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Islam and water management: Overview and principles

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This chapter is based primarily on the papers and discussion from the Workshop on Water Resources Management in the Islamic World, complemented by further analysis and review of other sources. Following the overview, a set of Islamic water management principles is presented, along with recommendations, significant further research, and conclusions.

Water as a social good

Water is of profound importance in Islam. It is considered a blessing from God that gives and sustains life, and purifies humankind and the earth.

The Arabic word for water, ma', occurs sixty-three times in the Quran. God's throne is described as resting on water, and Paradise is described as "Gardens beneath which rivers flow." As Caponera (this volume) points out, it seems that in the Quran, the most precious creation after humankind is water. The life-giving quality of water is reflected in the verse, "And Allah has sent down the water from the sky and therewith gives life to the earth after its death." Not only does water give life, but every life is itself made of water: "We made from water every living thing."

All human beings rely on water for life and good health but, for Muslims, it enjoys special importance for its use in wudu (ablution, that is, washing before prayer) and ghual (bathing). The benefit of the daily
prayers, one of the Five Pillars of Islam, has itself been compared by the Prophet (pbuh) to the cleansing action of water in the following hadith, “The similitude of five prayers is like an overflowing river passing by the gate of one of you in which he washes five times daily.”

Water and equity

Muslims believe that ensuring social justice, or equity, in society is the cornerstone of Islam, and that the Prophet Muhammad (pbuh) set the example for them in this regard. Virtually all of the hadith relate to the preservation of equity, and those related to water are no exception. For example, “None of you will have faith till he wishes for his (Muslim) brother what he likes for himself.” Obviously, this applies to the desire for an adequate amount of clean, fresh water, as well as anything else. A Muslim cannot hoard excess water – rather he is obliged to allow others to benefit by it. The Prophet (pbuh) stated that among the three people Allah will ignore on the day of resurrection are “a man [who] possessed superfluous water on a way and he withheld it from the travellers.” The Quran warns human beings against unfair distribution by stating that the riches of this world belong to Allah, his Prophet, orphans, the needy, and the wayfarer, and that these riches ought “not (merely) make a circuit between the wealthy among you.” In fact, the recognition of water as a vital resource, of which everyone has the right to a fair share, is emphasized by the following hadith, which effectively makes water a community resource to which all, rich or poor, have a right: “Muslims have common share in three things: grass (pasture), water and fire (fuel).” On the Prophet’s advice, one of his companions, Othman, who later became the third Muslim caliph, bought the well of Ruma (a settlement in Arabia) and made its water available free to the Muslim community – the well was actually made into a waqf, a usufruct or a collective property for religious purposes and public utility.

Rights of the environment

As in Christianity and Judaism, in Islam humankind has the first right to the resources that God has provided for his creation. It is well accepted by Islamic scholars (Mallat 1995, 129) that the priority of water use rights is: first, *haq al shafa or shurb*, the law of thirst or the right of humans to drink or quench their thirst; second, *haq al shafa*, the right of cattle and household animals; and third, the right of irrigation. However, as discussed later, the environment has clear and unmistakable rights in Islam.

God informs human beings of the rights of animals by comparing them (animals) to humans: “There is not an animal (that lives) on the earth, nor a being that flies on its wings, but (forms part of) communities like you.” Animals cannot be allowed to die of thirst, and the water that remains after humans have quenched their thirst must be given to them. The Prophet (pbuh) said, “there is a reward for serving any animate (living) being,” and “He who digs a well in the desert … cannot prevent the animals from slaking their thirst at this well.” The immense value of giving water to any creature is reflected by the following hadith: “A prostitute was forgiven by Allah, because, passing by a panting dog near a well and seeing that the dog was about to die of thirst, she took off her shoe, and tying it with her head-cover she drew out some water for it. So, Allah forgave her because of that.”

The Quran notes that the gift of water is for flora as well: “vegetation of all kinds” and “various colours” are nourished by rainwater that God sends down.

These verses support the statement that water is made available by God so that all life should receive support according to its needs, including humans, animals, and plants (Yusuf Ali 1977, n. 3107). As Amery (this volume) notes, nonhuman species have rights to sufficient water that is of “good” quality because the water has to be suitable for “nourishing vegetation” and for drinking by animals.

Humankind’s role as steward

Although humans are the most favoured of God’s creation, we also are responsible for ensuring that God’s gifts are available to all living things. As Amery (this volume) points out, in Islam, human-environment interactions are guided by the notion of humans as khulafa, viceregents or stewards, of the earth. Khalid (1996) states that although “we (humans) are equal partners with everything else in the natural world, we have added responsibilities. We are decidedly not its lords and masters: but its friends and guardians.” Given that the Arabic root of Islam, *salam*, means peace and harmony, and the specific rights of the environment outlined in the Quran and hadith, Ansari (1994, 394) argues that an “Islamic way of life entails living in peace and harmony” at ecological, as well as individual and social levels.

The environment is protected from humans by specific injunctions against upsetting its natural order through pollution or other activities. In the Quran, Allah commands believers to “make not mischief (fassad) on earth.” The meaning of fassad can be interpreted as spoiling the natural functioning of the world or spoiling or degrading of natural resources (Amery, this volume). The Prophet (pbuh) once instructed his companions to return to a bird’s nest the eggs they took from it. Islamic
scholars and rulers have attached penalties to misuse of water, including polluting or degrading clean water. This opens the door for punishing or fining polluters through modern legislation. Also, the Prophet Mohammad (pbuh) very sensibly forbade urination into stagnant water, and advised to guard against three practices, “evacuating one’s bowels near water sources, by the roadside and in the shade” (Al-Sheikh 1996).

The situation in the MENA

Given the strong emphasis on equity in Islam, it is useful to examine the current situation in terms of access to water. The low coverage of water supply and sanitation services in rural areas of less developed countries (LDCs) is well documented. In the poor, arid Muslim countries of the Middle East, the situation is no better. About 20 per cent of the population in developing Muslim countries in the Middle East and North Africa (MENA – that is, Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Sudan, Syria, Tunisia, and Yemen) was without access to safe water between 1990 and 1996, and close to 37 per cent was without access to sanitation during the same period (UNDP 1998, table 7).

Because the urban growth rate in the MENA is higher than the overall LDC average, informal settlements in and around cities all over the region are rapidly increasing in size. Few of these urban or peri-urban communities receive water and wastewater services, either because the communities were unplanned or because of legal or political restrictions imposed on public utilities. Many of the community residents rely on informal supplies of water sold by private vendors. In LDCs, on average, such families pay ten to twenty times more per litre of water than the rates paid by residents receiving piped water service – and this can rise to eighty to one hundred times in some municipalities (Bhatia and Falkenmark 1993). A literature search for prices paid by the unserved peri-urban poor in the Middle East revealed almost no data available on the topic. However, during the exceptionally warm summer of 1998 in Jordan, the city of Amman suffered a severe water shortage, exacerbated by an odour problem. The public was forced to buy water from vendors, and the black-market price of water delivered by truck tankers reached up to US$14 per cubic metre (Bino and Al-Beiruti 1998). Even under normal weather conditions in Jordan, some of the poor pay a very high price. An informal survey (conducted during an IDRC trip to Amman in December 1998) found that in the Al Hussein refugee camp in Amman, residents not connected to the municipal water system were buying water from their connected neighbours for prices ranging up to US$2 per cubic metre – four times the rate paid by the served customers, whose tariff includes sanitation. Under most conditions, US$2 per cubic metre is greater than the maximum theoretical price for municipal water service as measured by the cost of desalinizing seawater and distributing it.

The issue of water and equity in the MENA requires more investigation, based upon methodical, formal studies. Because the unserved poor live in informal, often unpleasant, forgotten settlements, they are often ignored by mainstream researchers. However, there is no reason to believe that the prices paid by the unserved peri-urban poor are any less in the MENA than in those countries for which information is available. Clearly the current situation is inequitable, and the primary water right under Islam – haq al shafa (the right to quench thirst) – is being compromised.

Water demand management

This section discusses both non-economic and economic approaches to water demand management (WDM) within the context of Islam. The non-economic approaches discussed at the workshop included water conservation and wastewater reuse. While not discussed at the workshop, Islam and family planning is also briefly discussed in this section.

Non-economic instruments

Water conservation

The Quran makes two clear statements regarding water that support water demand management. First, the supply of water is fixed, and second, it should not be wasted. The statement that water supply is fixed, and that therefore, at some point, demand must be managed because supplies cannot be infinitely increased is: “And we send down water from the sky in fixed measure.” The Quran then tells humans that they may use God’s gifts for their sustenance in moderation, provided that they commit no excess therein: “O Children of Adam!... Eat and drink: But waste not by excess, for God loveth not the wasters.”

The hadith are even more explicit. The Prophet Mohammad (pbuh) “used to perform ablution with one mudd of water [equal to 3/8 litre] and used to take a bath with one sal [equal to 2-3½ litres].” This hadith demonstrates the logical approach to sustainable water use in arid Arabia where the Prophet lived. However, the Prophet forbade waste even in conditions of seeming plenty when he said “Do not waste water even if performing ablution on the bank of a fast-flowing (large) river.”
Given the clarity of these examples, it is surprising that they are not used more widely to promote water conservation in predominantly Muslim countries. As noted by Atallah (this volume), ordinary Muslims support the idea of being educated about the environment by their religious leaders. In a 1993 survey in Jordan, 64 per cent of the respondents believed that the imams should play an important role in environmental education and public awareness, but only 34 per cent felt that imams were already doing so.

However, policy-makers are beginning to appreciate the value of including religious and cultural values in public awareness and education strategies. Falkenmark (1998) noted recently that regardless of people’s culture or religion, “spirituality and ethics are very important for influencing behaviour.” Islamic teachings on water conservation are beginning to be incorporated in WDM strategies in predominantly Muslim countries. In Afghanistan, the World Health Organisation (WHO) launched a health education programme through mosques. The programme included training imams on proper health practices, water conservation, and the importance of safe water, proper sanitation, and hygiene in the prevention of diseases. The imams then prepared and gave khutba (sermons) on the topic during the congregational Friday prayer (see Atallah, this volume). In Jordan, imams from mosques in the Amman Governorate were educated on water scarcity in the country and the need for public co-operation to address it in a joint programme of the Ministry of Water Resources and the Ministry of Awqaf and Islamic Affairs.

Because little information is available to evaluate the effect of these programmes, further research is needed on the topic. However, Shah’s chapter discusses a notable exception. He describes a pilot project in Pakistan in a small town, Dijkot, and its surrounding area. The aim was to overcome the shortage of water for domestic uses in the town and for irrigation in the surrounding area. In both cases, the users at the beginning of the water distribution system (the head of the canal in the irrigation district) were taking more than their fair share of water by installing illegal pumps and pumping directly out of the system. An informal group ran a publicity campaign with the participation of the imams in the local mosques and students at the town’s religious school. The main message, delivered by the imams on Fridays, and during daily discussions in the mosques, was that “taking another person’s share of water was a sin and morally wrong.” The results were surprising—the number of complaints registered about lack of water decreased by 32 per cent in the town and by 26 per cent in the irrigation district. These results show that in rural areas of Pakistan at least, where the local Maulvis—an honorific title for local Muslim leaders or imams in India and Pakistan—enjoy considerable respect and following among the people, focusing on religious values can be surprisingly effective.

In general, according to both Shah and Atallah (this volume), public awareness programmes need to be holistic and multidisciplinary. They should not focus solely on mosques or religious schools, but extend to the education system as a whole. Further, and what is rarely the case, programmes should be co-planned by ministries of Education, Water, and Religious Affairs, so as to be multi-disciplinary—with components of applied science, economics, health, and religion. The Egyptian National Community Water Conservation Programme (NCWCP) of 1993–96 concluded “that the strategy of water conservation communication must be global and interactive, and include ... all the actors concerned, such as religious, political, and informal community leaders” (Afi 1996). Another lesson was that programmes cannot be short, one-time events. Water conservation requires behavioural change at the societal level, which in turn needs careful, long-term plans of action.

**Wastewater reuse**

The practice of reusing domestic wastewater for irrigation can be traced back more than two thousand years to ancient Greece. Reusing wastewater is an essential component of a demand management strategy because it conserves freshwater for the highest-value uses. However, treating and reusing domestic wastewater has two other advantages: first, reduced environmental effects, and second, enhanced food production and reduced artificial fertilizer use because of the nutrients contained in the wastewater.

Reusing wastewater is not without health risks or obstacles. Raw wastewater is dirty—it looks and smells bad—and, more importantly, it contains pathogens, including bacteria, viruses, and helminths (parasitic worms), that can cause illness or even death. Given the importance of cleanliness in Islam, and that many MENA countries have minimal wastewater treatment, it is common to hear Muslims declare that wastewater reuse is undesirable, or even haram (unlawful according to Islam). However, as Abderrahman’s illuminating case study of Saudi Arabia outlines, reusing wastewater is not haram, provided that it will not cause harm. After a detailed study, in consultation with scientists and engineers, the Council of Leading Islamic Scholars (CLIS) in Saudi Arabia concluded in a special fatwa in 1978 that treated wastewater can theoretically be used even for wudu and drinking, provided that it presents no health risk (CLIS 1978).

Except in space travel, it is neither cost-effective nor necessary to treat wastewater to such an extent that it achieves a quality necessary for drinking, and the Saudi Arabian scholars did not encourage this practice
under normal circumstances. However, treated wastewater can certainly be reused in irrigation, following the WHO guidelines (Mara and Cairncross 1989) devised to protect human health. The guidelines divide irrigation into two main categories—restricted or non-restricted. The necessary wastewater quality, defined in terms of faecal coliform and helminth egg levels, varies depending upon the intended use of the wastewater. Wastewater used for unrestricted irrigation requires more thorough treatment because it can come into contact with edible crops grown at ground level, as well as in sports fields and public parks. Wastewater for restricted irrigation (i.e., of fruit trees, pasture, and fodder crops) requires less treatment, because these can be irrigated with water of lower quality without posing a threat to human or animal health.

On the basis of the 1978 fatwa, wastewater reuse in Saudi Arabia expanded greatly. In 1995, the kingdom reused about 15 per cent of its treated wastewater for irrigating date palms and fodder, such as alfalfa. Moreover, ablation water at the two holy mosques in Mecca and Medina is recycled for toilet flushing, thus conserving expensive desalinated seawater. In Kuwait, more than seventeen hundred hectares of alfalfa, garlic, onions, aubergines, and peppers (following the WHO’s guidelines) are irrigated using treated wastewater. In Jordan in 1998, 70 million cubic metres (MCM) of treated domestic wastewater were reused. All of this was used for restricted irrigation and accounted for 12 per cent of all water used for irrigation in Jordan (Ministry of Water and Irrigation, Jordan, 1998).

Al-Khateeb’s chapter contrasts Islamic precepts regarding wastewater reuse with the actual sociocultural context in Palestine. Almost all the surveyed farmers believed that wastewater reuse was allowable in Islam provided that the practice would not be harmful, and they noted the advantage of irrigating with treated wastewater, which contains valuable nutrients. Most significantly, the farmers were willing to pay up to US$0.24 per cubic metre to buy treated wastewater, and 67 per cent of consumers surveyed were willing to buy crops irrigated with this type of water. The willingness of consumers to buy such products is likely to rise if they are educated by studies such as the one carried out by Al-Khateeb. Wastewater from two pilot secondary treatment plants was used to irrigate eggplants, peppers, apples, grapes, and peaches, and the washwater and the flesh of the fruits and vegetables were tested in a laboratory at the Palestinian Ministry of Water Resources. It was concluded that all of the food was safe to eat. This study supports the WHO’s contention that its own guidelines can be relaxed when vegetables such as eggplants and peppers are eaten cooked.

Replacing freshwater with treated wastewater for agriculture will not be easy. Some plants, such as citrus fruits, cannot withstand the high salinity levels in domestic wastewater, but perhaps they should not be grown where freshwater is scarce (see the discussion on food security below). The areas for wastewater irrigation must be carefully selected to avoid contaminating shallow aquifers overlain by permeable soils. However, given that people in the Middle East are already frugal in their water use, and that freshwater will increasingly be taken away from agriculture, expanding wastewater reuse in agriculture is one of the most important WDM policy initiatives in the MENA. Also, because safe reuse depends on adequate treatment, it is vital that virtually every drop of wastewater receive at least some treatment in the region.

Providing effective wastewater treatment has proven to be a challenge in most MENA countries because centralized, mechanical wastewater treatment plants are often unaffordable and, for various reasons, cease to operate efficiently after some time. Perhaps even more importantly, they are designed with wastewater disposal, not reuse, in mind. Most MENA countries will have to implement decentralized, low-cost, natural wastewater treatment systems, for reuse on or near site. Researchers supported by IDRC are currently pilot-testing grey-water treatment using on-site, small-scale trickling filters for home gardens in the low-density hill settlements surrounding Jerusalem, aquatic wetlands using water lettuce or duckweed in the Jordan Valley and Morocco, and low-mechanical-content activated sludge in Egypt.

Family planning

As noted in the introduction, per capita water availability in the MENA dropped from 3,300 in 1960 to 1,250 m$^3$/ply in 1996, and is expected to decline to 725 m$^3$/ply by 2025. The main reason for this decline is the population explosion in the MENA—from 92 million in 1960 to about 300 million in 1999. Population in the region will pass the half-billion mark by 2025.

Family planning will not reduce the average water consumption of a given population; however, it can help prevent further reductions in overall availability of water per capita. Consequently, it can be considered a WDM tool—in many countries, without family planning, other strategies to manage water demand will have little or no effect. For instance, with a 1997 per capita water availability of 225 m$^3$/ply, Yemen is already terribly short of water. Yet its 1997 population of 16.1 million is expected to nearly double within 20 years (World Bank 1999, table 2.1), which will nullify the impact of ongoing measures to manage water demand, and exacerbate an already desperate situation.
Thus, it is reasonable to consider whether family planning is allowable in Islam and, if so, whether it should be encouraged. Although family planning was not a topic at the workshop, it is discussed briefly here.

A few Islamic scholars believe that birth control is not allowable in Islam, because the Prophet (pbuh) encouraged large families with the words “Marry women who are loving and very prolific.”24 However, while the Quran makes it clear that children are a blessing from God, it also cautions Muslims not to be too concerned with those other blessings which they covet in this world: “wealth and children are the allurement of the life of this world; but good deeds are best in the sight of the Lord.”25 Still, it is difficult to find evidence in Islam to support a ban on family planning. Although the religion encourages having children, it is not obligatory. Also, companions of the Prophet reported that they performed coitus interruptus, the only contraceptive method known at the time. Although the Prophet discouraged coitus interruptus in his time,26 he did not forbid it. Because family planning is not prohibited in the Quran or the hadith, the large majority of scholars believe that, in principle, contraception is allowable in Islam. However, a few simple conditions apply. First, family planning or contraception is only permissible within the Islamic definition of a familial relationship between a man and a woman—that is, the couple must be married. Second, contraception should have the mutual consent of the couple, according to the Prophet’s saying: “A man must not practice withdrawal (coitus interruptus) without his wife’s consent.”27 Contraception also cannot be imposed upon the couple (Hathout 1989, 228). Finally, the chosen method must truly control conception, rather than birth—that is, it cannot act by causing an abortion.

If these conditions are satisfied, most jurists believe that, following the principle of maslahah, if it is in the genuine interest of a society for people to practice family planning, the government should encourage it. For instance, in 1964, the rector of Al Azhar University in Cairo issued a fatwa on the acceptability of family planning, noting that “greater numbers were only required in ancient days so that Islam would survive” (Peterson 1999).

Given the support of most scholars, many predominately Muslim countries such as Algeria, Egypt, Iran, Morocco, and Tunisia have a definite government policy on population, while others encourage NGOs to distribute contraceptives and disseminate family planning knowledge: for example, Iraq, Jordan, Sudan, and Syria (Hathout 1989, 225). In fact, according to the UN, Iran, which initially encouraged population growth after the revolution, has emerged as a model of family planning. Beginning in 1987, to counter overcrowding, housing shortages, pollution, and unemployment, the government launched a major family planning program. The minimum age for marriage was increased, and every Iranian couple must attend mandatory classes on birth control before even applying for a marriage licence (Wright 2000, 133). All forms of contraception are free. The dramatic result, a halving of the population growth rate to less than 1.47 per cent in less than a decade, has earned Iran the UN Population Award for 1999 (Peterson 1999). The total number of births per woman (fertility rate) dropped from 6.7 in 1980 to 2.8 in 1997. Efforts in other predominately Muslim countries have also been very successful. Over the same period, the fertility rate dropped from 5.1 to 3.2 in Egypt, from 4.3 to 2.8 in Indonesia, and from 6.1 to 3.2 in Bangladesh. However, women in other predominately Muslim countries, including some of the most water-stressed in the MENA, continue to have very high fertility rates. For instance, the 1997 rate in Yemen was 6.4, while in the West Bank and Gaza it was 6.0 (World Bank 1999, table 2.5).

In summary, family planning is allowable in Islam. Because children are considered a blessing in Islam, family planning should not be encouraged solely for material reasons. Nor would it be allowable for political reasons—that is, to control the population of a particular ethnic or religious group. However, in many countries, continued high population growth is severely stressing existing water resources and the environment. In some of these countries, principles highly valued in Islam, such as equity, quality of life, and the rights of humans and other creatures to sufficient water of good quality, are being compromised. In such cases, where it is in the genuine interest of society to slow down its own growth, family planning should be encouraged. Furthermore, governments should work with religious leaders, because experience has shown that the most successful family programs in predominately Muslim countries have succeeded with the help and support of such leaders. Significant energy devoted to family planning now will lead to fewer social problems, including those related to water, over the next twenty to fifty years, than would otherwise be the case.

Economic instruments

Market approaches to water management, such as increasing tariffs and privatizing utilities, are controversial because water is such a vital social good. Economic measures may be even more controversial in predominately Muslim nations because of the Islamic precept that water cannot be bought or sold.28 This section examines economic WDM instruments in terms of water rights and categories, tariffs, privatization, and markets.
Water rights and “ownership” in Islam

In Islam, water is considered a gift from God, so no individual literally owns it. Humans are the stewards of water and other common resources that belong to the community. However, as Djebar explains (Kadouri et al., this volume), most Islamic scholars have concluded that individuals or groups have the clear right to use, sell, and recover value-added costs of most categories of water. These judgments are based primarily on two hadith. First, “It is better ... to go to the woods, [and] cut and sell lumber to feed himself ... than to beg people for help,” 125 which implies that common property resources such as wood and water can be sold and traded (Zouhaili 1992). Second, the earlier cited hadith about Othman’s purchase of the well at Ruma proves that wells can be owned and traded. Based upon these and other sources, water is categorized in Islam as follows (Sabeq 1981; Zouhaili 1992):

- Private property (water in private containers, treatment plants, distribution systems, and reservoirs). This is water in which work, infrastructure, and knowledge have been invested to obtain it. The “owner” of the “container” has the right to use it, trade it, or sell it.
- Restricted private property (lakes, streams, and springs located in private lands). The owner of the land has special rights over others, but also has certain obligations to them. 30 Within these limits, the owner can trade water like any other good.
- Public property (water in rivers, lakes, glaciers, aquifers, and seas, and from snow and rainfall). Obviously, water in its natural state cannot be bought or sold. However, if infrastructure and knowledge have been invested to withdraw it – for instance, if a public utility constructs a supply, treatment, and distribution system to convey it to people’s homes – then the water becomes private property, and the utility has the right to recover its costs. Because of the growing scarcity of water in the MENA, large volumes of freshwater in its natural state are becoming less and less common.

In his time, the Prophet Muhammad (pbuh) discouraged the selling of water, and even “forbade the sale of excess water.” 31 Also, as noted, he encouraged Othman to buy the well at Ruma, and give away its water free. These examples reflect the Prophet’s desire for the poor and weak to have access to wells controlled by the rich and powerful. It also made sense at the time because water, even though it was relatively scarce, was plentiful enough, clean enough, and accessible enough (through hand-dug wells in shallow aquifers) for sufficient amounts to be available to the very small population of the Arabian peninsula in the seventh century, with almost negligible costs of service provision.

However, it is counter-productive to use this tradition to oppose cost recovery for water services in the current context. In fact, the practice of supplying water (almost) free, under today’s conditions of polluted and scarce water supplies has resulted in severe inequities. Subsidizing the collection, treatment, storage, and distribution of water means that increasingly indebted public utilities and governments are able to provide (almost) free water only to the urban rich and middle class. The unserved weak and poor, the very group the Prophet wished to protect, often pay immorally high prices for water in informal markets, or receive water of very poor quality.

Under changing conditions, Muslim leaders can adapt different policies to meet timeless objectives, such as social justice. This point is illustrated by the recent practices of Saudi Arabia, which bases all its laws on sharia. Until about twenty years ago, the nation had both ample water and immense wealth, and a small population. Following the Prophet’s (and Othman’s) example, it provided domestic water nearly free to its citizens. Conditions have changed over the last twenty years, exacerbated by government subsidization of wheat production with cheap irrigation water, which resulted in fossil-water mining. The government has now largely reversed this policy, and the kingdom introduced new water tariffs in 1994, “to acquaint its citizens with the cost of providing water services” (Abderrahman, this volume).

Water tariffs

Evidently, recovering costs for providing water is allowable in Islam. But what is a fair tariff? According to Islam, a fair tariff will lead to greater equity across society. Given the crucial need to conserve water in the region, public awareness and education strategies can only be one element of a multipronged WDM strategy. They must be complemented by economic incentives. Djebar (this volume) notes that price elasticities of demand in LDCs average $0.45 (higher in rural areas and lower in urban areas), meaning that, all else being equal, a 10 per cent increase in water price would lead to a 4.5 per cent reduction in demand. There is ample room to raise prices for the served middle and high classes. Urban water rates in LDCs are typically less than one-sixth the full cost of water provision (Bronsro 1998). The actual full cost of providing water services will vary from country to country, but in Israel, the only country in the MENA where water is charged at full cost in urban areas, the price (including a surcharge for wastewater treatment) is US$1.00 per cubic metre (Shuval, as cited in Lundqvist and Gleick 1997, 37).

Also, as outlined in Sadr’s essay in this volume, full-cost pricing is allowable in Islam. In Iran, where the law is based upon sharia, irrigation water must be sold on the basis of average cost, with both operation and maintenance costs and capital depreciation included. This requirement is
enshrined in the 1982 Just Distribution of Water Law, the title of which makes the rationale for full-cost pricing self-evident. For urban areas, a 1990 act allows for full (average) cost recovery, including both capital and depreciation costs. As a result of this bill, in 1996 tariffs were increased by 25–30 per cent for household consumption above 45 cubic metres per month, and the tariff for commercial and industrial use was set higher than residential consumption, a step that reversed an earlier policy (see Kazem Sadr’s essay in this volume, p. 110).

Where does this leave the poor? In almost every MENA city, a realistic water price, which would allow for reinvestment into the system to serve the unserved poor, would be less than they currently pay, but higher than current prices paid by serviced urban residents. In Jordan, for example, as the informal IDRC survey of December 1998 showed, unserved residents are paying US$2 per cubic metre or more, whereas served residents pay a maximum of US$0.50 per cubic metre, and the full cost of provision is no more than US$1 per cubic metre. Second, tariffs can be structured to supply everyone a lifetime water volume, as is done in Iran, where about the first thirty litres per capita per day (LPCD) are provided free to all domestic customers in urban areas. This approaches the basic water requirement (BWR) standard of fifty LPCD proposed by Lundqvist and Gleick (1997).

Markets and privatization

In Islam, the government may fully recover its costs for providing water to the people. But what about privatization, leading to water being traded like other commodities in the market? First, it is useful to note that a fair and free market finds support in Islam. Muhammad (pbuh) was a businessman prior to his Prophethood, and he set the example for ethical business dealings by earning the title Al-Amin, “The Trustworthy,” for his personal integrity and fair business dealings. Second, as has been shown, private water rights, separate from land, are allowable for even so precious a commodity as water. Sadr (this volume) notes that in the early Islamic state, as the economy grew, markets for water were established: the first medium of exchange was crops, then the water itself, and finally money.

In a further endorsement of fair markets, the Prophet refused to fix prices for goods in the market, including water, except in special circumstances. In fact, most Muslim scholars agree that a just price for water is that determined by the market, providing that the market is free from unfair practices such as collusion (Khomeini 1989, 4:318–19). This little-known Islamic concept suggests three things. First, a fair price may include not only full cost recovery, but also a fair profit related to the equilibrium price for a good in the market. Second, considering Islam’s concern for the protection of the environment, a fair price can also include the cost of treating the wastewater that results from the water’s use.

Third, privatization is allowable in the water sector. In Iran, municipal water and sewer companies were established under the 1990 Act, which set the legal foundation for private-sector participation in urban water affairs.

Even if full privatization of the water sector is allowable in Islam, that does not mean that it is desirable. Instead, as is generally the consensus in the rest of the world where the private sector participates in providing water services, public-private partnerships are recommended, where the government maintains its “ownership” of water for the community, and allows the private sector to deliver (withdraw, treat, and distribute) water and sewerage services, but regulates the sector to ensure equitable access and also to ensure that quality standards are maintained.

Intersectoral water markets

Faruqui (this volume) argues that enhancing equity means that it is time to take a hard look at how freshwater is allocated in the MENA. Although some water can be saved through domestic conservation practices, the amount is limited because people in MENA already use water very carefully. Rapidly growing populations mean that more water will have to be allocated for domestic purposes.

Where will the water come from? Although the ratio varies from country to country, typically water is allocated in the MENA 10 per cent to industry, 10 per cent to the domestic sector, and 80 per cent to agriculture. Domestic demands are growing and, as MENA countries begin to industrialize, so will the demands of industry – even with recycling – and the water will have to come from agriculture. For instance, Israel’s policy is that as urban populations grow, the first priority in water allocation will always be for domestic-urban uses and then industrial needs, followed finally by agriculture (Lundqvist and Gleick 1997). Given the current rate of urbanization, and an unchanging combined urban water consumption rate of 342 LPCD, by 2030, 80 per cent of the fresh water will be used in cities and 20 per cent in agriculture in Israel.

What will be the mechanism of the intersectoral transfer in the MENA? Many recommend allowing the market to reallocate the water. Even with low tariffs, in most cases, the value of water is at least ten times higher in urban areas than it is in agriculture (Gibbons 1986).

What about national food self-sufficiency? An intersectoral transfer policy must be accompanied by increasing urban wastewater treatment, and recycling as much water as possible back to agriculture. Israel plans to reduce its total freshwater volume allocated to agriculture from 70 per cent in 1996 to 20 per cent by 2030. This will be accompanied by an
expansion of wastewater treatment so that 80 per cent of urban wastewater will be treated and recycled back to agriculture. This will leave the country with essentially the same amount of water for agriculture as it has at present.

The hard reality is that most MENA countries simply do not have sufficient water for national food self-sufficiency, so this concept must give way to one of national food security (Lundqvist and Gleick 1997, 22), or regional food self-sufficiency, and imports of “virtual water” through the purchase of goods and products produced where it is most efficient. In addition to Israel, water-poor countries such as Botswana have already accepted this fact; and the latter does not have a policy of food self-sufficiency but tries to ensure food security by annual negotiations with suppliers of cereals. Shuval (cited in Lundqvist and Gleick 1997) suggests that a small amount of freshwater, 25 m$^3$/p/y, should be reserved for domestic production of fresh vegetables, which have high economic and nutritional value. Some of this production may be met by the growing practice of urban agriculture – intensive vegetable production may use as little as 20 per cent of the water, and 17 per cent of the land, used by rural, tractor-cultivated crops (UNDP 1996). Such urban garden vegetables will usually be cheaper for the poor than imported ones. Where feasible, most other crops in arid countries will have to be grown, increasingly and eventually solely, with treated wastewater.

Regulated water markets have been successful in developed countries such as Chile and the United States. In 1991, during a drought period, the California Water Bank purchased water from farmers for about US$0.10 per cubic metre, representing 25 per cent more benefit than the value of the water if used for planting a crop. The water was then sold at an average price of US$0.14 per cubic metre to supply critical urban and agricultural uses (Bhatia and Falkenmark, 1993). In Jordan, the government paid farmers US$120 per hectare for not planting vegetables and annual crops in 1991, a clear case of trading established water rights (Shatanawi and Al-Jayousi 1995).

Are intersectoral water markets allowable in Islam? Two main prerequisites of water markets are that clear rights must exist to water separate from land and that those rights must be tradable. As already discussed, according to sharia, for most categories of water, these prerequisites exist. However, is intersectoral reallocation desirable from an Islamic viewpoint? The priority of use in Islam has been presented, and irrigation has third priority. Obviously, as a population evolves from rural and agrarian to urban and industrial, reallocation is not only permissible, but is required to preserve equity, and the primacy of the right to quench thirst.

In fact, intersectoral transfers through water markets are inevitable.

Already, the growing scarcity of water and its high black-market price have resulted in unregulated water markets all over the MENA, including in Jordan and Palestine. Unregulated markets without necessary legal, institutional, and economic measures in place can lead to unsustainable practices such as in India, where groundwater tables have dropped alarmingly as a result of farmers selling their water to other farmers or cities – ironically, by pumping with subsidized energy.

Governments need to set a vision for national water allocation, and regulate the sector, so that transfers will be slow, constant, and thoughtful. Using the above values, if we assume that one hundred units of renewable water are available to a country as a whole, transferring eight units from agriculture requires only a 10 per cent increase in sectoral efficiency, but this nearly doubles the amount available for domestic purposes and is not considering that the same volume, in treated wastewater, may be returned to irrigation, where feasible. In fact, demand management in rural areas is far more likely if users have an economic incentive to voluntarily trade their water use rights. Also, it has been proven that it is possible not only to maintain agricultural production, but even to increase it while reducing the use of water, especially when beginning with the low-efficiency irrigation practices common in most MENA countries. In Africa, for example, in Kenya (Machakos) and Niger (Keita), increases in agricultural production have been achieved while reducing the use of water by reversing land degradation (Templeton and Scherr 1997).

However, in contrast to the wave of neoclassical economics engulfing the world, which at times becomes almost a religion in itself, the rationale for the reallocation is not economic; it is social – the desire to enhance equity. A market approach is merely a tool that a government can use to increase fairness in its society. If regulated water markets are to be used as a tool by MENA governments, then they must put in place legal, institutional, and regulatory mechanisms to ensure that the markets operate fairly and efficiently. Primary among these are institutional mechanisms that will allow for community input and participation in the process (see next section) so that the hard choices necessary for equitable allocative efficiency are made by everyone concerned. However, most developing countries do not yet have the legal, institutional, regulatory, and economic prerequisites to establish sustainable and equitable water markets.

Integrated water management

Biswa set the context for a discussion on integrated water management at the workshop. The 1992 United Nations Conference on Environment
and Development in Rio de Janeiro affirmed that "The holistic management of freshwater as a finite and vulnerable resource, and the integration of sectoral water plans and programmes within the framework of national economic and social policy, are of paramount importance for actions in the 1990s and beyond." Simply put, integrated water management should address all water resource management issues in relation to each other, and to the water sector as a whole, with the ultimate goal of promoting equity, efficiency, and sustainability. Because the water resource sector has many vertical and horizontal linkages, such a system cannot exist without an integrated approach that can determine both micro- and macro-level effects of decisions and practices carried out throughout the sector. Biswas highlights some elements of water resource management that need to be integrated. These include:

- Water quality and quantity;
- Technical, environmental, and social issues;
- Land and water uses;
- River basin, estuarine, and coastal management;
- Legal frameworks (that is, cohesive systems of laws and policies); and
- Community-based, national and international water resource management.

Some attempt has been made to establish an Integrated Water Resources Management (IWRM) framework. For example, Agenda 21, Chapter 18 of the Rio de Janeiro conference lists a number of IWRM programme activities. This is a good first step, but developing an integrated water management framework is one thing and actually practicing it is far more difficult, even for developed countries. Far more research and additional pilot projects are required to identify how these components should be integrated and who will integrate them.

The workshop was able to touch upon some aspects of Islam and integrated water management by looking at three levels of management: local, national, and international.

**Community-based water management**

Development practitioners and policy-makers are beginning to accept the principle that water management should be decentralized and that priorities should be set and decisions made at the lowest appropriate level. In many cases, participatory approaches in which local communities help plan, pay for, implement, and run projects that concern them are more likely to be sustainable. For instance, in Uganda, a national policy of decentralization and user-pay has doubled the coverage of water supply from 18 per cent in the 1980s to 36 per cent in 1996, and coverage for sanitation has risen from 20 per cent to 45 per cent during the same period (Lundqvist and Gleick 1997). IDRC is currently supporting a study in India and Nepal that examines the use of local strategies for WDM and conservation to increase water supply and sanitation coverage.

Almost no abstracts were submitted for the workshop on the Islamic perspective relating to decentralization and community participation, and it is evident that further research is necessary in what is a very complex topic. However, based on an informal presentation made by Saeeda Khan of IDRC to initiate debate, and the discussion that followed, consensus among workshop participants was reached on four main points.

First, in contrast to the centralized decision-making system in many Muslim countries, the input of the community on any matter that concerns it, including water management, is mandatory in Islam. In the Quran, believers are defined as those who, among other things, "(conduct) their affairs by mutual consultation." This approach is required by all leaders in Muslim countries and was even required of and followed by the Prophet Muhammad (pbuh) himself.

Second, according to Islam, this consultation is required of all those who are entitled to a voice, including women. In addition, because women are mainly responsible for collecting water in developing countries and are consistently more concerned about the related issues of hygiene and waste management, their input is as important as or more important than that of men. Yet women in most developing countries – regardless of religion or culture – have historically been left out of decision-making. Certainly, in most Muslim countries, despite the rights accorded to them by Islam fourteen hundred years ago, and the Prophet’s consultation with his wives and other women, decision makers, who are almost all men, often do not follow the example set by him.

Third, both true community participation and Islam require communities and individuals to be proactive. As noted by Lundqvist (1997), "users must assume responsibilities (including paying fair prices) alongside rights and benefits." One cannot simply sit back and complain that the government has not provided water or wastewater services. Social responsibility begins with individuals and Muslims must help themselves and their communities, as enjoined by the following hadith: "No doubt, one had better take a rope (and cut) and tie a bundle of wood and sell it... rather than ask another who may give him or not."41

Fourth, because equitable water management ultimately depends upon a concern for fairness at the individual level, this change necessarily has to happen at the grassroots level. People learn from those nearest them, and individuals in positions of respect, whether for their values or the level of their education, carry a responsibility to propagate concepts such as equity, conservation, environmental protection, and self-help, and to
act on them within their own communities. Because these concepts are neither exclusively religious nor exclusively secular, educated religious leaders carry an added responsibility because their knowledge of these issues is reinforced by both their religious and secular knowledge. Many successful community development projects can be attributed to the proactive leadership and examples shown by educated individuals with strong values such as Mother Theresa in the slums of Calcutta or Dr. Akhtar Hameed Khan of the Orangi Pilot Project in Karachi, who inspired and motivated the community and led by example.  

National-level water management

No abstracts were submitted for the workshop on the Islamic perspective on national-level water management. Furthermore, in general, little work has been done on the integration of local, regional, and national-level water management. However, a few points can be made here.

If Islamic water management is distilled into one principle, it is water management that balances equity for all of God’s creatures as a whole. A nation-state cannot balance equity, efficiency, and sustainability across society without taking a holistic approach that acknowledges the interdependence of water issues.

Principles such as equitable tariffs for the society, protection of the environment, and food security require a discussion and integration of technical, environmental, economic, and social policies that must be sustained by grassroots input, but must ultimately be discussed at national level. The effects of increasing urban water prices and perhaps even irrigation prices can only be analysed at a national level because some effects, in the short term at least and perhaps in the longer term, will be negative, but others will be positive. For instance, raising water prices for those who can afford them may make it possible to serve the unserved poor who currently pay very high prices, and lead to greater equity for the society as a whole – nicely put by the Global Water Partnership slogan, “Some for all, instead of all for some.”

The hadith “Do not commit any harm or injury to yourself, and do not cause harm or injury to others” and those outlined in the preceding section on rights of the environment, collectively instruct Muslims not to conduct acts that will harm themselves, other creatures, or the environment. This principle cannot be properly upheld if a nation-state does not have a monitoring system to gauge harm to all creatures and the environment. This requires the integration of social, economic, and environmental policies and the development of laws and enforcement of them to protect land and water resources. It also implies the need for environmental, social, and health-impact assessments.

Water reallocation requires that hard decisions be made by all those concerned so as to make fair choices. The inevitable choice of moving from a policy of food self-sufficiency to food security necessarily requires an integrated set of policies and discussions among departments of trade, tourism, industry, water, and agriculture. Because states must be able to earn enough foreign currency from industrial exports and tourism to purchase food produced elsewhere in the world, they must have stable trading relationships (implying just peace between neighbours, see below), and the political situation must be such that food cannot be withheld for political purposes. Also, reallocating water from agriculture to urban areas will leave some farmers jobless, and alternative employment strategies and social safety nets must be considered at the national level by various ministries.

International water resource management

Ultimately, water management principles must guide interactions not simply between individuals, but also between sovereign states, because water does not follow national boundaries. In the Middle East, for instance, the Nile basin is shared by ten countries and the Rum Aquifer is shared by Jordan and Saudi Arabia. Little has been written about Islam and international water management, but Hussein and Al-Jayousi’s essay in this volume explores the topic and offers some preliminary conclusions. Internationally, the latest consensus in global water management is reflected by the thirty-three articles drafted by the International Law Commission and approved by the United Nations General Assembly in 1997. The convention is now awaiting ratification by member states. Its four most important principles are:

- Equitable and reasonable utilization of international rivers (Article 5);
- Avoidance of significant harm and compensation (Article 7);
- Cooperation among riparian states (Article 8); and
- Protection and preservation of international rivers and associated ecosystems (Articles 5, 8, 20, and 21).

These international law principles are in harmony with Islam because they are based on universal values. These values are embodied in the Islamic concepts that water is a gift from God to his creatures and hence that all of creatures have the right to use water to quench their thirst, that water should be apportioned equitably for other uses, and that no one has the right to withhold surplus water from others. A further concept, of avoiding significant harm to others, is emphasized by the hadith concerning committing harm or injury to oneself and to others as well as by another hadith, “He who eats to his fill while his neighbour goes without food is not a believer,” which is applicable to drink as well as food. “Neighbour” can
be considered as an individual or as a neighbouring state, whether Muslim or of another faith. Also, if harm does occur, according to sharia, it carries a liability – that is, the one against whom it is committed must be compensated. In addition, relevant universal values are embodied in the Islamic requirement of shura (consultation on all matters of mutual interest), as well as in the emphasis in Islam on protecting and preserving water and its ecosystems by avoiding fassad (mischief or harm).

In practice, however, the convention, even if ratified by all UN member states, will only be an unenforceable guideline, and there are currently many international water-sharing disputes where nation-states are not following these principles. For example, the per capita water usage in Israel is about 330 LPCD, whereas in Palestine it is about 50 LPCD. If there is to be just peace in the region, Israel and Palestine will have to co-manage the mountain aquifer underlying Israel and the West Bank, and share its water equitably, and the IDRC is currently supporting a research project on the joint management of the aquifer. Similarly, Iraq, Syria, and Turkey must work out an equitable agreement to apportion their shared waters. Because the international water management principles are strongly and explicitly supported by Islam, some workshop participants suggested that predominantly Muslim nations should take water-sharing disputes to an Islamic council authorized to mediate and judge on disputes. Although negotiations for equitable water sharing between states are difficult, they are not impossible, particularly when mediated – as was shown by the 1960 Indus Basin Treaty between India and Pakistan, brokered by the World Bank, which prevented war between the two countries. Islamic sharia provides legal standing to any contract or obligation that has been made between two parties and makes this contract binding.

Islamic water management principles

The workshop participants reached a consensus on Islamic water management principles under the following headings: water as a social good; water demand management; and integrated water resources management. The overriding principle under all three is that of ensuring equity.

Water as a social good

- Water is first and foremost a social good in Islam – a gift from God and a part of, and necessary for, sustaining all life.
- Water belongs to the community as a whole – no individual literally owns water.

- The first priority for water use is access to drinking water of acceptable quantity and quality to sustain human life, and every human being has the right to this basic water requirement.
- The second and third priorities for water are for domestic animals and for irrigation.
- Humankind is the steward of water on earth.
- The environment (both flora and fauna) has a very strong and legitimate right to water and it is vital to protect the environment by minimizing pollution. Individuals, organizations, and states are liable for harm that they have caused to the environment or to the environmental rights of others, including water use rights.
- Water resources must be managed and used in a sustainable way.
- Sustainable and equitable water management ultimately depends upon following universal values such as fairness, equity, and concern for others.

Water demand management

- Water conservation is central to Islam. Mosques, religious institutes, and religious schools should be used to disseminate this principle so as to complement other religious and secular efforts.
- Wastewater reuse is permissible in Islam; however, the water must meet the required level of treatment to ensure purity and health for its intended purpose.
- Full cost recovery is permissible: that is, the full cost of supplying, treating, storing, and distributing water, as well as the cost of wastewater collection, treatment, and disposal. However, water pricing must be equitable as well as efficient.
- Privatization of water service delivery is permissible in Islam, but the government has a duty to ensure equity in pricing and service.

Integrated water resources management

- Water management requires shura (consultation) with all stake-holders.
- All community members, including both men and women, can play an effective role in water management and should be encouraged to do so.
- Communities must be proactive to ensure equitable access to water resources.
- All nation-states have an obligation to share water fairly with other nation-states.
- Integrated water management is a necessary tool to balance equity across sectors and regions.
Recommendations

The workshop’s recommendations are directed at varying audiences. The recommendations are not made specifically to the IDRC, the International Water Resources Association (IWRA), or the Inter-Islamic Network on Water Resources Demand and Management (INWRDAM), although some recommendations may be relevant depending upon the mandate of the organization. In some cases, the recommendations are relevant to any water specialists, donor agencies, or policy-makers and, in other cases, they are specific to a Muslim audience.

Water as a social good

- Cooperation and sharing of knowledge of water resource management should be encouraged among Muslim scientists and countries by developing a network to promote equity.
- For the same purpose, cooperation and sharing of knowledge of water resource management should also be encouraged among scientists and countries regardless of religion.

Water demand management

- Non-economic incentives for conserving water, as well as penalties for wasting it, should be identified.
- Wastewater should be properly treated and reused.

Integrated water resource management

- Muslim countries need to agree upon the mandates of various existing international Islamic organizations, empower them to rule on conflicts over water use rights between Muslim states, and abide by their decisions.
- In disputes between Muslim states and those of other faiths, all parties should comply with fair and just rulings by appropriate international organizations.

Further research

The workshop’s recommendations for applied research projects or studies address questions left unanswered by the workshop, specific gaps in knowledge identified at the workshop, and proposals made by others to realize concrete benefits from new insights at the workshop. Although the suggestions were discussed at the workshop in detail, they have been left fairly general here, to allow interested parties to identify specific objectives and elements.

The suggestions are made particularly to policy-makers and to donor agencies, but the audience for each suggestion depends upon its nature. For instance, applied research particularly concerned with Islamic issues may be beyond the mandate of such organizations as the IDRC or the IWRA, and may be more relevant to such organizations as the Islamic Development Bank (IDB) and INWRDAM.

Water as a social good

- Conduct rigorous scientific surveys of equity of access to water and sanitation, by identifying the volume, quality, and price paid in the MENA by both the unserved poor in the informal sector and the served middle- and high-income classes. The surveys should capture such information as price paid per capita, percentage of income spent on water, and willingness to pay.
- Investigate the priority of rights to water relevant to current economic, demographic, and settlement patterns, in particular clarifying the rights of the environment and the right of wild animals and flora to water.

Water demand management

- Conduct a wide-ranging pilot study to integrate religious elements into a comprehensive programme of public education and awareness projects to encourage conservation and reuse, with particular emphasis on women and girls, who are often left out of such programmes because their religious learning does not occur in mosques or schools.
- Examine water tariffs, including the elasticity of water demand in different sectors and under different conditions, willingness to pay for improved water quality, tariff structures, and modalities of subsidies (on water, income, with stamps, and so on) for the poor.
- Investigate how intersectoral water reallocation using markets may be carried out more equitably by examining such issues as: Effect of unregulated markets; Development of models to analyse the social, environmental, and economic effects of intersectoral reallocation; Farmers’ willingness to sell freshwater use rights to the domestic and industrial sector in exchange for treated wastewater; Methods for monitoring third-party effects; Institutions that could serve as an interface between buyers and sellers; and
Legal reforms and private and state ownership of surface and groundwater rights.
- Explore methods to improve the efficiency and equity of water use in rural areas, including traditional and indigenous practices and technology.
- Use pilot decentralized, community-run, low-cost, real-world-scale wastewater treatment and reuse projects in a variety of conditions to methodically investigate how to make such projects sustainable.

**Integrated water resource management**

- Analyse models of community-based water management and stakeholder participation:
  - Identify contemporary and historical case studies (successes and failures) of community management in the Muslim world and regions of other faiths and develop models for dissemination;
  - Assess how to move beyond simply involving communities and water users’ associations in decision-making and to empower them;
  - Explore how to develop the common interest between communities; and
  - Develop gender analysis of community-based water management projects in Muslim countries – models for more effectively bringing women into community-based water management.
- Investigate how to take the concept of integrated water management from theory to practice, using various means, for example, by examining successful case studies.
- Research more specific and operational principles of international law, consistent with Islam, including historical practices.

**Conclusions**

Before it came to mean simply “law,” the Arabic word *sharia* denoted the law of water (Mallat 1995). It is, therefore, not surprising that a detailed examination of the Quran and the *hadith* shows that Islam makes a remarkable number of specific statements about water management.

There is no contradiction between what Islam says about water management and the emerging international consensus on the issue, as reflected by recent accords such as the Dublin Principles or the UN Water Convention. In fact, the Islamic water management principles are not unique. Some of the same principles could be derived by studying other faiths, their holy books, and the lives of their prophets. As one delves into Islam, one encounters values common not only to the other two Abrahamic religions, Christianity and Judaism, but also to many other worldviews and religions. But clean water has always been scarce in the Middle East where Islam emerged and where for many centuries most Muslims lived, whereas water has only recently begun to become scarce in regions such as Europe where for many centuries the majority of Christians lived. Hence, the rules governing water management are probably more specific and detailed in Islam than in most other religions.

The principles, recommendations, and suggested further work outlined at the workshop were noted in the previous section. The most important findings are as follows.
- Water is a social good owned by the community. Provided that equity is maintained, as in Iran where all urban residents receive a lifeline volume of water free to meet their basic requirements, Islam allows for private sector involvement in service delivery, and up-to-full-cost recovery for water and wastewater treatment services.
- In contrast to the current situation in the MENA, the priority of water rights is first, domestic uses; second, livestock watering; and third, irrigation. The environment has very strong and specific water rights, and individuals, organizations, and states are liable for harm that they have caused to the environment, which allows for “polluter pays” legislation.
- As indicated by the *fatwa* and actual practice in Saudi Arabia, wastewater reuse is allowable, and encouraged where necessary, provided that the water is treated to the extent that makes it safe for its intended use.

The workshop suggests that further studies and investigation are required, in areas such as Islam and community-based water management. How Islam, or other belief systems, can be integrated, along with a whole number of other factors, into holistic water management is a larger question.

Further studies of this nature are likely to be beneficial for more effective and equitable water management. The study that led to the *fatwa* in favour of wastewater reuse in Saudi Arabia demonstrated two things: first, *ijithad*, or innovation, is permissible, relevant, and necessary in today’s world; and, second, the specific objectives of Islam, and other religions, are a reflection of the religion’s values, such as maintaining equity in society, and are timeless and unchangeable. Some of the means of attaining these objectives, such as mandatory *zakath*, the charity tax, which is one of the Five Pillars of Islam, are also unchangeable. However, other practices to achieve the objectives, such as reusing treated wastewater to conserve water so that all may share in its benefits, can and must change depending upon specific conditions.

Finally, even though water has always been scarce in the Middle East,
per capita availability of clean water has dropped alarmingly only in the past decade, and the rate of decline is accelerating. In other words, up to now, we did not face a water crisis in the Middle East or elsewhere. Muslims, like other people, tend not to react to crises until they are upon them. So the time when Islamic water management principles are likely to become most relevant to Muslims is only now upon us. Important water demand management policy instruments, which must be used to combat this crisis are:

- Encouraging family planning to reduce high birth rates, where appropriate;
- Diverting fresh water from irrigation to domestic and industrial uses;
- Treating domestic and industrial wastewater and reusing it for irrigation;
- Protecting the environment, including legislating and enforcing liability for harm;
- Conserving water in all sectors;
- Exploring private-public partnerships for water services delivery and regulation; and
- Decentralizing water management and managing it at the community level.

These measures all have strong, specific support in Islam, more so perhaps than in other belief systems, which may make it easier to introduce such policies, if they are accompanied by comprehensive public awareness programmes, including religious elements.

Notes
1. 47:12.
2. 16:65.
3. 21:30.
4. Muslim 1411.
5. Al-Bukhari 1.12.
7. 59:7.
8. Abu-Dawood 3470.
9. 638.
10. Al-Bukhari 8.38.
13. 699.
14. 35:77.
15. 2:11.
16. Muslim 553.

17. For the period covering 1995–2015, the average urban growth rate for LDCs is 2.9 per cent, in contrast to 3.2 per cent for the MENA countries in which IDRC supports projects: Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria, Sudan, Tunisia, and Yemen.
18. 40:18.
19. 7:31.
22. A full discussion of the importance of personal cleanliness in Islam is beyond the scope of this chapter. However, Islam has very specific and detailed rules, easily referenced in the Quran and the hadith, for maintaining cleanliness including wudu, ablution before prayer; ghul, bath after sexual intercourse and before prayer; trimming body hair from underarms and intimate areas; and proper washing, with water, after defecation.
23. The type of treatment will vary, depending on specific local conditions such as type of soil, land availability, and the intended end use of the wastewater. For more information on IDRC-supported applied research projects on waste treatment and reuse in the MENA (Egypt, Palestine, Morocco, and Senegal), contact Naser Faruqui at IDRC’s Cities Feeding People Program.
25. 18:46.
28. The principle “water is an economic good” was worked out in a very general way at the 1992 UNEP Dubai Water Conference because, among other reasons, some participants from predominantly Muslim countries argued that selling water was against Islam (A. Bawas, personal communication).
29. Muslim 1727.
30. For instance, one has the right to trespass on private lands to satisfy thirst if one’s life or health is threatened, and no one has the right to hold back surplus water (Al-Bukhari 9.92).
31. Muslim 3798.
32. In Ivory Coast, in 1974, only 30 per cent of the urban population and 10 per cent of the rural population had access to safe water. By 1989, 72 per cent of the urban population and 80 per cent of the rural population had access to safe water (water points). This occurred because the private water company Société de Distribution d’Eau de la Côte d’Ivoire was allowed to increase urban tariffs above the level of long-term marginal costs, especially for industrial customers (Bhattia et al. 1995).
33. Five thousand litres per household per month, assuming an average of six persons per household (Sadri, this volume).
34. In fact, the amount of freshwater left over for agriculture may be even less than 20 per cent if Israel eventually allocates some portions of the freshwater currently under its control to its neighbours to achieve a peace agreement (Shivvald, as cited in Lundqvist and Gleick 1997, 37).
35. Earth Summit CD-ROM, Agenda 21, Chapter 18, Section 18.6. (IDRC, Ottawa, Canada, FIS No. 92-0608).
36. Ibid., Section 18.12.
37. For more information on this project, “Local Strategies for Water Supply and Conservation Management (India, Nepal),” contact David Brooks, at IDRC’s People, Land and Water Program.
38. 26:38.
39. One characteristic of Muslims who truly worship and serve Allah is that “conduct in life is open and determined by mutual consultation between those who are entitled to a voice, e.g., in private domestic affairs, as between husband and wife, or other responsible members of the household; in affairs of business, as between partners or parties interested; and in State affairs, as between rulers and ruled, or as between different departments of administration, to preserve the unity of administration” (Yusuf Ali 1977, n. 4578).

40. One example of the Prophet Muhammad’s (pbuh) consultation and acceptance of his wives’ views is provided by the following hadith: “When the writing of the peace treaty (of Al-Hudaybiya) was concluded, Allah’s Apostle said to his companions, ‘Get up and slaughter your sacrifices and get your heads shaved.’ By Allah none of them got up, and the Prophet repeated his order thrice. When none of them got up, he left them and went to Um Salama (his wife) and told her of the people’s attitudes towards him. Um Salama said, ‘O the Prophet of Allah! Do you want your order to be carried out? Go out and don’t say a word to anybody till you have slaughtered your sacrifice and call your barber to shave your head.’ So, the Prophet went out and did not talk to anyone of them till he did that, i.e., slaughtered the sacrifice and called his barber who shaved his head. Seeing that, the companions of the Prophet got up, slaughtered their sacrifices, and started shaving the heads of the one another’” (Al-Bukhari 3:83).


42. The Orangi Pilot Project was a highly successful community-based water management initiative of the 1980s. It was designed to provide low-cost sewage disposal and sanitation services to the low-income settlement of Orangi on the outskirts of Karachi, Pakistan (Hassen 1994).


44. Shur’ah Al-Imam-Baihaqi.

45. For more information on this project, contact David Brooks at IDRC’s People, Land and Water Program.

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Islamic water management and the Dublin Statement

Odeh Al-Jayyousi

In the last two decades, the need for new approaches to the assessment, development, and management of freshwater resources has been emphasised at various global meetings. According to the United Nations Development Programme (UNDP 1990), integrated water resources management is based on the perception of water as an integral part of an ecosystem, a natural resource, and a social and economic good. The International Conference on Water and the Environment: Development Issues for the Twenty-First Century, held in Dublin in January 1992, called for new approaches to the assessment, development, and management of freshwater resources (UN 1991; UNEP 1992). Moreover, the United Nations Conference on Environment and Development in Rio de Janeiro in June 1992 confirmed the widespread consensus that the management of water resources needs to be reformed. The conference stated that “The holistic management of freshwater as a finite and vulnerable resource, and the integration of sectoral water plans and programs within the framework of national economic and social policy are of paramount importance for actions in the 1990s and beyond” (World Bank 1993, 24).

Necessary conditions for the success of these approaches include: public awareness campaigns, legislative and institutional changes, technology development, and capacity-building programmes. Underlying all these must be a greater recognition of the interdependence of all peoples, of their norms and values, and of their place in the natural world.
Water management in Islam

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