A closed community meeting to discuss the division of an electricity bill. Photo: Think Heritage! 2014.

individual seems to carry a watch or a mobile phone, knowledge about specific aspects of astronomy is still transmitted to help farmers understand the length of the seasons and to determine timings for planting and harvesting crops.

External advisers

The customary laws of water irrigation sometimes affect planning decisions about the type of crops each farmer wants to grow. It is important to establish a balance of crops with different watering needs to prevent anyone requiring more water than is available from the existing source. Farmers divide crops into two categories: the regular and the exceptional. The exceptional crops need extra water for successful growth. According to Haji-Ahmad's assistant, planning to plant crops without consulting the farms of one's own group, as well as neighbouring water distribution clusters, was a recipe for disaster. He went on, explaining: *The heritage of water irrigation taught us collective planning. If everyone planted crops that require high levels of irrigation then all farms would not be able to irrigate enough and we would all lose* (Haji-Ahmad; 2013). If a farmer decided to plant a water-intensive crop without prior consultation and agreement, he would usually be punished by not being granted his request for additional water. If more than one cluster of farms uses a single source then all must meet to plan the crops ahead of the planting season. Haji-Ahmad also informed the authors that even they benefited from this practice in that without it, the lack of coordination would lead to an oversupply of certain crops on the market. Not only would this ruin the farmers financially, but it would also affect the consumer by limiting supplies and forcing them to buy expensive imported products.

In our meetings, we used to ask each other about what we were planning to grow, or I would say: 'I am planning to grow tomatoes' only to keep coordination in mind. Some low risk farmers grew little amounts of everything. Sometimes even groups of farmers in one village would inform other villages of what they were planning to grow (Haji-Ahmad; 2013).

To enable this type of cooperation, the closed meetings are often extended to include several clusters of farms in order to balance the selection of crops.

Arbitration and adjudication

Despite the high ethics and morals implicit in the traditional oral system, water distribution problems and conflicts are inescapable, especially when one member ventures into growing crops demanding extra irrigation without prior consultation. The closed community sometimes fails to arrive at a solution suitable to all the disputing parties. In such cases, the closed community would invite an arbitrator, usually from a neighbouring village or farm cluster. He would listen to all the parties and attempt to effect a compromise. If even the arbitrator's attempts at mediation failed, then the disputing parties would seek advice from the official state judicial system.

Haji-Ahmad pointed out that both the *fiqh al-Jaʿfarī* and *fiqh al-Mālikī* acknowledge that customs which do not conflict with the principles of Islam are valid under Islamic law, and that farmers are well aware of these principles. Based on this fact, a *Mālikī* or a *Jaʿfarī* judge – depending on which legal system (or systems) the particular farmers' community favours - can resolve farmers' disputes. To facilitate such arbitration or adjudication, however, the internal matters of the closed group need first to be shared and explained to the arbitrator or state judge.

Shaykh Ibrahim bin Hamad Al Khalifa pointed out that an elderly member of the ruling family, who used to work in the Bahraini judicial system as a *Mālikī* judge, had told him that even among the ruling family many members were very well-versed in the customs and codes of the customary irrigation system. The senior retired judge said:

... a judge must know how to calculate the day and the night irrigation portions. This entails knowing the sundial clock along with the astronomy of stars. We, as followers of fiqh al-Mālikī, have benefited from the views of the Mālikī Imam Shihāb al-Dīn Al-Qarrafi (cf. Jackson; 1996) *who in his book Anwār al-Burūq Fī anwāʿ al-furūq stresses the importance of knowing that customs are both different from one location to another and from one time to another* (cf. Al-Qarrāfī; 2001, p.229). *For this reason I, as a judge, kept a network of 'urufā'* (sing. ʿarīf) *a local concept wherein each farming community appoints a local arbitrator to act as their referee when they have a dispute so that he may inform me about their local standards.* (Al Khalifa; 2011)



Plate 4
An improvised garden *majlis* for meetings of the farming community. Photo: Think Heritage! 2014.



Plate 5
A public gathering on a farm to discuss irrigation matters. Photo: Jasim Kuwayyid, 2013.

Open groups

Public gatherings

It is customary that villagers from all walks of life meet at public gatherings called *majlis*.[i] [Plate 4] Each village has their *majālis* where people can exchange points of view and talk about matters of general interest. It is obvious that in villages that depend on farming for their livelihoods farming practices are a matter of general interest, and hence members of the closed community sometimes continue their debates in the wider public arena. However, they would not use the specific language of irrigation law but speak a more general language that their audience would understand. The discussion would therefore be instructive or informative for the other listeners. In such a setting, the customary guiding principles and ethics of water irrigation would have been disseminated with the aim of instilling the general values of social community interaction and fairness into the wider society. At the same time, the community members would come to understand that the farmers were men with high moral and ethical values which were not only applied in water distribution. The wisdom embodied in the customary laws of water irrigation can thus be applied at a more general level. Lately, the fashionable notion of sustainability has gained much prominence in the context of such discourses and has in fact revived some of the lost interest in customary irrigation law and ethics. [Plate 5]

Community integration in customary irrigation

The irrigation laws regulate not only the distribution of water but also access to the public irrigation channels via which the water is distributed. They grant the public the right to construct the infrastructure for water provision along public irrigation channels. The channels are used as supply sources for the community (*mawrid*), for sanitation (*hammam*, sanitary facilities and bathhouses), and people are allowed to build mosques on either side and construct steps leading into the channel for ritual ablutions. Farmers also use the public irrigation channels to wash cattle and other animals, especially donkeys.

The wide usage of the water irrigation structures contributes significantly to creating a sense of community, so it may not be surprising that the irrigation channels play a role in various festivities. For instance, marriages between villagers were traditionally closely related to the shared use of water resources; both bride and groom would conduct a purification ceremony in one of the irrigation baths as part of a rite of passage before marriage. It was customary to take lengthy baths in the public bath houses, which are known as the *al-sabbuha* or *al-ghassulah* for women and the *ghassaalah* for men (Al-Jamri; 2009a). Marriage ceremonies also entailed the *taqsimat al-ʿadhra* ritual, which consisted of throwing a handful of sweetened cooked rice into the water irrigation channel as an offering to the *jinn* (a supernatural being) thought to reside there (cf. Al-Jamri; 2012a). These forms

of public access to the water channels created a strong sense of collectiveness, as is demonstrated when farming communities join together to perform the so-called *faz'at al-kisāha.* This formal Arabic term describes a communal cleaning of the irrigation channels to remove sludge and fallen leaves.

The formalisation of the customary irrigation system

In the 1960s Bahrain expanded its state judicial system to enable it to give rulings in the disputes of farming communities. To this purpose it incorporated the first written version of customary irrigation law into modern civil law. In the year 1960 the *Irrigation Law for Palm Trees,* known as *qānūn miyāh al-nakhīl,* was published (Serjeant; 1993, pp. 471-72). In its preparatory stage, the Directorate of *Ja'farī* Awqāf (a Shia religious endowment) of the Kingdom of Bahrain collected precise details about customary practices from the farmers who still followed the customary laws transmitted from previous generations. In Karrānah village the al-'Uda water spring, also known as Umm al-Jinn, was one of the few springs in Bahrain which was connected to a lengthy irrigation channel. Because of the complex task of ensuring equal distribution from such an unusually lengthy and multi-branched irrigation system, the farming community of Karrānah was very well-versed in calculating the distribution for each farm's irrigation needs (Al-Jamri; 2012) and acted as a point of reference for the later state legislation. According to Mr Al-Jamri, these farmers, who were benefitting from the water well of Umm al-Jinn in Karrānah, were the key sources for the state law *qāūn miyāh al-nakhīl* (Al-Jamri; 2012).

Today, the official state law allows interested individuals easier access to the complex knowledge systems relating to water irrigation. Formerly, this knowledge was an exclusively oral tradition and was not written down anywhere. The law, for example, describes in detail the watering periods and how they are estimated, knowledge previously confined to the informed inner circles. It also confirms a somewhat preferential treatment for palm gardens as opposed to seasonal crops, and it affirms the right to both irrigate and drain through channels in a neighbouring plot without explicit permission from the owner. The law further stipulates that no adjustments can be made to irrigation channels without the consent of the local farming community and that the costs of maintenance and of repairs to the main channels have to be shared. Last but not least, clauses 15 and 23 are of particular interest; the first describes the then novel practice of using pumps to raise ground water; the second encourages sharing the water resources provided by these pumps according to the terms of customary irrigation law (Serjeant; 1993, p. 481).

While the formal state legislation has made several aspects of the customary law more accessible, the complete context of the different regulations cannot be understood solely on a legislative basis. This is why a few Bahraini farmers continue to pass down the knowledge of the moral codes and ethics of customary irrigation practice to ensure that customs, as well as the law, can still be enacted by future generations. While the *qāūn miyāh al-nakhīl* encourages such practices, modern irrigation techniques seem to be equally important when it comes to continuing to ensure the sustainable use of shared resources. [Plates 6-8].

The contemporary challenge of Treated Sewage Effluent (TSE)

Following tremendous population and industrial growth after the discovery of oil in the first half of the 20th century, along with an increase in water salinity, as result of over-exploitation after the introduction of privately-owned, petrol-run water pumps, the government resorted to the distribution of Treated Sewage Effluent (TSE) (Agricultural Affairs Directorate; 2001, p. 3). The government of Bahrain constructed wide networks of pipelines, distribution stations, pumping stations and storage tanks for this purpose (Agricultural Affairs Directorate; 2001, pp. 10-11). Mr Ali al-Shabani, who works in the Section for Artesian Wells in the Agricultural Affairs Directorate, pointed out that TSE is an intelligent and timely solution to replace the old system of water irrigation, and its distribution can be based on the same ethical principles (al-Shabani; 2013). Both Mr al-Shabani and Mr Jasim Kuwayyid, who works in the Section for Farmer's Education in the Agricultural Affairs Directorate, talk about new patterns of behaviour which have abandoned the customary community focus for a 'Me first and most' mentality:

Many farmers are now consuming water in un-organised and un-coordinated patterns. They don't follow or respect agreed timetables of irrigation. If a farmer opens his TSE valve while others have not turned off their valves, the

flow of water will not be sufficient to irrigate his farm due to lack of pressure. (al-Shabani; 2013: Kuwayyid; 2013).

The TSE system actually requires a return to the customary patterns of irrigation to ensure that each farmer in his turn has optimal water pressure to distribute the water to all parts of his property. Unfortunately, after one or two generations of using self-sufficient water pumps, quite a number of farmers have forgotten the traditional irrigation practices, and with them have lost the notions of fairness, equity and communal responsibility.

When the authors asked about the contemporary situation, those few farmers still retaining traditional knowledge described the collapse of the ethical system that has gone along with the reduction in knowledge about customary water irrigation law. Haji-Ahmad and Haji-Abu-Husain diagnose the situation slightly differently. Haji-Ahmad explained that calculating the water allocation for farms was almost seen as a religious act among northern villagers. As in Islamic *fiqh*, where wasting water during *wuḍū'* (ablutions) is considered a misdeed, miscalculating irrigation times and over-consumption by one farm may take away the blessings from that particular farm (Haji-Ahmad; 2013). Haji-Abu-Husain said that few farmers now have a responsible attitude. In the past each farmer attended to his farm at the time of irrigation. They would supervise the whole watering operation. Today most (but not all) of the young



Plate 6
Irrigation channels in a multi-crop garden. Photo: Think Heritage! 2014.



Plate 7
Irrigation channels in a multi-crop garden.
Photo: Think Heritage! 2014.



Plate 8
Irrigation channels in a palm garden. Photo: Think Heritage! 2014.

farmers open the TSE valve and leave the farm to visit and socialise with friends. It was not clear to the elderly men whether the young farmers simply forgot to switch off their valves or if they just did not care whether other farms received their necessary shares of water. *Our generation believes that resuscitating features of the customary intangible heritage, which was always good for us, is needed at this time and I leave that to you to judge,* Haji-Abu-Husain advised the authors in 2013. He wished many more people concerned with farming and irrigation systems in 21st century Bahrain shared his views.

However, this conviction is not purely a matter of age. A young dedicated farmer from Diraz village, Mr Muhammad, explained that he wishes to base his farming on principles of fairness of distribution. But he explained that the income he makes from the farm is not enough to support his wife, children and mother, and that it was even more difficult if his competitors took unfair advantage. To provide sustenance for his small family, Mr Muhammad recently bought a small delivery van in order to take delivery orders to earn some extra money. This, however, according to Mr Muhammad explains some of the poor performance on his farm - including, perhaps, leaving the valve open beyond the time allotted to him (Muhammad; 2013).

Remnants of the past – and an alternative for the future

Haji-Ahmad proudly told us that a few farming groups today still conduct their water irrigation practice exclusively in accordance with the customary irrigation laws. He knows of at least three closed communities sustaining this practice but assumes there may be many more he does not know of. The area of Bahrain in which traditional irrigation practices seem to have been retained is located along the northern coast of Bahrain, including the villages of Karrānah and Jannussan.

The authors share his perception that these communities may well hold a precious key to the future of farming in Bahrain. The authors met one of the closed communities which retain the traditional oral knowledge system of irrigation practice in Bahrain. Hasan, Ja'far and Sadiq, three brothers who inherited their father's farm and keep it operating, explained how they apply the traditional codes of practice. Following their father's death they divided the farm into three lots. As the farm has only one water-well, the resource has to be shared among the three brothers. They built an electrical water-pumping room and when the water pump is switched on it pumps water into a pool. The pool has three valves and each valve irrigates a designated farm lot via a waterway. They meet at regular intervals to agree on a timetable of irrigation and open and close the valves to the three plots accordingly. It seems they have never had a serious disagreement over water distribution, but at times they argue about how the electricity bill for operating the water pump should be divided. Fortunately they have nearly always managed to reconcile their differences (Hasan-Ja'far-Sadiq; 2014). Haji-Ahmad was requested to attend their meeting as an arbitrator to resolve a problem – but only once (Haji-Ahmad; 2013). The young farmers had learned many concepts from their late father and from Haji-Ahmad whom they regularly visit in his *majlis*, and they are content that their system works well. They would make promising teachers for the wider farming community.

Conclusion

The customary oral knowledge system of water irrigation in Bahrain promoted a fair and sustainable approach to the distribution of a scarce resource, as well as encouraging ethical values and community cohesion. Farming communities were divided according to their level of knowledge, and openness of dispute and debate into closed, conditionally accessed and open groups. Their ability to learn, and to collaborate across boundaries, their social networks and the flow of knowledge, operated as bi-directional agents, enhancing interdependency on macro levels of existence and disseminating skills to transmit and safeguard intangible cultural heritage in traditional community structures. Today, the customary irrigation system has the potential to improve the communities' economic standards and uphold their internal morals and ethics. Knowledge bearers were always conscious that every closed community had differently oriented farms and waterways of different lengths, and so developed many versions of the customary irrigation law to suit their various needs. Their geography created heritage as much as sustained it. This flexibility of accommodating space and time in social reality kept it going for hundreds of years and should make it possible to adjust the system to new sources of water and new distribution technologies.

The authors are confident that the transmission of this knowledge system remains relevant for the present challenges in water distribution. Its failure to be adopted by TSE farmers - with a few noteworthy exceptions - calls for an urgent solution. Farmers who were, and are, applying the customary irrigation law are convinced that a slightly modified version of it could succeed in contemporary Bahrain, including for the distribution of TSE or pumped water. However, those who have lost the customary knowledge remain trapped in an uncooperative attitude and no longer seem to appreciate the values of sharing and community fairness. The challenge will be to enable these individual farmers to return to communal planning and to understand that while the selfish over-attribution of water to their farm might provide economic benefits to them, they would also be responsible for the unsuccessful yields of their neighbours.

The economic benefits of the traditional knowledge system for the farmers community at large might convince even the most ignorant groups of farming egoists. With the increasing depletion and salination of the underground aquifers, the dependence on treated sewage effluent (TSE) will grow over the forthcoming years, and individual over-exploitation through pumps will soon no longer be successful. TSE and its distribution schemes carry the potential for conflict, and fair distribution will only be achievable if the farmers return to communal irrigation agreements and schedules. The authors recommend basing such agreements on the customary codes of the traditional irrigation law, perhaps slightly adjusted to the specific needs of contemporary TSE distribution. However, it would be desirable to retain the key aspects of the traditional customary irrigation law which retains the moral ethics of the intangible heritage of Bahrain.

Possible strategies to revitalise and disseminate this oral knowledge system include workshops, ideally led by those members of the farming community who have continued to apply the customary irrigation codes. As the legal basis for its application does still exist, these workshops should be focused on highlighting the economic viability and benefits to the participating farmers, rather than being restricted to formal codes and regulations. However, according to the judgement of Mr Jasim Kuwayyid from the Directorate of Agricultural Affairs, outside appreciation or incentives are needed to encourage more farmers to participate. The authors agree that both financial and recognition-based incentive schemes could be promising ways of revitalising the application of the intangible cultural heritage. High level recognition of a closed community still practising the customary knowledge system could start wider media coverage, or awards for fair and responsible irrigation practice could be created and distributed at regular intervals. The authors believe that many opportunities could be found, but that decision-makers seem not to be aware that a possible solution for the sustainable use of resources does not lie in further modernisation, but might be found in returning to traditional customary codes and intangible heritage practices. This recognition would be a relevant step forward for the younger generation of farmers and point towards a future for sustainable water management in Bahrain.

ENDNOTE

i pl. *majālis*, designates a public or semi-public gathering as well as the meeting area in which such occurs. A *majlis* can be just a room in a privately owned house that on certain days of a week is opened to the public for specified hours.

INTERVIEWS

- al-Jamri, Husayn M., Nov. 2012. Personal interview at a farm in Budaiya-Bahrain. Husayn al-Jamri is a Bahraini historian specialising in the documentation of the oral history and folklore of villages in Bahrain. His famous personal blog, the *Encyclopaedia of oral history of villagers* is visited by many researchers and is well-respected. Mr al-Jamri has also published in other journals and newspapers.
- Haji-Ahmad, Feb. 2013. Personal Interview at a *majlis* in Karrānah -Bahrain. Mr Ahmad Khalifa, or Haji-Ahmad, is a 74 year old farmer from Karbabad village in Bahrain. Son of a fourth generation farmer, he started helping his father on the farm in 1948. Haji-Ahmad is very knowledgeable about traditional farming and is very aware of the challenges brought about by modernised farming techniques in Bahrain. Many consider him a sage, and as such he is a valuable reference point for many farmers. He still has a lot of energy to manage his farm. The father of Haji-Ahmad and the father of the following interviewee, Haji-Abu-Husain, were friends. The two continue the friendship of their fathers, which they hold dearly, and are still in touch with each other today.
- Haji-Abu-Husain, Dec. 2013. Personal interview at a farm in Karrānah, Bahrain. Mr Ahmad Salman, or Haji-Abu-Husain, is a 68 year old farmer from Karrānah village in Bahrain. Son of a sixth generation farmer, he started helping his father at the age of eight. Haji-Abu-Husain is a respected member of his community who earns his living from the farms he looks after. He also maintains good contacts with the other farmers, both old and young.
- Hasan-Ja'far-Sadiq, Jan. 2014. Personal group interview at a *majlis* in Karrānah, Bahrain. Hasan, Ja'far and Sadiq are three brothers in their late forties and early fifties, who inherited the farm of their late father and continue to run it. They have always practised the traditional customary knowledge of irrigation and are convinced that this has prevented family conflicts and allows for shared cultivation in a harmonious atmosphere.
- Al Khalifa, Shaykh Ibrahim bin Hamad, Nov. 2012. Personal interview at a *majlis* in Al-Janabiyah-Bahrain. Shaykh Ibrahim bin Hamad Al Khalifa is a member of the royal family of Bahrain. His university degree in human geography has influenced his specific interest in traditional farming and irrigation techniques in Bahrain.
- Kuwayyid, Jasim, Dec. 2013. Personal interview in his office in Budaiya, Bahrain. Jasim Kuwayyid holds a university degree in agricultural education and in 2000 joined the Ministry of Municipal Affairs and Urban Planning, Directorate of Agricultural Affairs. Since then he has been responsible for educating farmers and has developed good contacts as well as gaining much awareness of their difficulties.
- Muhammad (farmer from Diraz), Nov. 2013. Personal interview in a *majlis* in Diraz, Bahrain. Muhammad is a young Bahraini farmer from Diraz who has struggled to make a living for himself and his family from the produce of his farm. As a consequence, he combines several occupations, including a delivery service, which at times has reduced the attention he can give to his farm.
- al-Shabani, Ali, Dec. 2013. Telephone interview from his office in Budaiya-Bahrain. Ali al-Shabani is a Bahraini specialist in Artesian wells and has been employed by the Ministry of Municipal Affairs and Urban Planning, Agricultural Affairs Directorate, for 30 years.

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