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CLIMATE CHANGE, WATER AND SOCIETY IN THE MENA REGION: A LEGAL AND POLICY PERSPECTIVE

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Climate Change, Water and Society in the MENA Region: A Legal and Policy Perspective

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ABSTRACT

The MENA Region, having a history of both severe climate change as well as drought, now confronts the challenges of a new period of climate change and drought. Its international water law treaty regimes are underdeveloped and frequently violated, resulting in conflict, increasing the instability and insecurity of the region. The countries of the region also have underdeveloped and frequently violated internal legal regimes. These problematic constructs are now compounded by a crisis in global agricultural trade (virtual water). With the cultural strength of Islamic water and environmental principles, the region has potential for organization and education. The development of an alliance system which enforces the international law principles of ‘equitable use’ and ‘no significant harm’ could prevent conflict and foster development.

Keywords:
Climate Change, MENA Region, Water, Islamic water management
I. HISTORY OF DROUGHT AND CLIMATE CHANGE IN THE MENA REGION AND PROJECTIONS FOR THE FUTURE

While the climate in the MENA Region has changed drastically and many times throughout history, it has never changed with such large numbers of humans present with its borders. The wetland Sahara disappeared about 12,000 years ago\(^1\) and the entire northern coast of Africa and the Middle East evolved into its present state as one of the driest places in the world. Beyond this general dry land state, periodically there were, and are, extraordinary droughts and instances of abrupt climate change.\(^2\) One of the first droughts recorded in the history of human civilization occurred around 2200 BCE. It was a prolonged drought that brought down the Old Kingdom of the Pharaohs\(^3\) and the Akkadian culture of Mesopotamia.\(^4\)

The result of the drought in Mesopotamia was migration, severe depopulation, conflict, and change of governments. Populations were re-established at lower, locally sustainable levels. The same period of drought closed the Um al-Nar period of Gulf history and opened the Wadi Suq period.\(^5\) In recent years frequency of droughts has accelerated. According to the World Bank, climate change will “increase the occurrence of droughts: an effect which is already

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materializing in the Maghreb, with an increasing of drought frequency from one event every 10 years in the beginning of the 20th century, to five or six events every 10 years currently.  

While only 3 of the MENA region countries were water scarce in 1955 (Bahrain, Jordan and Kuwait), by 1990 seven additional countries fell into this category (Algeria, Israel and the Occupied Territories, Qatar, Saudi Arabia, Somalia, Tunisia, the UAE and Yemen) and seven more are expected to be added to this list by 2025 (Egypt, Ethiopia, Iran, Libya, Morocco, Oman and Syria).  

The impact of drought and water shortage is directly linked to population increase. The MENA Region has the highest population growth in the world. In the last 50 years alone, it has exploded from 100 million people in 1950 to 380 million in 2000. Expectations for 2025 range from 450 to 600 million people in the region. With 6.3% of the world’s population and 1.4% of accessible fresh water, these statistics presage difficult times for portions of the population unless significant changes and adaptations are made. For the Ethiopians who are suffering their second major drought and famine since 1984, and expecting between 6 and 15 million of the population starve to death, the disaster is present and recurring. Equally the Palestinians are suffering acute

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7 Id.
water source deprivation. In short, for some in the MENA Region, or their neighbors, climate change is present and devastating.

As it is, the MENA Region “imported about 25 percent of its water requirements as virtual water in 2000; virtual water will provide 50% of its doubled water requirements in 2050.”\(^{10}\) The phrase “virtual water” signifies water embedded in water intensive commodities such as grain. The region is thus now, at a time of global agricultural trade crisis, in a very vulnerable position due to its growing reliance on the global trade in virtual water since the 1950s. Had the principles of international water law, in particular equitable use and no significant harm, been respected and dispositive, the Region might be in an entirely different position.\(^{11}\)

II. INTERNATIONAL TREATIES ON WATER AND HOW THEY HAVE BEEN IMPLEMENTED OR VIOLATED.

An examination of international water law principles and theories requires an understanding of the assumptions and considerations of current international water law. International water law includes laws and legal principles on the management and maintenance of international watercourses.\(^{12}\) The concept of watercourses in international law has historically referred to international rivers and lakes shared by two or more states. However, this approach is being broadened to include groundwater as part of the watercourse system. The inclusion of


\(^{11}\) Id. at 10.

groundwater within international law is especially important for countries such as Saudi Arabia, Libya, and Oman where there are very few permanent surface water bodies and thus a heavy reliance on underground water sources.

The International Law Commission in describing the international watercourse stated that, “An international watercourse is not a pipe carrying water through a territory of two or more states. While its core is generally and rightly seen as the main stem of a river traversing or forming an international boundary, the international watercourse is something more, for it forms part of what may be best described as a ‘system.’”

The 1997 United Nations Convention on the Law of the Non-Navigable Uses of International Watercourses describes a watercourse in its Article 2(b) as, “a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus.” This definition includes rivers and their tributaries, lakes, aquifers, glaciers, reservoirs and canals and groundwater as part of subsurface water.

There are four main theories of international water law. The first is the absolute territorial sovereignty theory where an upstream State can freely utilize the water resources within its borders without the need of considering other States. The implication is that the State has absolute authority over the natural resources within its boundaries, including water. The Principle is a development from the 1895 Harmon Doctrine which was used to address a dispute.

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13 Id.
14 James Frederick, *Thou shall not covet thy neighbor’s water: A look at the journey both Texas and the Middle East must embark upon to solve the kinks in their water regulation*, 29 Hous. J. of Int’l L. 423,441 (2007).
between the United States of America and Mexico over the pollution of the Rio Grande River. However, this principle has received very little international support.

The principle of prior appropriation gives preference to the State that first made use of the water source. This is illustrated in the treaty agreements on the Nile that allow Egypt and Sudan the use of 90% of its waters. Although the principle of prior appropriation has had little international support in the formulation of recent international water agreements or in the negotiation of such agreements, it has historically been the basis for many international water agreements.

Absolute territorial integrity, on the other hand, implies that a downstream State should not have its watercourse, interrupted by an upstream State regardless of priority. This principle places an unnecessary burden on the upstream State without placing a similar burden on the downstream State. Another example of this arrangement is the position of the upper riparian states on the Nile River to the lower riparian States.

A middle point between restricted territorial sovereignty and restricted territorial integrity is the principle, “in an equitable and reasonable manner (“equitable use” standard). This principle mandates States to use the water resources within their borders in ways that will not prejudice the need and use of the same watercourse in other States. Equitability signifies equality of right to a share of the uses and benefits. This principle has received wide international support but the

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major challenge has been the practical ways of implementing the principle of “equitable and reasonable use”.

The priority of use in international water law is given to “vital human needs,” which is reflected in both Article 10 of the 1997 UN Convention on the Non-Navigable Uses of International Watercourses and Article 11(2) of the Draft Convention on the Law of Trans-boundary Aquifers. The UN Committee on Economic, Social and Cultural Rights uses the broader term, “personal and domestic uses” in its General Comment No.15. It is the most basic standard that is expected to be met regardless of what theory is being applied by a State in its water demand management policies.

The most internationally recognized principle of equitable and reasonable use has been very difficult to implement because it presumes a watercourse is a single integrated system which should be administered as a whole.17 This presumption is especially problematic in the MENA region because of the lack of political cooperation that exists between some of the riparian States in the region.

Equitable and reasonable use also raises several questions about its interpretation and application in the complex social/political/economic dynamic within the MENA States. How are they to be applied with regards to economic and sustainable development? What about issues of population growth? Should the regional basin authorities be responsible for ensuring that riparian countries grow at a rate that would ensure sustainable use of the relevant river basin system? Where is the

17 Frederick, supra note 14 at 442.
diving line between a State's territorial sovereignty and its territorial integrity? How do unpredictable rural-urban migrations affect vital human needs? What are the necessary yardsticks to measure needed infrastructural investments in the light of water needs in the different sectors of the economy? Such measures would have to consider the fact that technology gives the State the ability to access more water sometimes at a faster rate than the water is being replaced as evidenced with the use of aquifers in the MENA region.

Another important factor is the differences in the economic value of water in the different areas of the economy such as agriculture, industry, pollution management amongst others. Such the water needs be sectors based or development based? If the needs are sector based, what happens when the sector expands and engages in global trade for example agriculture or industry? What sacrifices will a state need to make to ensure that there is sustainable utilization of the water within a river basin system? What will be the measure for the fairness and equitability of the water sharing arrangements between riparian States?

There are various international agreements on the use of trans-boundary rivers and aquifers. Most of these agreements are regional. In an attempt to codify what the International Law Commission considered to be customary international law sourced from judicial decisions, state practice and previous treaty agreements, the commission drafted the United Nations Convention on the Non Navigable Uses of Water 1997. Although most MENA states have not ratified this convention, the convention is one possible source of soft law and policy which can be used as an analytical tool for examining the situation in the MENA river basins.
Article 5 of the 1997 UN Convention on Non-Navigable Uses of International Watercourses\textsuperscript{18} lays down the principle of equitable and reasonable utilization of international water courses. The factors relevant for analyzing the principle of equitable use or reasonable utilization are listed in Article 6, where the Convention also gives the factors for the measurement of reasonable use. Article 7 lays down the principle of the obligation of States not to cause “significant harm” to replace the previous unpopular “no harm” principle. Few MENA countries are signatories and even fewer are parties.

Article 5 of the UN Convention specifically provides,

\textit{Equitable and reasonable utilization and participation}

1. Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits there from, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.

2. Watercourse States shall participate in the use, development and protection of an international Watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.

Article 6 describes the factors for measuring reasonable use which are given as follows:

1. Utilization of an international watercourse in an equitable and reasonable manner within the meaning of article 5 requires taking into account all relevant factors and circumstances, including:

(a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
(b) The social and economic needs of the watercourse States concerned;
(c) The population dependent on the watercourse in each watercourse State;
(d) The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
(e) Existing and potential uses of the watercourse;
(f) Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;
(g) The availability of alternatives, of comparable value, to a particular planned or existing use.

2. In the application of article 5 or paragraph 1 of this article, watercourse States concerned shall, when the need arises, enter into consultations in a spirit of cooperation.

3. The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable use, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.

Equitable and reasonable use of a water course includes an "obligation not to cause significant harm," which is defined in Article 7 of the 1997 UN Convention which postulates that,

1. Watercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States.
2. Where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall, in the absence of agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.
These articles pose more questions than answers to the prevailing problem of sharing transboundary waters. The right to utilize the water course gives rise to an equivalent duty to permit utilization by other riparian states in article 5 of the UN Convention. The duty to cooperate gives a riparian state the right to demand for negotiations on the protection and development of the watercourse. How will the States reconcile these duties and rights with the "obligation not to cause significant harm" under article 7?

What would happen where riparian states at different levels of development bring their respective cases on equitable utilization on the one hand and significant harm on the other? Putting aside the ability of each state to prove its case, which of these two right of action should prevail? How significant can harm be before it invokes a violation of article 7? Should one state's development be hindered to all for the other state? If so, what would be considered adequate compensation for the affected state's sacrifice?

In addition, the term, “significant harm” is not defined. Perhaps this is intentional to allow states to negotiate not only on how to avoid significant harm but also to determine what will amount to significant harm. This process can considerably delay quick and peaceful negotiations on the issue because each state has different developmental policies in the light of its unique social, political and economic situation.
Evidence of customary international law as the basis for the equitable use and no significant harm principles\textsuperscript{19} is based on the North Sea Continental Shelf Cases\textsuperscript{20} and the Gabcikovo-Nagymarous Project\textsuperscript{21}. The question is what is customary international law and why is it given such great significance in the development of international water law? Under art.38 of the Statute of the International Court of Justice, Customary International Law is a source of international law. It is defined generally as the practice of States which practice is borne out of a sense of legal obligation\textsuperscript{22}. It is also held as a basis to justify State's claims and places limits on the claims that States make. These limitations develop as a result of the need to establish a custom through claims and counter claims of States\textsuperscript{23}.

Customary international law can be sourced from the votes of international assemblies, decisions of international courts and arbitrators, from the unilateral acts of States, and sometimes from unratified agreements which in this case may include the United Nations Convention on the Non-Navigable Uses of Water 1997.

International water management has more issues than domestic water management because the property (water) right regime is less developed. Even the UN Convention on the Non-Navigable Uses Of International Watercourses creates uncertain national rights.\textsuperscript{24} There is also less

\textsuperscript{21} (Hung. V. Slovk.) 1997 I.C.J. 7 (Sept. 25).
\textsuperscript{23} McMurray and Tarlock, \textit{supra} note 19.
\textsuperscript{24}Dan Tarlock, \textit{How well can international water allocation regimes adapt to global climate change?} 15 J.Land Use & Envtl. L. 423, 424 (2000).
flexibility in international water law regimes compared to the domestic ones because of the expensive and tedious political process involved in their formulation.  

This inflexibility has made it difficult and sometimes impossible to address the water issues in the MENA region through international law. This has, in certain circumstances, led to conflicts, while in other situations international agreements have led to a fragile peace.

For the MENA region, like other regions, there still is the need for formal political agreements on water issues such as treaties. These treaties may develop into legal theories which can metamorphose into institutional applications of law that result in specific and hopefully effective rules. It is such rule arrangements that ensure that any solution resorted to will have the legitimacy of law. Presently there are no durable legal institutions dealing with water issues and disputes in the region. This institutional gap has resulted in the continuance of ongoing disputes in the region including the Iraqi stance with Syria and Turkey over the Euphrates, Syria and Lebanon on the Orontes and Egypt, Sudan and Ethiopia on the Nile.

One such political process that failed to produce any binding legal agreement thus hindering a multilateral solution was the Johnston Plan of 1955 on the distribution of the Jordan River Basin waters. Although the Plan reached the level of a formal agreement, it never developed into a treaty arrangement owing to the ongoing hostilities among the Jordan River Basin riparian states, Lebanon, Syria, Israel, Palestine, and Jordan. Volatile incidences of drought, decades of distrust,
developmental neglect and territorial disputes have made water management and cooperation a very sensitive matter in this river basin and generally throughout the whole MENA region.\textsuperscript{26}

An example of this volatility is seen in the altercation between Israel and Lebanon over pumps put on the Wazzani River, a small stream that feeds the Hasbani River, a tributary of the Jordan River. The construction of pumps on the Wazzani River, though carrying only 10 liters of water per second to the neighboring villages in South Lebanon, still created negative media coverage in Israel and threatened to escalate into a full-scale war in February 2001. The international water law principles of absolute territorial sovereignty and the priority right doctrine were both used to justify the stance of each state in the dispute.\textsuperscript{27} Although the war was averted with the intervention of the United Nations, this incident exemplifies how easily water matters in the MENA region, especially the Middle East can escalate. Some have even opined that in the Middle East countries prefer the military option over diplomatic means of resolving issues regarding water.

In 1994, Israel and Jordan signed a peace agreement,\textsuperscript{28} which included certain clauses on the distribution of the Jordan River. However in 1999 during a harsh drought period, Israel reduced the allocation to Jordan by half and Jordan was forced to resort to a water rationing system to deal with the shortage. In 1995, Israel also signed the Interim Agreement with the Palestinian

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\item[\textsuperscript{27}] Id. at 321,323.
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Authorities on the use of water in the Jordan Basin. Despite these Agreements, Israel still relies heavily on the use of virtual water for the needs of its population.\textsuperscript{29}

The Riparian States of the Jordan river have depended on various international water law principles to put forward their claims based on their position on the river course. Lebanon, as an upper riparian, favor the use of absolute territorial sovereignty principle on the Jordan River while Jordan, a lower riparian State, has relied on the absolute integrity principle. Syria as both an upper riparian on the Jordan and Yarmuk and a lower riparian to its main source of water, the Euphrates and Orontes has oscillated between the two principles. Israel holds on to the absolute territorial sovereignty principle with regards to the Jordan River while the Palestinians revert to equitable utilization of both the Jordan and its shared aquifers.

The history of Nile river Basin is also illustrative of the type of issues that could arise in the shared utilization of a river by riparian States. After Britain gained control of Egypt in 1882 and later, Sudan, Uganda and Tanzania, it obtained by treaty, with the Congo (controlled by Belgium), Ethiopia and Italy, an agreement that the Nile waters not to be interfered with without Britain’s consent.\textsuperscript{30} The Egyptians were not comfortable with the arrangements this led to discontent cumulating in the assassination of the British Governor-General of Sudan in Cairo in 1924. This event led Britain and Egypt to renegotiating and later signing another agreement on


the Nile in 1929.\textsuperscript{31} When Sudan gained independence in 1956, the Sudanese government demanded a modification to the 1929 Agreement. This led to the negotiation and signing of the 1959 Agreement on the Nile and this is the present day regime on water allocation of the Nile River.\textsuperscript{32}

Among the ten States within the Nile River Basin three, Sudan, Ethiopia and Egypt, are sometimes considered to be in the MENA region. There have been growing tensions on the inequitable water allocation regime under the 1959 agreement. Ethiopia, where 90% of the Nile water originates, was excluded from the agreement and has been the most inequitably harmed. However, Sudan also complains of its own allocation which amounts to about 12% of the Nile water.\textsuperscript{33}

Spectacular projects in the region like the building of the Aswan Dam enhanced the prestige of Egypt’s rulers. The then Egyptian president, Anwar El-Sadat, threatened to bomb water facilities in Ethiopia if Ethiopia diverted water for irrigation projects.\textsuperscript{34} However, this language of hostility was softened by the Egyptian government’s cooperation with other Nile riparian States in the 1990’s in what is known as the Nile Basin Initiative, aimed at bringing the Nile Basin Countries to the drawing board to develop their respective countries by joint effort within the region.

\textsuperscript{31} Exchange of Notes Regarding the Use of the Waters of the Nile for Irrigation, May 7, 1929, Egypt-U.K., 93 L.N.T.S. 43.
\textsuperscript{32} Agreement on the Full Utilization of the Nile Waters, Nov. 8, 1959, United Arab Republic-Sudan, 453 U.N.T.S. 51.
\textsuperscript{33} Fort and Schipani supra note 29 at 265.
\textsuperscript{34} Id.
In reality, this effort has led to no significant improvement for the water deprived state of Ethiopia and little for the Sudan. This has led to the ICCON (International Consortium for Cooperation on the Nile), opining that “Egypt has seriously undermined its reputation as an honorable partner by its unilateral launch of its New Valley Project in 1998.\(^{35}\) The project will use whatever volumes of water might have been available for future detailed allocation negotiations.” Beyond this, Egypt refuses to access or calculate its massive underground Nubian Sandstone Aquifer capacity in negotiations with the Sudan or Ethiopia.

The Tigris-Euphrates River system is the only real source of water between Turkey, Syria and Iraq and has been a source of growing tension between those countries.\(^{36}\) The rivers are responsible for approximately, thirty percent of Turkey’s needs (Turkey has built three dams on the Euphrates and has just commissioned a $32 billion dam on the Tigris)\(^{37}\), eighty five percent of Syria’s needs (Syria has built one dam on the Euphrates and is planning to build another) and one hundred percent of Iraq’s needs (Iraq has built dams both on the Tigris and the Euphrates, being the last riparian State of the two Rivers).

The potential of conflict in the region was witnessed in the 1990s when Turkey essentially cut off the flow of the Euphrates from Iraq and Syria in order to fill the Ataturk Dam Reservoir. In a potential threat with water implications, Turkey has warned Syria to exercise greater control over the Kurdish groups. Syria’s perceived indifference towards this request has become a potential source of conflict.

\(^{35}\) Allan, supra note 10 at 14.
\(^{36}\) Fort and Schipani, supra note 29 at 259.
The volatility of the region was illustrated in April 1975 when Iraq called an urgent meeting of the Foreign Ministers of the Arab League to discuss claims to Euphrates waters. The source of contention was the construction of the Tabqa (ath-Thawrah) Dam on the Euphrates by Syria in 1973 and Turkey’s construction of the Kebar Dam, its first major dam on the River. Mediation by Saudi Arabia diffused the tensions between Iraq and Syria who had by that time had already sent troops to their respective borders.  

Transboundary groundwater is equally, but less obviously, an important part of any international watercourse system. Also known as international or cross-border groundwater, it is found in almost all continents of the earth and is subject to the same competition as surface water. In the Middle East and North Africa, water scarcity is coupled with political instability and inequality in power structures between nations sharing groundwater resources. Therefore, political factors play an inevitable role in the settlement of water matters in the region including groundwater matters.

The two main problems with groundwater management are pollution and depletion. Overexploitation and depletion of aquifers has increased the costs of pumping water as the water...
tables go down past recharge capability; this depletion affects availability across borders and can lead to conflict in water stressed areas of the MENA region.\footnote{Fadia Daibes, \textit{supra} note 40 at 98.}

On the hydro-geological level, groundwater poses the following problems:

a) The interaction between groundwater and other elements in the environment;

b) The complexity of the structure of groundwater associated with surface water and confined aquifers;

c) The vulnerability of the aquifers to pollution and the difficulty of measuring the extent of such pollution;

d) The nature of replenishment or recharge of the aquifer;

e) Reduction of the water table.\footnote{Id. at 99.}

From the legal perspective, groundwater regulations are problematic because of:

a) The difficulty in identifying the scope and description of groundwater sources;

b) The multiplicity or sometimes non-existence of rules that govern allocation of water use and allocation under national laws;

c) The legal entitlements of States at the international level, especially the developments of procedures, mechanisms and institutions that ensure compliance and enforcement of such legal entitlements.\footnote{Id. at 99.}
There is lack of data on key characteristics of aquifer systems including how they form, the water resources that contribute to them and the ways in which they are recharged, especially in the cases of confined aquifers. Aquifers are used extensively in the MENA regions in domestic uses and in irrigation schemes. Therefore, the complexity of the groundwater regime complicates the task of assessing and managing the resources. The result is difficulty, both at the national and international levels, in formulating policies that can embrace and manage this resource.\(^{45}\)

In 1966, for the first time, The International Law Association recognized the existence of trans-boundary water resources in the Helsinki Rules on the Uses of Waters of International Rivers.\(^{46}\) The Rules represent a pioneering effort at comprehensive codification of the law of international watercourses but did not specifically deal with aquifers or underground water sources. The Rules deal with matters such as pollution, navigation, and timber floating. The Rules define an international drainage basin as, “a geographical area extending over two or more States determined by the watershed limits of the system of water, including surface and underground waters flowing into a common terminus.”

This inadequacy in the Helsinki Rules led to a 1987 meeting of experts on international water law in Bellagio Italy, whose deliberations were the basis of a Model treaty, the Bellagio Draft Articles. These rules were meant to ensure the equitable utilization and management of internationally-shared groundwater basins. In spite of the Model Treaty, the 1997 UN Convention on the Non-Navigable Uses of International Watercourses does not apply to confined

\(^{45}\) Id.

aquifers because it applies only to ground-waters that are tributary to, or share a common terminus with surface waters.

Other Agreements have been made with regards to the management of transboundary aquifers, with notably two in the MENA region, the Agreement on the Northwestern Sahara Aquifer System (SASS) and the Agreement on the Nubian Sandstone Aquifer. The former, the Northwestern Sahara is between, Algeria, Libya and Tunisia, while the latter, the Nubian Sandstone is between, Chad, Egypt, Libya and Sudan. Both Agreements were signed not only to allow for integrated groundwater development but also for the creation of joint commission to oversee such work.

There are a number of shared aquifer systems in the MENA and not all of them are covered by international agreements much less any form of allocative rights to help in the equitable use of the aquifer system. The shared aquifers of the region include the Nubian Sandstone Aquifer (Chad, Egypt, Libya and Sudan), the North Western Sahara Aquifer System (Algeria, Libya and Tunisia), the Mountain Aquifer (Israel and West Bank), Disi Aquifer (Jordan and Saudi Arabia), Rum-Saq Aquifer (Jordan and Saudi Arabia), the Great Oriental Erq Aquifer (Algeria and Tunisia) and Al-Kabeer Al-Janoubi (Lebanon and Syria). 47

While some form of project-related arrangements exist on a number of these aquifers (including the Nubian Sandstone and the North Western Sahara Aquifer System), they deal largely with

monitoring and exchange of information established under external project support. None of the transboundary aquifers in the MENA region is managed and exploited under a multicountry cooperative framework. The absence of such frameworks has further intensified the drive by the countries most economically able and politically powerful to exploit these finite water resources, establishing ‘facts on the ground’. 48

Looking at the equitable utilization principle in the light of no significant harm principle as postulated by the 1997 United Nations Convention, it is not difficult to understand why more than ten years after its making; it has still not been ratified at least by the majority of MENA countries. These countries face the question of food security versus food self sufficiency in the light of the global financial crisis and the present crisis in global trade. On the other hand are the growing population, rural and urban migration, pollution and sustainable development.

More than fifty percent of the waters in the region are trans-boundary which therefore forces the international dimension of water management in the region. Therefore, international law is a significant factor in the management of the looming water crisis in the region but is fast losing its significance in the light of the magnitude of the water crisis and the weak enforcement mechanism that international law operates by.

The extent of international law development on water management cannot however replace the significance of the domestic legal regime within the nation state and this is especially true with

48Id.
the MENA region. Some of these domestic legal frameworks have had mixed results but on the whole, much more still needs to be done.

III. INTERNAL LEGAL REGIMES AND MENA REGION ISSUES.

When the Law and Enforcement working group met at the Water Governance in the MENA Region conference in Cairo in 2007, one of the major conclusions was that, “In the MENA Region, laws in general are still not perceived as pillars of fundamental importance to achieve progressive changes in all sectors of the countries, and thus there are many examples of their inappropriate or unequal enforcement. To these contribute the fragmentation of a heavily centralized water sector, lack of coordination of public institutions, interdependency with other non-enforced laws, and inadequate political will.”

The five most significant aspects highlighted and analyzed by the group included:

(1.) Laws and regulations that were not sufficient or “mature” (for example because they were out-of-date, had gaps and conflicts, or did not have all the implementing regulations; in many instances, weaknesses in the legal and regulatory structures only became apparent upon implementation and enforcement);

(2) Fragmentation of laws and institutions (within the water sector, with other sectors such as agriculture, and vertically because of decentralization) and the need for better coordination;

49 International Conference on Water Governance in the MENA Region, Critical Issues and the Way Forward, Cairo Conference ,1,9, (June 23–27, 2007), available at http://www.thirdworldcentre.org/invest.html. The Cairo Conference sponsors were: InWEnt, Capacity Building International (Germany) and Arab Water Council, with the support of the Third World Centre for Water Management (TWCWM).
(3) Lack of human, technical, and financial capacity to develop, implement, comply with, and enforce water laws and regulations;
(4) Lack of awareness; and
(5) Other aspects of enforcement such as political will conflict of interest, competing mandates, and corruption.” 50

Of particular interest was the finding that “capacity for the development of law and contribution to its maturation was a common issue for the whole participating countries in the group.” (Syria, Yemen, Egypt, Morocco and Jordan) 51 This was illustrated by examples where technical experts operated without an understanding of the qualitative factors of water laws.

While national improvements are being attempted in some areas, for instance groundwater management, implementation of laws continues to be difficult. In Lebanon, Jordan and Syria pumping and use of groundwater is regulated, as is well drilling. While all of these countries rely extensively on groundwater for irrigation, in Syria for instance, where 60% of all irrigated areas are currently irrigated by groundwater and permits are required to dig wells, “despite rules and regulations on [the] required permits, almost 50% of the total number of wells in the country are considered illegal.” 52

The net result, of course, is that despite law and government attempts at regulation which would allow for planned water management, water over-abstraction occurs, extraction exceeds

50 Id. at 10.
51 Id. at 11.
recharge, groundwater tables’ fall, and in coastal areas aquifers have salt-water intrusion, compounding the problems of trying to manage an already scarce resource.

The Water Integrity Network determined that between 30 and 50% of all world water project funds are lost to corruption.\textsuperscript{53} The 2007 report on Africa points out that internal legal frameworks strongly influence public officials and that there is corruption in policy making to insure future rent, but that grand corruption occurs during planning and budgeting processes. It further points out that many water projects are regressive, which is to say, they benefit the rich, not the poor or those most at risk from poor water supply.

Unfortunately, corruption is perceived as playing a catalytic role in the global water crisis at a time when the crisis will already be further magnified by climate change. \textsuperscript{54} Development of water resources and technical expertise requires a great deal of funding. The World Bank report of 2003 stated that “In four developing regions… (MENA being one of them)...corruption figures as one of the 3 leading constraints” (on economic development).\textsuperscript{55}

The water regime in the region needs to be informed by certain policy considerations. There needs to be accountability systems put in place to ensure that the institutions that are responsible for implementing the laws and policy considerations of the government are not incapacitated. Such accountability mechanisms include, setting clear objectives that the water users can accept,

\textsuperscript{53} \url{http://www.waterintegritynetwork/content/download/174/1434/file/Plummer_Cross2007.pdf}
managing services at the local level with local participation, creating mechanisms for user feedback, giving utilities operational autonomy thereby addressing the issues of bureaucracy, rewarding utility staff for good performance and evaluating how well public funds are spent.56

Three levels of managing the scarcity starts from, reliability of supply which includes technical and engineering solutions; second level is to improve the end user efficiency which involves making rules to protect the resource and provide services; and thirdly to allocate water for the most beneficial use. This is achieved by weighing all competing claims and providing water services in accordance to the importance of the service to the economy. These policy objectives could be summarized as allocative efficiency, services end-use efficiency, and supply management. The first involves having more value per drop of water, while the second involves more use per drop and the last deals with having more water available.

Water, according to the world bank report of 2005, takes up most of the MENA states’ public expenditure. This is because, all available sources of water has been exploited and new supply is difficult to exploit, maintainance costs for water infrastructure are increasing, and subsidies for urban utilities is growing.57

In short, mitigation of the impending damage to the water systems and supplies in a time of climate change needs to be tackled from many different legal angles in order to improve the entire system simultaneously in the MENA region countries. Systems that are quasifunctional in

57 Id. at 118.
“normal” times despite legal shortfalls and corruption may fail with the additional stresses of food and water shortages.

IV. WATER, FOOD SECURITY AND THE GLOBAL AGRICULTURAL TRADE CRISIS.

In 2002 Professor Allan of the SOAS in London, pointed out that denial and de-emphasis of water security issues is a significant political technique endemic in the Middle East. He asserted that the “virtual water” solution which invisibly supported the population growth of the region has had “an important unintended negative consequence: the de-emphasis of the actual water predicament of the region through the accessibility of virtual water slows the adoption of sound economic and environmental approaches to the use and allocation of water.” 58

The increase of food prices by 57% in the last year 59 appears to have brought this era of denial to an end. It was impossible to deny the pictures of the bread lines in Egypt or to deny the fact that 50% of the populace was unable to afford to purchase food at past levels of consumption.

The July 2008 failure of the WTO trade talks over agricultural matters, namely Farm Aid, made it clear that this food security matter might, indeed, be a harbinger of globalized trade failure in the face of energy price escalation and climate change water impacts. Conferences on food

58 Allan supra note 10, 2.
59 The International Institute for Sustainable Development (IISD) in collaboration with the U.N. Food and Agriculture Organization (F.A.O.), High Level Conference on World Food Security: The Challenges of Climate Change and Bioenergy, 1 (2008), available at http://iisd.ca/ymb/wfs/html/ymbvol_150num3e.html. The High Level Conference was convened on 4 June 2008, at the UN Food and Agriculture headquarters in Rome, Italy.
security were convened both internationally and regionally\textsuperscript{60} indicating serious fears on the part regional governments. Further signs of a new dawn came in the announcement that Egypt would stop exporting rice.\textsuperscript{61}

Given that Egypt uses 90\% of its water for irrigation and still has to import close to 50\% of its grain, food exportation seems a luxury. “The Middle East imported about 25\% of its water requirements as virtual water in 2000; virtual water will provide 50\% of its doubled water requirements in 2050.”\textsuperscript{62} While desalination has dropped in cost, and the proximity of much of the MENA population to sea or major rivers makes production of drinking water possible, it is not possible to desalinate for food production, with only about 10\% of the total of 600 billion cubic meters needed for food coming from desalination.\textsuperscript{63}

There is a certain irony to the MENA Region countries, which include the OPEC countries, raising a call against biofuel production in the Western world because it threatens their food security. For years, the OPEC countries have had a significant hold on the oil prices, threatening other kinds of security for the rest of the world. Speakers at the High Level Conference highlighted the linkages between the food and energy crises.\textsuperscript{64} This conflict between food as a weapon and oil as a weapon also came to a head previously in 1973 when the Gulf economies deployed their oil weapon and the US responded with a reminder re the security of staple foods.

\textsuperscript{61} “Egypt cannot afford to export water and rice is water.” Al-Ahram Weekly, Bans and penalties welcomed, 3 - 9 April 2008 Issue No. 891 Economy available at http://weekly.ahram.org.eg/2008/891/ec1.htm
\textsuperscript{62} Allan, supra note 10 at 6.
\textsuperscript{63} Allan supra note 10 at 5.
\textsuperscript{64} The International Institute for Sustainable Development (IISD) supra note 59 at 10.
The net result of this incident was a 1974 Arab food self-sufficiency project which failed.\(^{65}\) The grain picture is difficult. Given that “the major exporters-the U.S. and the EU-put much of their grain exports on the world market at half their production cost.” with long-standing production and export subsidies, Arab attempts at self-sufficiency seem futile for several reasons. However, droughts in the US, Australia and the EU, the depletion of groundwater supplies such as the Ogallala in the US, along with increased energy costs may change the economics of grain exports. Climate change may be more definitive than world trade and internal country politics in the future.

Notably even if food is imported and, even if there are water agreements that are honored in word and substance, water scarcity will not be adequately addressed in the MENA Region if population growth issues are not confronted. The increasing aridity of the region must also be recognized and confronted. Adding another layer of complexity is the fact that water sources in the region are not evenly distributed which in many cases can, and has given rise to resentment within national borders, and within the region as a whole.

It appears that the MENA Region countries will need to concentrate on all possibilities that might increase food security simultaneously. Factors such as, population planning, significantly improved technology and efficiency, progressive domestic water initiatives such as “water harvesting” through the construction of micro-scale dams,\(^{66}\) modernization of current systems of water distribution and processing, reclamation and encouragement of traditional pastoral

\(^{65}\) Allan, supra note 10 at 6.
\(^{66}\) Id.
\(^{67}\) Id. at 9.
agricultural practices and water conservation via every mechanism available should be considered.

Promoting regional integration of agriculture and, aiming for sustainability in the Arab region was one of the points of the Global Call to Action meeting of the coalitions in the Arab region in June 2008. And, finally, given that the Gulf countries in particular have been investing by buying property in the “outside” world, perhaps these still cash and oil rich societies should look to water rich countries for different kinds of legal arrangements of a higher long term value than immediate grain purchase. Purchases or long-term leaseholds of farm land might promote more food security than grain contracts. This initiative is presently being spearheaded by Saudi Arabia that has already acquired farmland leaseholds in Sudan.

V. ENVIRONMENTAL DEGRADATION IN THE MENA REGION.

Surface water, groundwater and coastal environmental degradation by pollution are serious problems throughout the MENA Region. Pollution contributes not only to human health morbidity and the accompanying costs, but also to the destruction of scarce agricultural land, wildlife habitat and further adds to the water scarcity of the region. With most of available freshwater used in irrigated agriculture, damage occurs due to heavy use of fertilizers, contributing to the degradation of quality and salinsation. Hazardous chemicals and solid wastes seep into the groundwater tables. There is generally weak enforcement of whatever

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68 Id.
69 The Global Call to Action Against Poverty, supra note 60.
environmental legislation exists. High population density and a scarce water supply compound the damage.

Further significant environmental degradation is caused by airborne emissions. According to the World Bank the MENA Region Greenhouse Gases (GHG) emissions are small in world terms (about 4.5% of the world’s total) and per capita terms. But the growth rate of CO₂ emissions from fuel combustion was the 3rd largest in the world from 1900-2004 and about the same rate as that of India. The emissions grew 3 times the speed of the world average. “In terms of CO₂ intensity, MENA’s energy-based, non forest-and land use CO₂ emissions per unit of GDP per capita are second only to those of the ECA, and unlike ECA, the trends do not suggest decreases in intensity.”

Most of these emissions (74%) come from the Gulf oil producing countries. “The emissions due to energy transformation and use account for 83% of all MENA emissions. The greatest sources of emissions are, in order of magnitude, “electricity and heat”, followed by “manufacturing and construction” and “transportation” equally. “Fugitive emissions comprise 12.4% of all emissions, a higher percentage than any other region of the world. The major GHG emitting sectors also release PM, Sox and NOx contributing seriously to local air pollution and high regional health costs. Energy subsidies are regressive, cost about 5% of the region’s GDP and are incentives for wasteful resource.”

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70 Hakan Tropp, supra note 52 at 1.
71 Preliminary draft for consultation and feedback, The World Bank, Middle East and North Africa Region (MENA), Sustainable Development Department, Region Business Strategy to Address Climate Change, (6 Nov. 2007)
72 Id.
The Arab coalition meeting for the Global Call to Action recognized the connection between the largest reserves of petrol in the world and significant environmental deterioration. It also mentioned the need to “reinforce global peace and resolve conflicts in a way that limits the proliferation of nuclear arms and toxic waste, which diminish productivity, particularly in the agricultural sector.” And specifically, point 9 of the recommendations to the Heads of State meeting in Rome was to “support the efforts of the Arab countries to combat the effects of climate change, by building capacity, transferring environmental technology, supporting regional integration, and sharing strategies to reduce greenhouse gas emissions. International donors are also requested to facilitate the transfer of technologies appropriate to environmental protection in the Arab region.”

The region must plan for climate change. Apparent options include mitigation and/or adaptation. Adaptation will include costs and the allocation of such adaptation costs potentially involves a discussion of causative liability for climate change. Major hindrances to adaptation include formidable environmental, economic, informational, social and attitudinal and behavioral factors. Compensation for past emissions may act as an incentive to avoid novel forms of harmful products. This could be justified by tort of public nuisance (or its equivalent). However, not all MENA countries have this system so the question will be one of accountability for such retroactive claims. Any discussions must also be premised on acceptance of the following

73 The Global Call to Action Against Poverty, supra note 60.
74 Id.
75 Id. at 4.
77 Id. at 4.
factors: climate change is real, it will have serious effects and it will be expensive to cope with its effects.\textsuperscript{78}

Some of these effects have been described: rising sea levels caused by the warming leading to ice melt and thermal expansion, both of which will possibly result in loss of coastal lands, intrusion of salt water into drinking sources and increased food damage\textsuperscript{79} in addition to extended drought periods. Mitigation on the one hand may be more cost effective in the long run but adaptation will be necessary in the short run. The end result should be the mitigation of human induced factors that are contributing to climate change. Another aspect of mitigation is that the effects of global climate change are indeed global and so are the causes. International agreement(s) and implementation are crucial and must triumph over a world of imbalance of regional power, human, natural and capital resources.

VI. ISLAMIC WATER MANAGEMENT PRINCIPLES

The Middle East and North Africa region is home to over 300 million Muslims along with supporting large minority groups of other religions and faiths. Water is of profound importance to Islam and is considered a blessing from God that gives and sustains life and purifies humankind.\textsuperscript{80} In Islam, water is a social good and because of its importance there are Islamic

\textsuperscript{78} Id. at 5.
\textsuperscript{79} Id. at 8-10.
\textsuperscript{80} Naser I. Faruqui, \textit{Islam and Water management: Overview and Principles}, in \textit{WATER MANAGEMENT IN ISLAM}, edited by Naser I. Faruqui, Asit K. Biswas and Murad J. Bino ,International Development Research Centre, United Nations University Press,1,1 (2001). Naser I. Faruqui is a senior program specialist with the International Development Research Centre, Ottawa, Canada and focuses on water management in the Middle East. He was selected by the International Water Resources Association [IWRA] as one of 14 water leaders of the next generation, world wide. Asit K. Biswas is the President of the Third World Centre for Water Management in Mexico
injunctions on its equitable use, categories, and priorities of rights. These carry environmental implications as well. The rights of the environment, in the light of Islamic principles are also an important factor in this dimension.

A consideration of this area necessarily includes the non-economic and economic structures of water demand management in Islam, integrated water management and the practices of MENA States that have used such Islamic principles as part of their water policy framework. The non-economic instruments of water demand management in Islam fall under the following categories, water conservation, public awareness and wastewater reuse and management. The economic instruments of water demand management, on the other hand, refer to permissibility of trading and cost recovery in Islam, water pricing, inter-sectoral water trade, privatization of service delivery, inter-sectoral water markets and reallocation.

Water is a social good in Islam, considered a gift from God necessary for the sustenance of life.81 On the importance of water and its centrality to life in the ecosystem as a whole, the Qur’an states, “And We created from water every living thing.” 82 Water belongs to the community as a whole so no individual can literally own water. This is recognized in the sayings of the Prophet (pbuh) who said that of the three people Allah will ignore in the day of resurrection is the man, “[who] possessed superfluous water on a way and he withheld it from travelers” and also in the

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81 Id. at 22.
82 21:30.
hadith that states, “Muslims have common share in three things: grass (pasture), water and fire (fuel).

It is well accepted by Islamic scholars that the priority of water rights is first: haq al shafa or shirb, 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. The Prophet (pbuh) said, “there is a reward for serving any animate (living thing)”; and, “he who digs a well in the desert…cannot prevent the animals from slaking their thirst at this well.”

Under Islamic Law the effective regulation of the use of water necessitates humans to recognize that they are stewards of water on the earth and not its owners. In Islam, human-environment interactions are guided by the notion of khalifa, meaning vice regent or steward of the earth. The philosopher of religion, Ali Sharaiti, argued that the spiritual as well as the material dimensions of humans are both “directed towards the singular human purpose of khalifa (vice regency).” Therefore, humankind should ensure that the environment especially, that of water, is not polluted and is well kept.

The key directive to and mission of every Muslim is given in the following Quaranic verse, God "forbids all shameful deeds, and injustice and rebellion”.” “Injustice” can therefore be looked at as a form of “wickedness” which is seen as the result of pollution and wastefulness of natural

83 Hussein A. Amery, Islam and the Environment, in WATER MANAGEMENT IN ISLAM, supra note 80, 40. It quotes Al-Bukhari, which states that, “he who digs a well in the desert…cannot prevent the animals from slaking their thirst at this well”- Al-Bukhari -3:38, 5550, in the Hadith Encyclopedia.
84 Id.
86 2:16.
resources which deprives the future generations from being able to meet their own needs. The Qur'an also enjoins believers to “Make not mischief on the earth….Mischief has appeared on land and sea because of (the meeds) that the hands of men have earned, that (God) may give them a taste of their deeds: in order that they may turn back from evil”)\(^{87}\). The word mischief is taken from the Arabic word, fassad, i.e., the spoiling or imbalancing of God’s order which also implies water and its ecological system.

Islamic teachings including the Qur'an, therefore, command Muslims to avoid and prevent fassad which encompasses undue exploitation or degradation of environmental resources including water. Individuals,\(^{88}\) organizations\(^{89}\) and States are liable for the harm that they may cause to the environment or the environmental rights of others, including water rights. Sustainable and equitable water management will ultimately depend on the universal principles of fairness, equity and a concern for others.

The need for water and its management is also evidenced in the principles of Islam concerning water demand management. This is shown in the Quaranic verse that states, “O children of Adam! Wear your beautiful apparel at every time and place of prayer: eat and drink: but waste not by excess for Allah loveth not wasters” (7:31). Also according to the tradition of Islam, a Muslim is instructed to be economical with water even if he is taking his water from a fast flowing river. “Allah’s Apostle (pbuh) happened to pass by Sa’d as he was performing ablution.

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\(^{87}\) 2:11, 30:41.  
\(^{88}\) Hussein A. Amery, Islam and the Environment, in WATER MANAGEMENT IN ISLAM, supra note 80, at 41, 42. The Qur’an also enjoins believers to “Make not mischief on the earth….Mischief has appeared on land and sea because of (the meeds) that the hands of men have earned, that (God) may give them a taste of their deeds: in order that they may turn back from evil”)\(^{2:11, 30:41}\).  
\(^{89}\) This may also imply the recognition of corporate social responsibility.
Whereupon he said: Sa’d what is this extravagance? He said: Can there be any idea of extravagance in ablution? Whereupon he (the Prophet) said: Yes, even if you are by the side of a flowing river.⁹⁰

This Islamic injunction has led the introduction of several water control and conservation measures in Saudi Arabia. Some of these include the introduction of water tariffs in 1994 to enhance people’s awareness of the value of water production, the use of leakage control measures to minimize water losses from water supply networks, recycling treated waste water, for example the recycling of ablution water for toilet flushing at the two Holy Mosques of Makka and Al-Medina Al-Monawwarah and using highly saline water from Wadi Malakan for toilet flushing at the Holy Mosque at Makka instead of desalinated water.

Water conservation is central to Islam and mosques, religious institutes and religious schools can be used to disseminate this principle to complement other community and government efforts in this regard. The success of this strategy was illustrated in the town of Dijkot, Pakistan where the building of illegal pump structures in the upstream areas of irrigated fields was reduced when the Imams preached that such acts amounted to sin and were therefore immoral. ⁹¹

Wastewater reuse as part of water management is considered permissible in Islam provided that the water does not cause harm as was evidenced by the 1978 fatwa given by the Council of Leading Islamic Scholars in Saudi Arabia. The fatwa postulates that,

⁹⁰Hussein A. Amery, *Islam and the Environment*, in *WATER MANAGEMENT IN ISLAM*, supra note 80, 41-44.
⁹¹S.M.S. Shah, M.A. Baig, A.A. Khan, and H.F. Gabriel; *Water Conservation through community institutions in Pakistan: Mosques and Religious Schools*, *WATER MANAGEMENT IN ISLAM*, supra note 80.
“impure water can be considered as pure water and similar to the original pure water, if its treatment using advanced technical procedures is capable of removing its impurities with regard to taste, color and smell, as witnessed by honest, specialized and knowledgeable experts. Then it can be used to remove body impurities and for purifying and even for drinking. If there are negative impacts from its direct use on the human health, then it is better to avoid its use, not because it is impure but to avoid harming the human beings. The CLIS prefers to avoid using it for drinking (as possible) to protect health and not to contradict with human habits.”\textsuperscript{92}

Wastewater falls under two categories, restricted and unrestricted. Unrestricted wastewater is such water used for edible crops on ground level as well as in sports fields and in public parks and therefore needs more treatment than restricted wastewater. Restricted wastewater is used for fruit trees, pasture, fodder crops, requires less treatment, and has more nutrients than natural freshwater.\textsuperscript{93}

Full cost recovery is permissible in Islam where additional costs were incurred in the supplying, treating, storing and distribution of water. Such costs also include the costs of wastewater collection, treatment and disposal. This is based on primarily on two hadiths. The first, “it is

\textsuperscript{92} Walid A. Abderrahman, \textit{Water Demand Management in Saudi Arabia}, WATER MANAGEMENT IN ISLAM, \textit{supra} note 80, 74.

\textsuperscript{93} \textit{Id.}
better…. to go to the woods, [and] cut and sell lumber to feed himself….than to beg people for help”, which implies that common properties such as wood and water can be sold and traded. Second is the hadith where Othman purchased a well at Ruma and gave the water in the well out freely; again showing that water can be sold and traded.

The caveat is that the pricing placed on such water must be equitable as well as efficient. A fundamental principle in dealing with wealth-generating resources in Islam is combating unfair distribution, “in order that it may not (merely) make a circuit between the wealthy among you”. For the purposes of trading water, most Muslim scholars sub-divide water into private goods which are, water in private containers, treatment plants, distribution systems and reservoirs, and restricted public goods which are lakes, streams and springs located on private lands, and public goods which are water in rivers, lakes, glaciers aquifers and seas and from snow fall and rain fall in its natural state.

Integrated water resources management is also part of water management under Islam. Water management requires shura (consultation) with all stakeholders–this includes members of the communities that will be affected by water use policies in a respective area. All community members, both men and women, can and should play an effective role in water management. In such cases, communities must be proactive to ensure the equitable access to water resources. This extends to States that have an obligation to share water fairly with other States. Integrated

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94 Id. at 23.
95 59:28
96 Id. at 11-13.
water management can therefore be used as a tool to balance equity across sectors and regions in line with the fundamental tenets of Islam of equity and peace.

One of the most controversial, and also the most effective tool in water management is family planning. It is estimated that the MENA region increased from a population of about 100 million in 1950 to about 380 million in 2000. At the present rate, the population will pass the half-billion mark by 2025. While family planning will not reduce the average water consumption of a given population, it may help increase the overall availability of water per capita. While the Quran makes it clear that children are a blessing from God, it also cautions Muslims not to be too concerned with those and other blessings which they acquire in this world stating, “wealth and children are the allurement of the life of this world; but good deeds are best in the sight of the Lord.”

There is a general consensus among Muslim scholars that in principle contraception is permissible in Islam but with certain conditions: the couple must be married, contraception must be with the mutual consent of the couple and finally that contraception must not be forced on the couple.

The acceptability of contraception is evidenced in the fatwa that was given by the rector of Al-Azhar University in Cairo in 1964 which showed an acceptance for family planning noting that “great numbers were only required in the ancient days that Islam would survive.” In Iran the

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97 18:46.
98 Faruqui supra note 80 at 14-15.
99 Id.
government launched a major family planning program where the minimum age of marriage was increased; very Iranian couple had to go for mandatory classes on birth control even before applying for a marriage license. The dramatic result was a 1.47% decrease in population growth rate in a decade earning Iran the UN Population award for 1999. Countries like Algeria, Egypt, Iran, Morocco and Tunisia have a definite government policy on population while others such as Iraq, Jordan, Sudan and Syria encourage NGOs to distribute contraceptives and disseminate family planning knowledge. Despite these efforts, more still needs to be done for the MENA Region still has one of the fastest growing population in the world.\textsuperscript{100}

Islamic law and principles have enormous potential as a societal reinforcement of good water management and for public education in the same. Continued implementation of its principles in government policy on water demand management could radically change the course of the imminent water crisis in the region.

\textbf{VII. CONSTRUCTING A LEGAL FRAMEWORK REGIME FOR WATER MANAGEMENT AND EQUITABLE USE IN ACCORD WITH INTERNATIONAL LAW PRINCIPLES.}

With the global agricultural trade crisis and the drastic rise in food prices of this past year the states of the MENA Region have a changed recognition of the reality and urgency of finding their own alternative solutions in regard to water and food sustainability. This critical recognition must be used as a planning and education tool going forward with great speed and discipline. The nature of this forward movement is projected in recommendation No. 4 from the members of the GCAP (Global Call to Action Against Poverty) in the Arab Region to the Heads of State

\textsuperscript{100} Id.
Meeting in Rome: “Promote regional integration in the Arab region, particularly around agriculture. The Riyadh Communiqué from the General Assembly of the Arab Organization of Agricultural Development provides for the preparation of a time bound action plan to coordinate agricultural policies in Arab countries, and in the medium term, to develop a common agricultural strategy aimed at the sustainable development of Arab agriculture.”\textsuperscript{101} All of the proposals in the Call to the Summit are a recognition that the Arab World must reform to become sustainable within itself.

This marks a drastic, revolutionary, 180 degree turn, within the space of the one year of the food crisis, from previous planning emphasizing a dependence upon globalized food trade. The Conference further called for a reform of the global trade systems policies that reduce the ability of the Arab countries to protect local production\textsuperscript{102} It also noted that these international trade policies are a danger to national sovereignty, “and consequently food sovereignty.”

The High-Level Conference on World Food Security: the Challenges of Climate Change and Bioenergy that met on June 4, 2008 under the auspices of the UN Food and Agriculture Organization was attended by leaders and representatives from most of the countries of the world, signifying recognition of the seriousness of the situation\textsuperscript{103}

The conference focused on causes and solutions to high food prices, climate change and food security, transboundary pests and diseases, and the relationship of bioenergy and food security.

\textsuperscript{101} Meeting Of Coalitions In The Arab Region, \textit{The Global Call to Action Against Poverty}, (3 May 2008), available at \url{http://www.whiteband.org/media/press-info/call-to-the-summit-on-food-security-climate-change-and-biofuels}

\textsuperscript{102} Point 3 of the Call.

\textsuperscript{103} \textit{Supra} note 59.
This time of crisis was identified as an opportunity for sustainable development and the role of small-scale farmers was noted. Further discussion emphasized the importance of policies connecting water, energy and food.

Disciplined planning and actualization of legal frameworks for cooperation in the MENA Region will be critical to the ability of the Region to meet the challenges of climate change. With the MENA region having 60% of surface water shared across international boundaries, it currently has

“the world’s highest dependency on international water bodies” combined with “a striking absence of inclusive and comprehensive international water agreements on its most significant transboundary watercourses…while some sort of arrangements concerning transboundary waters exist for the Helmand, the Jordan, the Kuraaraks, the Nahr El Kebir, the Nile and the Tigris-Euphrates basins, these arrangements are generally not inclusive in their scope and do not deal with optimization or plan, nor do they have at their core established principles of international water law, such as equitable and reasonable utilization and obligation not to cause significant harm.”104

This is in contrast to other regions where international relations have evolved to a point that initiatives to establish formal, inclusive legal frameworks can be articulated. “The lack of

international water agreements reflects in large part the weak political and multilateral engagement among the countries sharing the water. In the absence of agreements to allocate water, unilateral actions are perfectly rational.” Further, “None of the transboundary aquifers in the MENA region is managed and exploited under a multi-country cooperative framework.

The absence of such frameworks has further intensified the drive by the countries most economically able and politically powerful to exploit these finite water resources, establishing ‘facts on the ground’.105 Hakan Tropp points out106 that a concrete planning example for the Arab world may be found in the EU Water Framework Directive and also points to the water priorities in regional processes such as the Europe-Mediterranean Partnership, Barcelona Convention, and the Mediterranean Commission on Sustainable Development.

The European Water Framework Directive adopted by the European Parliament in October of 2000 specifies a Community wide river basin approach to water resources. A primary goal was the protection of the water environment at a high ecological level. The Framework Directive was followed by a groundwater directive in 2006, Decision 2455/200/ED, on the strategy against chemical pollution of surface waters and an ecological decision directive among others. While the EU Water Framework is heavily directed towards an ecological result in a geographic area that already has a more sophisticated level of political organization, internal legal adherence and a better recent history of cooperation, the procedural tools of the Framework are valid models for the MENA Region. Basic principles of the Water Framework Directive can be summarized:

105 Id.
106 Håkan Tropp, supra note 52.
• "extended water protection covering all surface- and groundwaters
• achievement of the environmental objective good ecological and chemical status (qualitative and quantitative) by 2015
• no deterioration of water resource status
• application of a combined approach - combination of emission control and environmental in-stream quality standards
• stepwise reduction or elimination regarding the emission of specific hazardous substances
• economic analysis for a wise use of water
• public participation”

RECOMMENDED STRATEGIES

One approach to managing the MENA region's water crisis is to adopt the approach pioneered by the European Union in integrated water management. The methodology taken is elaborated upon below.

Four main strategies have been identified to accelerate the pace at which local water managing practices and water policy could converge with the underlying fundamentals exposed by water science.

- Promote the constructively engaged research and practice of integrated water resources allocation and management [CE-

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IWRAM] in FP7 and in international water research cooperation of EU Member States;

- Align cooperation more strongly with region-specific CE-IWRAM priorities;

- Require that international water research adopt the constructively engaged IWRAM approach and seek links to education, capacity building and innovation;

- Require research to continue to connect local knowledge, gender-aware socio-economic development, cultures and policy institutions and implementing bodies.\textsuperscript{108}

In addition to the European approach to integrated water management system outlined above, there is also the important work of institutional capacity building. There are three major issues that the countries of the MENA region have to face and those are, a revision of their irrigation strategies; a more diligent approach to virtual water trade and lastly having to address the issues of the lack of cooperation over transboundary water resource management.\textsuperscript{109}

In seeking to achieve an integrated and sustainable water demand management system, the region's countries have to take what they have in common and use it as a basis for their cooperation namely the accepted rules of international water law and Islamic water management principles. The latter ensures that there is greater public awareness and public participation especially those of women that are culturally sensitive to the need of the people in the region.

\textsuperscript{108} Id.
addition, it ensures that there is participation where the information dissemination is done at the grass roots through the mosques and religious leaders.

If the MENA Region states could come together and agree on this kind of structure for a plan of action, harmonize and enforce their internal water laws, agree to accept the international legal principles of equitable and reasonable utilization as best they understand it in the spirit of cooperation and peace, as well as plan for population control on the principles that Iran has so successfully implemented, the challenges of climate change and the global food crisis might become manageable. The 2007 Cairo and the 2008 Marrakech International Conferences in the MENA Region\textsuperscript{110} were important steps in this direction, but the agenda for the meeting must be pursued with vigor and determination, as was indicated in the subtitle to the Marrakech meeting: “From Analysis to Action”.

Alternatively, the region can continue to slide towards further conflict and procrastinate adaptive action by denial, continuing to de-emphasize the problems, unrealistically hoping that the trade in “virtual water” will somehow continue to pull them through their own food incapacities\textsuperscript{111} carrying the burden of the ‘historical, psychological and political barriers that have impeded cooperation and deadlocked diplomacy of the MENA Region.’\textsuperscript{112}

The MENA Region States can decide to move to a future of adaptation and mitigation of climate change, beginning to plan contingencies for projected events or they can procrastinate, argue and deny, and go back to the future of the populations of Akkad and the Old Kingdom.

\textsuperscript{110} Id.