

Review

Water conservation through Islamic public awareness in the Eastern Mediterranean Region

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Introduction

The World Health Organization (WHO) Eastern Mediterranean Region (EMR) comprises 23 countries with a population of approximately 436 million. The majority of EMR countries are in arid or semiarid zones with low to average annual rainfall. Except in a few countries, i.e. the Islamic Republic of Iran, Iraq, Pakistan and Sudan, scarcity of water resources is a severe problem. In all, 11 countries — Bahrain, Cyprus, Jordan, Kuwait, Libyan Arab Jamahiriya, Oman, the Palestinian Self-Governing Authorities, Qatar, Saudi Arabia, United Arab Emirates and Republic of Yemen — are already consuming more than 100% of their renewable resources [1].

Because of the experiences of moderately developed countries in arid zones, renewable freshwater resources of 1000 m³ per capita per year have been proposed as the approximate benchmark below which most countries are likely to experience chronic water scarcity sufficient to impede development and harm human health [2]. By this measure and 1990 records, 20 countries already suffer from water scarcity of which 11 are in the EMR: Bahrain, Djibouti, Jordan,

Kuwait, Qatar, Saudi Arabia, Somalia, Tunisia, United Arab Emirates, Republic of Yemen and the Palestinian Self-Governing Authorities. Unfortunately it is expected that by the year 2050, 9 additional EMR countries will face the same crisis: Afghanistan, Cyprus, Egypt, Islamic Republic of Iran, Lebanon, Libyan Arab Jamahiriya, Morocco, Oman and Syrian Arab Republic [3]. In a similar analysis, the World Bank projected that the annual per capita renewable water in the Middle East and North Africa will have dropped from 3430 m³ in 1960 to 666 m³ in 2025 [4].

Several additional factors contribute to the potential for water shortages in the Region by limiting the available supply. Among the most serious is water pollution from a variety of industrial, municipal and agricultural sources. Inefficient water resource management is another important factor which adds to water shortages and limits available supplies. Domestic water use in the Region varies between 5% and 30% of all water use and is expected to rise as the population grows and urbanization continues. Agricultural water use comprises the largest share in the Region and is 80% on average. The economic returns of

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Received: 30/09/98; accepted: 01/07/99

using freshwater resources in agriculture are not optimal and water is not used efficiently. Commercial and industrial water uses are often reported under municipal water use and therefore their share of water resources is not well known. Records and studies in some EMR countries indicate excessive and wasteful use of water among all users. Water losses of at least 70% in agriculture arise from inefficient irrigation systems. Furthermore, there is 50% leakage from water supply networks and general 10% losses in industrial use [4].

Many countries of the Region have virtually tapped all their natural water resources. The potential for developing other renewable sources is limited. Developing alternative water resources is costly and unaffordable for many countries. In this critical situation immediate action by governments, water users and donors must be taken together in partnership. Fragmented, supply-oriented approaches to water development must give way to integrated water resource management with emphasis on a partnership between water suppliers and water users and on the conservation both of quantity and quality.

Water conservation: current practices

Water conservation entails a complex interconnected system that includes a variety of aspects ranging from consumer education to advanced technological equipment. Water conservation includes: programmes and techniques designed to curb domestic, agricultural and industrial water use; wastewater reduction, treatment and reuse; and supply-demand and replenishment-depletion relationships, energy consumption and environmental concerns. All aspects must be considered in relation to economic, so-

cial, religious, political, legal and aesthetic ties [5,6].

Water conservation concepts have changed drastically from fragmented supply-oriented activities towards an approach which integrates supplier-user partnerships. Under the Dublin Statement and Agenda 21, future water conservation strategies are to integrate water conservation as a basic component of integrated water resource management focusing upon public awareness and education to guarantee the involvement of the public [7,8].

Public awareness

Public awareness is an essential component of water conservation programmes and therefore the cooperation of everyone, including consumers, service providers and policy-makers in designing and implementing conservation measures is essential. Both education and raising awareness are indispensable if attitudes are to be changed. To achieve greater cooperation and involvement, the public must be made to understand its water supply situation. This includes the cost of delivering water, water resource status and conservation needs, and the objectives of water conservation. The public needs to be aware of its role in conserving water resources. This should be done with consideration to the physical, biological and socioeconomic environment and to human development by using effective formal and informal methods of communication [9].

Water conservation from an Islamic perspective

The religious focus of this paper is on Islam and its philosophy as the majority of the

population of the EMR are Muslims. We believe it is important to use Islamic administration, education system and teachings to increase and improve public participation and awareness in water conservation. Addressing the public of the EMR through the Islamic education system on important issues such as water conservation seems to be ideal. Over the past 10 years campaigning for the conservation of the environment within the Islamic faith has proved to be productive [10]. Hamdan et al. concluded, that there was a desperate need for Islamic environmentalism in the finite world [11]. Raising awareness with Islamic concepts is feasible for the reasons now described.

Islam has a strong influence in the EMR

This is well known in politics. However, the same is true for social and economic issues. Hundreds of charities and cooperative organizations in the Region are based on Islamic concepts. Involving Islamic concepts and teachings in all aspects of life is endorsed by most of the countries of the Region. Leading physicians, scientists, experts of jurisprudence and religious scholars from the 23 countries of the EMR, for example, have endorsed the importance of Islamic behaviour in promoting good health [12]. In their declaration they identified 60 lifestyle components in which Islamic teachings offer guidance on healthy and harmful behaviours. Water conservation and protection were among the areas of concern.

Water conservation is well documented in Islamic teachings

In Islam the relationship between humans and water is part of daily social existence. Humans are responsible for the welfare and the sustenance of all citizens of the world and it is believed that water is the most pre-

cious resource needed by all living creatures. This is well documented in the Holy Quran as well as in the *sunna* (practices undertaken or approved by the Prophet Muhammad ﷺ and established as legally binding precedents).

Water is mentioned in more than 80 verses of the Holy Quran [13]. The link between life and water is explicitly stated in several verses, e.g. *We made from water everything* (21:30) and *And Allah has sent down the water from the sky and therewith gave life to the earth after its death* (16:65).

Islam emphasizes the achievement of perfect harmony between spiritual and physical purification. Physical purification cannot be achieved except by ablution and bathing, both of which require pure or clean water. Because of this, purity and cleanliness of water receive much attention in both the Holy Quran and the *sunna*. Muslims are urged not to pollute water. The Prophet Muhammad ﷺ said: "Let no one of you urinate in stagnant water" (related by Ibn Majah); "Let no one of you bathe in stagnant water to remove the state of ceremonial impurity" (related by Muslim); and "Guard against the three practices which invite people's curses: evacuating one's bowels near water sources, by the roadside and in the shade" (related by Abu Dawood).

Conservation is a fixed concept in Islamic teachings. It is a way of living that should be implemented throughout a Muslim's life. It is not an ad hoc approach to shortages nor occasional but should exist in all circumstances [14]. Islamic teachings emphasize adherence to balance and the just satisfaction of individual and group desires and needs. Such teachings stem from verses of the Holy Quran such as: *O sons of Adam, Look to your adornment at every place of worship, and eat and drink, but be not prodigal* (7:31) and *the squanders were even brothers of the devils, and the devil*

was even ungrateful to his God (17:27). This holds for all natural resources although Islam does give special attention to water conservation. According to the tradition of the Prophet Muhammad ﷺ, a Muslim is ordered to be economical with water even if he takes water from a fast flowing river. The Prophet Muhammad ﷺ said to someone who used excessive amounts of water for ablution, "Do not waste water". Muhammad ﷺ was then asked whether there was waste if water was used for the purpose of ablution. He replied, "Even if you are taking from a big running river" and in another narration "in anything there can be waste" (related by Abu Dawood and Ibn Majah) [10,13]. Ibn Majah related that the Prophet Muhammad ﷺ said, "There is a *shaytan* (devil) for ablution called '*wal-han*', meaning greedy, avoid the waste of water".

Other Islamic concepts and rules, such as human appointment as vice-regent, co-operation and public participation, public consultation and the relationship between the public and governing bodies are well documented in Islamic teachings. They can be useful tools for raising awareness and involving the public in water resource management and conservation. Water conservation is not the sole preserve of water agencies. Everyone must participate in fulfilment of the Quranic injunction: *Cooperate with each other for righteousness and piety, not for wrongdoing and enmity* (5:2). The whole world has been placed under human responsibility to be cared for and not misused. Furthermore, God created human beings for a great reason, namely that they might act as viceroy upon the earth. Their mastery of the earth is for its betterment and development and not for evil or misuse. *And when thy Lord said unto the angels: "I am about to place a viceroy in*

the earth", they said: "Wilt Thou place therein one who will do harm therein and will shed blood, while we hymn Thy praise and sanctify Thee?" He said: "Surely I know that which ye know not" (2:30).

Enjoining of good and forbidding evil is an obligatory action, *wajeb*, that should be followed by all Muslims. This is a very important tool not only for raising awareness, but also for urging involvement and prohibiting harmful behaviour. *Those who follow the Apostle-Prophet, the Ummi, whom they find written down with them in the Torah and the Gospel who enjoins them good and forbids them evil (7:157).* "No harm, no harming" (related by Ibn Majah) is another legislative tool which can be used to declare official Islamic positions on water conservation issues. With this rule, every harmful action including wastage of water is forbidden, or *haram*.

Typical Islamic behaviour and action is guided by: "I heard the messenger of Allah as saying: 'He who amongst you sees something abominable should modify it with the help of his hand; and if he has not strength enough to do it, then he should do it with his tongue; and if he has not strength enough to do it, (even) he should (abhor it) from his heart and that is the least faith'" (related by Abu Saeed Al Khudri).

There are misinterpretations of some Islamic concepts. For example, the Prophet Muhammad ﷺ said: "People are partners in water, grass and fire" (related by Abu Dawood). This *hadith* is being used against water-pricing policies intended to reduce water demand. Some people claim that water should be supplied free of charge as it comes freely from the sky or from ground-water aquifers. This is an inaccurate interpretation. The partnership permits use of all elements of life and if one does not respect the implicit partnership he may lose his

rights. It is implied that measures should be taken to guarantee the continuity of this partnership.

Public awareness and Islamic communication channels

Islam is the means by which ambitions within the Islamic culture are expressed. One's belief in Islam may be viewed as a reflection of society's state of affairs, its reality and aspirations. Likewise, society's state of affairs and aspirations are reflections of the individuals' religious beliefs. These are intertwined and emphasize that morality drives the behaviour of society's building block, the individual. Morality overrides all physical benefits a Muslim might gain and hence is the basis for ethical change necessary for society [11].

The Islamic education system offers several forums for delivering Islamic teachings. Mosques are well respected in all Islamic countries. They continue to be the best forum for addressing the general public. Mosques exist almost everywhere. Messages that are delivered in them cover all aspects of daily life. There is a weekly opportunity, the Friday prayer, to address the public. Furthermore, in most Islamic countries, there are daily gatherings and lessons at which imams address people on important issues. In a field survey in Amman, Jordan, 63.5% believed that the imam of a mosque should have an important role in environmental education and public awareness. However, only 33.8% indicated that imams were doing so [15]. In Egypt one basic lesson learned from a major water conservation public awareness campaign was that the strategy of water conservation communication must be global and interactive and include all consumers and all people concerned, such as religious, political and informal community leaders [16]. In mem-

ber countries of the Gulf Cooperation Council it was concluded that conservation of natural resources in general, and water resources in particular, is a principal component of Islamic teaching. Because the population of these States is predominantly Muslim, the most effective way to make the public aware of conservation from an Islamic perspective is through the media and the educational system [17].

A basic rule in Islam is that everyone must be an educator within the family and the society as a whole. There is a specific *fatwa*, or formal religious legal opinion, that environmental education is *wajeb*, or an obligatory action that must be followed by all Muslims. Not fulfilling *wajeb* is sinful for Muslims. Such *fatwa* make all Muslims responsible for participating in environmental education [13]. Therefore, Islam provides a dynamic forum that can reach all the Islamic population whether in the house, street, school or mosque.

These are ideal tools for reaching the public in Islamic countries. Unfortunately, these tools are not being used efficiently. Fragmented, occasional and scattered activities have been implemented in some countries of the Region. In the few countries where religion has been used to support public awareness campaigns, it has been limited to the use of quotes from the Holy Quran and *sunna* in posters and newspapers. Water conservation efforts involve all people and behavioural changes are required. It involves effort and cost. It requires the full cooperation and integration of efforts of all stakeholders. Therefore, scattered activities will not achieve tangible results. Water resource management and conservation strategies that incorporate Islamic concepts in public awareness activities are needed.

Water conservation and public awareness activities within the Region

In most EMR countries there is a strong belief in water conservation as a reliable and cost-effective solution to the water shortage problem. This is clearly reflected in the recommendations made at regional and international meetings of water agencies as well as in the strategies of national and international groups. Water conservation has been given high priority in most countries of the Region [1,4,18-21]. Unfortunately, only water producers, i.e. water agencies and decision-makers, are giving this priority. Poor consumer participation indicates that the public is not fully aware of the problem. Although public awareness activities are being implemented in some EMR countries, these activities are fragmented and ad hoc.

A comprehensive literature search of water conservation public awareness activities in EMR countries was carried out. Very few documents were retrieved. This highlights two basic problems: a lack of such activities in the Region and poor information exchange and accessibility. Another major problem is that most conservation activities target domestic users with very little focus on agriculture and industry.

Regional and intercountry activities

The Centre for Environmental Health Activities (CEHA) of the WHO Regional Office for the Eastern Mediterranean promotes integrated water resource management as the best approach to improve access to safe water supplies in the EMR. Water conservation is an integral part of water resource management. Two intercountry meetings and several national meetings and special studies have been

held since 1991. The result was a draft water conservation strategy and a commitment to mobilize national resources to conserve water resources. Efforts are being focused on developing a handbook which will consist of 10 modules covering all related aspects of water conservation, including public awareness. This handbook is planned as a resource book for water authorities to launch water conservation actions. In order to avoid a duplication of efforts, CEHA plans to join with other regional and international agencies in the development and promotion of the handbook.

WHO has great experience in public awareness and education in the EMR through the integration of Islamic teachings in health education programmes. The Regional Office launched the programme "The right path to health: health education through religion." This programme covered environmental health, water and sanitation relevant to the Region and was specifically designed to reflect the influence of Islam.

The United States Agency for International Development allocated approximately US\$ 2.5 billion to implement its Near East Resources Action Plan (1993-1997) in Jordan, Morocco, Egypt and Oman. A substantial portion of the activities of this plan addresses water conservation and raising awareness [20]. Other international and regional agencies such as United Nations Environmental Programme (UNEP), World Bank, United Nations Economic and Social Commission for Western Asia, United Nations Educational, Scientific and Cultural Organization, United Nations Industrial Development Organization, Arab Centre for the Study of Arid Zones and Dry Lands, and International Center for Agricultural Research in the Dry Areas also address water conservation issues in the Region.

Afghanistan

WHO is active in the rehabilitation of the water and sanitation infrastructure and health education in Afghanistan. Among these activities is the "Health Education and Awareness through Mosques Campaign" which was launched in late 1997. This is a good example of the use of Islamic teachings in public awareness activities. It was the first of a series of campaigns that will be conducted in Afghan cities to impart correct health practices and to raise awareness about water conservation and the importance of safe water, adequate sanitation and hygiene in disease prevention. Mullahs were trained by a qualified religious person and water experts. They were provided with clear messages quoted from available literature. In the campaign, training the mullahs was an essential component. After training, each mullah prepared a special Friday speech and delivered it at two consecutive Friday prayers [1]. Initial evaluation indicated that messages were well received. Further evaluation is expected upon completion of the campaign series.

Countries of the Gulf Cooperation Council

In the countries of the Gulf Cooperation Council (GCC) (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates) demand for water has increased dramatically as a result of rapid development, an improved standard of living and diversification of economic activity. To meet this increase in demand, desalination is being developed extensively [17]. The very high cost of sophisticated desalination plants is putting pressure on the governments of the GCC countries. A shift in societal values from development to conservation of water resources is occurring. It is believed in GCC countries that conservation of natural resources in gener-

al, and water resources in particular, is a principal component of Islamic teaching and that the most effective way to make the public aware of conservation from an Islamic perspective is through the media and the educational system [17].

Following concerted governmental action, GCC countries optimized water use in the oil industry [21]. Similar success has been seen in wastewater treatment and reuse. Recently most GCC countries began to meter water and to charge reasonable costs to consumers with the aim of reducing demand. Water conservation public awareness campaigns are being conducted in most GCC countries. Islamic messages are being used in the posters and videos of these campaigns. On the occasion of World Water Day 1998 and upon the request of the ministries of Islamic affairs, imams devoted Friday speeches to "Islam and Water Conservation" [22]. Despite several water conservation public awareness campaigns that have been launched in the GCC countries, these efforts need to be integrated into a comprehensive, long-term plan of action which targets behavioural change. Most of the activities were implemented in close collaboration with the private sector.

Egypt

The National Community Water Conservation Programme (NCWCP) in Egypt was created to address problems of potable water loss. It did this through national and local conservation activities. NCWCP implemented massive communication activities through their Water Conservation Communication Strategy 1993-1996. As reported by Affifi [16], one of the main lessons learned was that the strategy of water conservation communication must be global and interactive, and include all consumers and all the factors concerned, such as religious, political and informal community

leaders. The incorporation of imams in the environmental education system has been promoted in Egypt since 1988. For example, a national training seminar for mosque imams and preachers was organized by the Institute of Environmental Studies and Research and UNEP in 1988.

Jordan

With funds from USAID, Jordanian governmental and nongovernmental organizations are implementing a US\$ 25 million project "Improved Quality and Increased Quantity of Water Available for Use on a Sustainable Basis". A major part of this project is devoted to public awareness activities using available forums and communication channels. Some of the materials, such as posters, games, newspapers clips, television programmes and seminars, target water consumers. Islamic teachings and concepts are used in some of the materials. Several Friday prayers have been devoted to water and conservation issues [23]. In early 1998, in collaboration with the Ministry of Religious Endowments and Islamic Affairs, a prototype was implemented called "Week of the Mosque". Imams from the mosques of Amman Governorate were trained for 1 week to incorporate daily life issues, including water conservation, in their Islamic education. They were provided with information on water resources and the shortage crisis faced by Jordan and the need for public cooperation in water conservation. After training, imams were to educate the public through their mosques on the issues. Similar activities will be implemented in the other governorates of Jordan.

Morocco

The National Office for Potable Water has finalized a comprehensive water conservation public awareness strategy for Morocco. Activities have already begun with early

signs of success. It was decided to use television shots of 15–20 seconds for all public awareness activities. None of the messages has been based on Islamic teachings, but instead the focus has been on cost of water and on health implications related to safe water [24]. Despite the success of these activities, they have targeted only the domestic sector.

Pakistan

Pakistan is the only country in the EMR that has prepared a comprehensive conservation strategy which addresses all environmental aspects. Among these aspects, water conservation was placed at the top of priorities. The strategy focused on community participation and involvement as a basic prerequisite for the success of any conservation activity in Pakistan. The strategy proposed comprehensive formal and informal education and communication policies to promote participation. Researching, documenting and communicating the cultural and religious bases of water conservation was recommended [25]. Although some elements of the strategy have been implemented, most of the activities were proposed for implementation with external funds. The strategy focused only on agricultural water and very little attention was given to domestic and industrial sectors.

Tunisia

In 1981 the World Bank predicted that 25%–37% of domestic water use in Tunisia could be reduced by implementing a comprehensive water conservation strategy [26]. Tunisia achieved more than was predicted after water conservation activities were implemented in all water-user sectors. Water losses from leaking distribution networks were reduced from 30.5% in 1982 to 27.5% in 1992 and there was a 3% drop in

overall water demand [27]. Tunisia's experience is unique in that it addressed all domestic, agricultural and industrial water users including the tourism sector. Water conservation activities were also accompanied by comprehensive public awareness programmes that targeted everyone including children, youth, farmers, tourists and industrial workers. Involving the public in water management through water societies seemed to increase the success of the water management programme. Islamic concepts and teachings were not used in the public awareness programme.

Guidelines for the development of water conservation public awareness programmes based on Islamic concepts

General guidelines

Initiation and supervision of water conservation programmes should be led by authorities responsible for water resource management. Water conservation in municipal, agricultural and industrial sectors should be entrusted to the relevant governmental entity in each. Close coordination should be formalized between parties responsible for water supply, for demand management and for education, media and awareness. Unfortunately ministries of education, religious endowments and Islamic affairs rarely participate in water conservation programmes in the Region. To launch effective awareness activities, the participation of these ministries is essential.

Public awareness is essential to the success of water conservation programmes. The involvement of all stakeholders in the design and implementation of conservation measures is necessary. This includes consumers, service providers, managers and

planners as well as policy-makers. Basing public awareness on Islamic concepts should not neglect any communication tools or channels as they all should be integrated into awareness activities.

The public must understand the cost of delivering water and the need to maintain and conserve water resources for future generations. This is the first step in any successful public awareness activity. Telling the truth is a basic principle in Islamic teachings; therefore, credibility and accountability should be the rule whenever public awareness is based on Islamic concepts. The public expects the truth from imams and other Islamic sources.

Although the Islamic education system is independent of any specific group of people, imams play a very important role delivering Islamic teachings and educating the public in mosques. Therefore, imams and mosques should be the backbone of water conservation public awareness activities. Imams should be properly trained and informed. As community leaders they should never be excluded from water resource planning and management activities.

In addition to mosques, all formal and informal education channels are essential to raise awareness and to deliver messages to the public. Water shortage and the need for conservation should be addressed in education. This can be done through the subjects of religion, science, Arabic and geography.

Most water conservation activities require change of behaviour and attitude. This is usually a slow process. Therefore, ad hoc public awareness activities are ineffective. Water authorities in close collaboration with ministries of education and Islamic affairs should plan continuous and long-term activities.

Some water conservation activities involve costs to be paid by the public. For example, fixing a water tap, upgrading an irrigation system or modifying the production lines in an industry. Therefore, water conservation programmes should involve incentives. In addition to tangible incentives, the moral and spiritual incentives offered by the Islamic approach should be promoted.

Although conservation, cooperation and other water conservation-related concepts are well understood and identified in Islamic teachings, there is a need to document these concepts and issue official Islamic positions (*fatwa*) from regional and national Islamic legislation institutes. Such *fatwas* will be very useful in convincing the public. It would be more effective, for example, to say that wasting water is *haram* than to tell people not to waste water because the Prophet Muhammad ﷺ said, "Do not waste water even for ablution".

Traditionally water conservation activities and awareness campaigns focused on domestic users only. This should be avoided and the focus should be on all water users. Mosques are ideal places for this as all kinds of people meet there weekly. Imams should be aware of the need to address all sectors.

Imams are usually well educated on *fiqh* (Islamic jurisprudence), *sunna* and *sharia* (the body of Islamic law based on the Quran) but their knowledge of water resources and conservation practices is not adequate for them to act as educators. They are, however, more capable of reaching the public than water specialists. Therefore, it is the responsibility of water specialists to train, educate and inform imams to educate the public about the issue. Imams should be educated about water shortages, water conservation practices and the need to involve

the public. Imams should also be provided with audiovisual tools and materials to help them reach the public.

Raising awareness through mosques

The Friday prayer held in mosques is an important weekly occasion in the life of a Muslim. The majority of Muslims do their best to attend this occasion. Therefore, it is a unique opportunity to address the general public on water conservation issues. Imams should prepare Friday speeches in close collaboration with water conservation and communication experts. The speeches should be based on reliable figures and reasonable proposals. They should not be occasional but should be planned with reasonable frequency to achieve behavioural change. It is recommended to increase frequency in the summer and during periods where demand is at its peak.

In most mosques imams offer daily religious lessons on various aspects of life. The audience at these lessons is not as large as at the Friday speech, but it is usually more religious and has the potential to act as educators for others. Therefore, this is also an important occasion that should be used to deliver messages on water conservation.

Raising awareness through the mass media

Newspapers articles, television slots, posters and other mass media tools are very effective in addressing the general public. Usually this is the responsibility of water authorities in collaboration with other environmental protection agencies. However, it is important to incorporate Islamic concepts and attitudes in these tools. This of course must be done in close collaboration with ministries of religious endowments and Islamic affairs.

Raising awareness through formal and informal education

Unfortunately, environmental education is in its early phases in most EMR countries. Therefore, the ultimate goal is to upgrade curricula to include environmental education among other subjects. Environmental education should address priority issues including water resources, protection and conservation.

Whenever changes to textbooks or curricula occur, water authorities should make use of the opportunities to include water conservation concepts in the new books and curricula. For example, in religion classes, water conservation concepts could be taught to students in the same way as any other *fiqh* or *sunna* subject. Examples from the Prophet Muhammad's life ﷺ can be given to students.

Because there is poor formal environmental education, informal education seems to be more feasible in the near term. Seminars, workshops and lectures should be arranged for students and other groups. It is important to incorporate Islamic concepts into such activities.

Recommended action and research

WHO/EMRO/CEHA has the capacity to deal with water conservation issues and public awareness based on religion. Moreover, links with all water-related agencies and professionals in the EMR as well as with regional and international bodies are already established. WHO/EMRO/CEHA is in the position to strengthen water conservation and public awareness activities and to initiate a new project that develops tools to incorporate Islamic teachings into public awareness programmes. Initiating a pilot programme in a limited geographical

area of the EMR would be useful due to the size of effort required for this area. Such a programme should have the flexibility to update tools before addressing the entire Region. As resources for such a project are very limited, cooperating with other regional and international partners and donor agencies is necessary.

Conclusions

By the year 2050, almost all EMR countries will be facing water shortages. Integrated water resource management seems to be the most feasible option to overcome this crisis. Water conservation should be an integral part of this option. To increase the chance of success, it should clearly focus on public awareness and participation.

Lack of access to information related to water conservation and public awareness activities is a problem in EMR countries. Limited activities and poor information management and exchange activities are the reason for this problem. Access to water conservation and public awareness information can be improved by compiling a database of all available literature documenting the experience of the EMR in this area. This database should be made available to water specialists as well as to the public.

Islamic teachings are full of concepts and tools, such as conservation, cooperation, preventing harm, water pollution and water protection that are useful for raising public awareness of water resource conservation. However, official Islamic positions towards these issues must be declared by regional Islamic legislative bodies. This will require close cooperation and coordination between water agencies and legislative bodies.

Islam is influential in the EMR; therefore, incorporating Islamic teachings and concepts will help public awareness programmes achieve their goals. Using the Islamic education system seems to be effective and reliable. However, this must be done in close coordination and collaboration with all stakeholders and should be integrated in water resource management activities. Occasional and local actions are ineffective and should be avoided.

Public awareness activities based on Islamic teachings and concepts should not be limited to mosques, but should extend to

the education system. This can be done by incorporating clear messages into materials taught in schools including religion, science, environment and Arabic literature.

Water conservation activities require behavioural changes. Such changes are usually slow. Therefore, long-term plans require long duration projects. Because of the lack of resources, piloting small geographic areas will add to the chance of success. Upon achieving satisfactory results, the pilot project can be modified and replicated on a larger scale.

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