

Water Rights and Equity in the Arab Region

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Abstract

Water rights and equity are among the most debatable water issues. The different concepts and understandings of both terms and their applications in some North African, Middle Eastern and International countries are explored. Also, the approaches to achieve equity within the same water use sector and among different sectors are discussed. Moreover, equitable transboundary water allocation is explored. What adds to the complexity of the problem is the lack of a universal definition for both terms. A close look into the doctrines and rules set by international organizations indicates that much more specifications are needed to overcome the rigidity of current laws. Country specific studies have proved that water laws are insufficient in the absence of strict law enforcement. Also, many of the accepted norms and practices may have some restrictions in certain countries due to cultural differences. However, some alternatives can be introduced to reduce the excessive use of water, enhance equity, and define clear water rights.

1. Introduction

"It is now time to consider access to safe drinking water and sanitation as a human right, defined as the right to equal and non-discriminatory access to a sufficient amount of safe drinking water for personal and domestic uses - drinking, personal sanitation, washing of clothes, food preparation and personal and household hygiene - to sustain life and health. States should prioritize these personal and domestic uses over other water uses and should take steps to ensure that this sufficient amount is of good quality, affordable for all and can be collected within a reasonable distance from a person's home."Office of the UN High Commissioner for Human Rights on the Right to Water, September 2007.

The previous statement clearly explains what the term "right to water" refers to. The UN expects all governments to take all the necessary steps to assure a non-discriminatory right to water as a normal extension to right to life. While maintaining this basic right is a trivial problem in areas with plentiful water resources, it is more of a complicated process in areas with limited water resources. Maintaining the right to water in such less fortunate areas may dictate limiting the use of water for other purposes and accordingly other sectors. Hence, the appropriateness of water laws arises. The most important sector in water law is the Water Right.

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Water Rights refer to the right of a user to use water from a water source. That water source could be a river, pond, lake, stream or a groundwater source. Normally, the legislation system gets more complicated in arid areas. Water right issues in such areas have often led to conflicts, both physical and legal. Some legislation systems treat surface water and groundwater in the same manner, while others treat them differently.

The World Water Assessment Programme (WWAP) coordinates different UN initiatives within the area of freshwater assessment. Following the Second World Water Forum in The Hague, The Netherlands, and in preparation for the Third World Water Forum in Kyoto, Japan, March 2003, WWAP designed their framework. They identified and prioritized water needs. They identified the basic needs as those for health and household services which agrees with the recent UN high commissioner for human rights notion; however they did set other priorities. Securing the food supply came on top of those priorities which corresponded to the global rapid growth in food production needs. Although, growth in food production has substantially outpaced the growth of population, there still exists a variation in calorie supply between developed and developing countries and accordingly many people in the developing world could be safely labeled as "undernourished". WWAP recognized that action is needed to reduce the nutrition gap between developed and developing countries through the more equitable allocation of water for food production. The report also recognized protecting ecosystems as one of the priorities, as the depletion in quantity and / or the deterioration in quality of freshwater may cause various species to extinct. WWAP, therefore, developed key indicators to monitor the use of water adopting the principle of ecological justice that assures that the biological and environmental integrity of the different ecosystems are properly maintained. The report also pointed out that industry is vital to life and should not be constrained by water availability, and in return, industrial processes should have no adverse qualitative impacts on water (Bhanu and Young, 2001).

Whether it is the basic needs declared by the UN or the more sophisticated needs recognized by the WWAP, laws have to be set and strictly followed to achieve fair water rights. These laws have to be dynamic to cope with any rising issue or potential conflict at any given time.

There is a huge diversity as to how different individuals and entities believe of a water right. What may sound obvious and intuitive to one group may sound excessive and unnecessary to another group. The problem is much more complicated when different groups representing different cultures and different needs share one water source. Such a situation would surely arouse a conflict if relevant water laws are not implemented.

A total of 145 countries are riparian to one or more of the world's 261 international basins. It takes lots of effort from regional politics to resolve disparities between riparian states. Setting a joint water law or agreement between riparian states might be a difficult task, however if achieved, may prevent lots of potential future water stress.

Historians claim that conflicts over freshwater started back in 4500 BC in the Mesopotamian cities of Lagash and Umma, now in modern Iraq (Clarke, 1989). There has been a global dispute over water ever since. The competition for water is much fiercer in arid areas and where water use is not regulated by a treaty.

Even in river basins within the same country, several issues may lead to disputes; the most common among them is the upstream-downstream sharing, distribution between sub-national units and also between different sectors.

This paper explores the concepts of Water rights and Equity with some examples on how the concepts are being applied in practice in well developed countries and in selected countries of the Arab region. As religion is the main constituent of Arabic culture, religious inscriptions concerning water will be investigated to see if religious teachings could inspire a fair water policy that could act as a peaceful solution to a potential or ongoing conflict.

2. Water Rights and Equity in International law

2.1 Water Rights

According to the 2006 report by the Food and Agriculture Organization of the United Nations (FAO), there is no universal definition for the term "water rights". This is mainly attributed to the fact that conceptions of water issues and water rights vary dramatically around the world.

Due to the dynamic complexities of the hydrological cycle, let alone the human intervention into it, and also the different prevailing social and political circumstances, water rights tend to be rather complex (FAO, 2001). The 2006 FAO report reviewed the traditional approaches to water rights and suggested moving to a modern system of water rights. The proposed system needs new institutional arrangements. Such arrangements, in the form of a water administration, should include mechanisms for stakeholder participation. A water administration may have competence throughout the relevant jurisdiction. It may alternatively be established specifically to manage a given aquifer or water body (FAO, 2006).

European conceptions of water and water law have strongly influenced the development of formal water laws around the world, through the two principal European legal traditions: the civil law tradition and the common law tradition.

The civil law tradition, which is sometimes described as the Romano-Germanic family, is found in most European countries (including the former socialist countries of Eastern and Central Europe), nearly all countries in Latin America, large parts of Africa, Indonesia and Japan as well as the countries of the Former Soviet Union. The common law tradition emerged from the law of England. Eleven Countries in which the common law tradition applies include Australia, Canada,

India, New Zealand, Pakistan, Singapore, and the United States, and the remaining African countries that are not in the civil law tradition as well as other Commonwealth countries and a number of countries in the Middle East (FAO, 2006).

The traditional water rights laws were divided into three categories: surface water rights, ground water rights and rights to water in artificial water courses.

For the surface water rights, the historical default was the private ownership of running water. Most of the progresses that occurred in the field of water rights ever since were influenced by the rejection of such unfair idea. Roman law, for example, denied the possibility of private ownership of running water. The Institutes of Justinian published in the year 533 through 534 stated that running water was a part of the "negative community" of things that could not be owned along with air, the seas and wildlife. It was nevertheless recognized that things in the negative community could be used and that the "usufruct" or right to use the benefit of the resource needed to be regulated to provide order and prevent over-exploitation (Getches, 1997).

The common law tradition agreed with the Roman law on the fact that flowing water are public ownership. From this basic principle, two divergent approaches to water law and water rights were developed: the doctrine of "riparianism" and the doctrine of "prior appropriation". The doctrine of riparianism was developed gradually over the years through a series of court decisions and reached its zenith, in terms of its development, in England and the New England states of North America in the course of the nineteenth century.

The riparian doctrine held that a riparian right holder had the right to make "ordinary" use of the water flowing in the watercourse. This encompassed the "reasonable use" of that water for domestic purposes and for the watering of livestock and, where those uses of water were made, abstraction could be undertaken without regard to the effect which they might have had on downstream proprietors (Howarth, 1992). In addition, a riparian land owner also had the right to use the water for any other purpose provided that it did not interfere with the rights of other proprietors, upstream or downstream. Such purposes were categorized as being "extraordinary" uses of water (FAO, 2006). It could be noticed that such doctrine lacked accuracy by using flexible words like "reasonable" and "extraordinary" without setting any limits or definitions as to what is reasonable enough and what is far from ordinary.

The prior appropriation doctrine was developed in the nineteenth century to serve the practical demands of water users in the western United States. The doctrine originated in the customs of miners on federal public lands and was pretty much affected by the gold digging mentality. The doctrine accorded the best rights to those who first used water just as they had accorded mining rights to those who first located ore deposits. In any event given that their gold washing activities were taking place on federal public lands and not on private land they simply could not seek to apply the doctrine of riparianism. The doctrine was accepted as the law in a number of states and indeed it continues to apply in the states of Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah and Wyoming (Getches, 1997). In addition, a number of states, including California, have hybrid systems under which both the prior appropriation and riparian doctrines are simultaneously applied.

It could be noticed that the prior appropriation doctrine honors the beneficial water use on the expense of water availability and its public ownership. A number of criticisms are made against the prior appropriation doctrine. One criticism is that it tends to discourage water saving by senior appropriators who know that their entitlements are relatively more secure. Furthermore, users have been able to continue seizing water as long as a single drop remained in the stream or aquifer (Freyfogle, 1996). While these and other issues have led to calls for water law reform, little progress has been made to date.

The Civil law tradition was mainly built on the distinction between "public waters" and "private waters". The French Civil Code, given the name Code Napoleon, which was promulgated in 1804 after the French Revolution, maintained this distinction. Public waters were those which were considered to be "navigable" or "floatable" and belonged to the public or national domain. Their use required a government permit or authorization. Private Waters, which were those located below, along or upon privately owned land, could be freely utilized subject to certain limitations of a statutory nature such as servitudes and rights of way. The right to use such private waters, both surface and underground, derived from land ownership which recognized the owner's right to use at pleasure the water existing upon his land without any limitations. A similar distinction was recognized by the Spanish water act of 1886 (FAO, 2006).

Moving on to the groundwater rights, the civil law tradition sees groundwater as a property of the owner of the land above it. Whereas, the common law tradition states that there is no property in water percolating through the sub-soil until it has been the object of an appropriation (Tomlinson, 1885). This law entitles a land owner to sink a borehole or well on his land to intercept water percolating underneath his property, despite the fact that such an act may interfere with the supply of underground water to nearby springs.

In the United States most western states still apply the prior appropriation doctrine toward all or some of the groundwater within their jurisdictions, providing individuals with relatively secure rights to the use of specified amounts of this resource. Other states follow variations of the "beneficial use" doctrine, allowing overlying landowners to pump unspecified amounts of groundwater as long as they do not engage in wasteful uses or interfere with the rights of other overlying owners. Because the doctrine does not confer rights on individuals to abstract specific quantities, ground water is essentially an "open-access" resource for overlying owners (Blomquist et al., 2001). In Arizona, for example, until 1980 when the Arizona Groundwater Management Act was enacted groundwater use was governed by the beneficial use doctrine whereby a land owner can pump as much water as he/she can reasonably use on the overlying land. (Blomquist et al., 2001). However, recently, problems of groundwater overdraft have led to the introduction of statutory controls over groundwater abstractions in the western United States.

Concerning, rights to water in artificial water courses, both the common and civil laws agree that the owner of land adjacent to a canal or other artificial water course has no rights whatsoever to the water in the absence of some form of grant or arrangement (FAO, 2006).

The concept of "Tradable water rights" has been recently introduced. It supports the sale of water rights at freely negotiated prices. It needs many guidelines to be established to secure an appropriate trading framework (Holden and Thobani, 2005).

2.2 Water Equity

The term "Water Equity" refers to the equity of water resources allocation for different users within the same sectors and also among different sectors. The equity issue often takes international dimensions when it involves different riparian states that share a river basin or a common water resource.

In most cases, a situation of asymmetry exists whereby downstream users may not affect upstream users but upstream users do cause downstream impacts. Because of this asymmetry the equitable sharing of water resources between upstream and downstream users will always imply that upstream users have to forego some potential water benefits (Van der Zaag, 2007).

Common water allocation practice is based on either hydrographical or chronological grounds. The hydrographical aspect relates to the origin of the water body and how much of its boundaries fall in each riparian state (Speigel, 2005). On the contrary, the chronological aspect, which is almost typical to the prior appropriation concept discussed earlier, refers to the historical use of the water body that honors the "first come, first serve" base (Abukhater, 2007).

International law introduced various measures to promote water-sharing equity. These measures, including rights-based measures, needs-based measures, and measures based on economic grounds or efficiency, evolved over time (Abukhater, 2007). International law gives priority to both "existing" and "historical" uses of water (Kally, 1993).

The Helsinki rules of 1966 provided many factors pertinent to hydrographical and socio-political criteria. Those factors were expected to resolve all water allocation problems at that time (Abukhater, 2007).

The two main principles of the 1997 UN Convention are "equitable and reasonable utilization", and "no significant harm" to other watercourse states, (Diabes-Murad, 2004). The concept and guidelines for "reasonable and equitable" sharing of common waterways were introduced in the Helsinki Rules of 1966, as well as the 1997 UN Convention. The factors affecting equitable and reasonable use according to the 1997 UN convention included geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character and also the social and economic needs of the watercourse states concerned (AbuZeid,2001). However, no clear definition of the equitable or reasonable use concept was provided (Caponera, 1985). This makes it easy for disputing entities to interpret the law differently according to their own perceptions and desires, which tends to generate a great deal of conflict (The European Platform for Conflict Prevention, 2000).

Aside from the lack of clear definitions, The 1966 Helsinki rules and the 1997 UN convention had some differences in terminology , for example, The UN convention pertains to water in " an

international water course" as opposed to "international drainage basin" in the Helsinki rules (AbuZeid, 2001). Such discrepancy leads to a major difference, as the term" drainage basin" is more general than watercourse. According to Helsinki Rules, the water that falls on the drainage basin and is used before flowing into a common terminus is a beneficial water use for the State in place, whereas the U.N. Convention would not consider any water use from outside of the watercourse as part of the water budget to be equitably utilized (AbuZeid, 2001).

All the previous laws and rules considered surface water on the expense of groundwater. But, as some of these laws are already ambiguous, some might argue that they are also applicable to groundwater although there is no confirmed explicit mention of such claim. Even if we agree that the international law has applied the same principles of surface water to groundwater, the validity of these principles will remain questionable.

Many countries have treaties and agreements regarding the equitable sharing of common water bodies. The main keys for enhancing the cooperation are: deciding how to hold parties accountable for implementation, enforcement and sanctioning mechanisms and the will to strengthen and modify existing agreements (WWAP, 2006).

Namely, an international groundwater law has not been developed until 2007. The reasons for that might be the complex nature of aquifers, interdisciplinary problems, or the fact that the transboundary nature of groundwater aquifers is invisible (Mechlem, 2007).

Groundwater was covered in some regional agreements and featured in few bi-and multilateral international agreements before 2007. Almost none of these international agreements deal exclusively with groundwater (Mechlem, 2007). One of the few exceptions is the Genovese Aquifer, which is a shared aquifer between France and Switzerland. In 1977, both countries signed a very detailed agreement that comprised 24 articles. The agreement covered every possible aspect of aquifer operation in the light of the neighborliness of both countries. One of the important aspects of the agreement was the artificial recharge which was the responsibility of the French part if they exceed a certain withdrawal limit.

The international law on Tranboundary aquifers was developed in 2007. It consists of 5 parts comprising 19 articles. Part II article 3 refers to the sovereignty of aquifers. Article 4 refers to the equitable and reasonable utilization. Article.7 refers to general obligation to cooperate (UN, 2007).

2.3 Water Pricing

Selling water within the same country has been heavily criticized and ridiculed in the Dublin water and Environment convention in 1992. Despite all objections, the convention concluded that water should be valued with money in order to appreciate its importance and prevent its misuse (FAO, 1994).

Simpson and Ringskog (1997) indicated that there are many prerequisites for successful water markets. There has to be a definable product to be traded which can be controlled, measured and traded as a commercial good. They also indicated that the acceptability of the water markets concept is highly related to the social and cultural values of a particular community.

There are different forms of international water trade. An example of that was when Turkey offered the waters of Sehan and Gehan to Syria, Jordan, Israel and some Arab Gulf countries in what was referred to as "Peace Pipes". The offer was strongly rejected for obvious political reasons. Also Turkey proposed the conveyance of the Mangavat River water to Israel through under-sea pipes (Beshorner, 1992).

Also, there is the international desalinated water trade, and the highly controversial trade of water from estuarine countries to non-riparian countries. Israel, once offered to purchase the Nile water. The offer was highly rejected for political and legal reasons (AADO, 1997).

There have been many claims that any two nations are free to make any agreement that involves the purchase of water. However, many of such agreements lack equivalency as the arid country (the buyer) is not always in a position to question or reject what the seller dictates. Therefore, such agreement is made under pressure and is strictly prohibited by international law (AADO, 1997).

Pricing of water services is another subject. Water supply and disposal services were defined to include potable and non-potable piped water supplies and the direct withdrawal of water from its source as well as the disposal and treatment of effluents in the sewerage system (OECD, 1987).

With the term "Equity" becoming more and more significant in the water industry, lots of concerns have been raised investigating whether "Equity" and "Water services pricing" get along. Some parties believe that basic water needs for households is a human right and should not be priced at any circumstances and costs of delivery should be provided by governments. Others accept the idea of pricing, but at subsidized rates.

Subsidy is the transfer of money between a unit of governmental authority and a water service utility, (OECD, 1987). In some rare cases, the transfer is from the water utility to the government. The latter case is often referred to as negative subsidy, where part of the utility surplus is collected by the government. Subsidy is common in Japan, Australia and North America, negative subsidy has been reported in Canada and the Netherlands (OECD, 1987).

Another water services pricing approach relies on dividing consumers into categories by income class, and levying the prices on users belonging to the higher income class.

A different view than that of those who are anti-pricing and pro-subsiding comes from highly developed countries, some voices have suggested that financial aid to poorer members of the community should be awarded from taxes and social security without waiving any service charge.

The most common practice of water service pricing is the flat rate tariff, where users pay a fixed price regardless of the quantities of water used. Also, there is the average cost pricing where all service costs are lumped together and divided on the total number of participating units to generate a unit price (OECD, 1987). There is also the block tariff system where prices rise on a tiered basis according to the quantities of water used (UNDP, 2006).

Any particular pricing system is not guaranteed to have the same result wherever it is applied. In many cases, the tariff structures intended to achieve equity have opposite effects. The application of the flat rate tariff in Bangladesh provided no incentive for water conservation. It was mainly applied because the country was not well equipped with monitoring meters (UNDP, 2006).

3. Water Rights and Equity in some developed countries

Water rights included in water laws and other practices related to equity in water allocation will hereby be discussed in two developed countries. The United States of America and France were chosen as two representatives of the developed world from Europe and North America.

3.1 The United States of America

The United States encompasses many climatic and geographic variations which lead to variable water availability. Being a federal country, every state has its own law regarding different aspects of life. It could be expected that water laws would be more developed in arid states.

There are two divergent systems for determining water rights. Riparian water rights, which were derived from English common law and they are common in the east. The prior appropriation water rights (developed in Colorado and California) are common in the west. Each state has its own variations on these basic principles, as informed by custom, culture, geography, legislation and case law. California law, for example, includes elements of both systems. In general, a water right is established by obtaining an authorization from the state in the form of a water right permit. A legal right is formally consummated, or perfected, by exercising the water right permit and using the water for a beneficial purpose (DeVilliers, 2001).

Under the prior appropriation doctrine, water rights are "first in time, first in right." That is, the older, or senior, water right may operate to the exclusion of junior water rights. The concept of "priority date" is significant (DeVilliers, 2001).

The only exception to the main two doctrines is what is called "Reserved water rights are rights". These rights are established when the federal government reserves land for a specific federal purpose. Examples of reservations include Indian reservations, national wildlife refuges, federal forests and military bases (DeVilliers, 2001).

The use of water in Colorado and many of the states in the western U.S. is governed by the doctrine of prior appropriation, also known as the "Colorado Doctrine" of water law. The essence of the doctrine of prior appropriation is that, while no one may own the water in a stream, all persons, corporations, and municipalities have the right to use the water for beneficial purposes (Castle, 2008).

Groundwater can either be privately owned or publicly owned. Groundwater owned by the State is usually distributed through an appropriation system. Privately owned groundwater may allow unlimited production or limited production rights based on land ownership or liability rules (DeVilliers, 2001).

Although the term "Water Markets" is somehow associated with Chile, The United States was among the first nations to introduce water markets in many states as well as water pricing. In southern California for example, the price of water differs according to the source of the water and the purpose of use. The agricultural water is the least expensive. As the need for reliable water supplies increases, so does the cost. Informal and formal water markets are increasing. Markets for permanent water rights and annual water rights have been incorporated into recent legal judgments for groundwater basins in Southern California (Hamer, 2008).

3.2 France

France is a big industrial country with many renewable water resources. The huge industrial progress is significantly reflected on water allocation to different section. While, the agricultural sector is the primary water beneficent in developing countries, the industrial sector consumes more than 72% of the French water. (Earth trends, 1999). The domestic sector is the second biggest consumer followed by the agricultural sector which has less priority due to the fact that agriculture is mainly rain fed. France releases 55 BMC/ per year of surface water to the Mediterranean through the river Rhone, which is the same amount that represents Egypt's annual share of the River Nile (AbuZeid, 2008).

There is more than one issue that makes the French water sector different than many others around the world. The most distinct one is the private public partnership model where local communities are given the choice either to manage the water services on their own or delegate it to a private firm (United Nations Research Institute for social development, 2006). The private water industry is huge. 80% of customers are supplied by private firms, which might raise many questions about water equity in France. However, The French water sector charges no specific pricing scheme, rebate or discount tariff, for the poorest households. The mechanism put in place by public authorities and private firms in order to guarantee affordable access to water corresponds to a financial aid that helps qualified low-income households facing difficulties with paying their water bill. This is what's called targeted subsidies. The main explanation of this situation is that, according to the French definition of a public service, all customers having similar characteristics must pay the same price (UNRISD, 2006).

Aside from the Genovese Aquifer example, France is an active participant in many transboundary basins organizations. Lake Geneva is shared between France and Switzerland, and the River Rhine is shared between France and eight other European nations. The nineties have seen many laws and agreements organizing the relation between the nine riparian countries and most importantly dividing the river protection responsibilities (European Water Framework Directive) (WFD), 2008).

A famous agreement between France and Spain concerning Lake Lanoux was enforced in 1970. Efforts between both countries started in 1957. The agreement included an article allowing both countries to install equipment to measure the volume diverted from the lake to guarantee equity of distribution (International Water Law Project, 2008).

4. Water Rights and Equity from a religious prospective

Although the majority of countries around the world have secular governments, religions play an important role in forming people's culture and common sense. The importance of water as the source of life and the basic constituent of all living creatures has deep roots in many religions.

Everybody on earth is aware of the fact that rainfall is a variable process both spatially and temporally, it might occur frequently in a certain area, and scarcely in another, it might rain heavily in a specific month, rarely in another. Relying on the semi fact and the historical evidence that natural events tend to repeat themselves throughout time, people living in rainy areas take rainfall for granted, while others in arid areas try to manage their limited water resources as wisely as possible. The scientific approach has always adopted statistics and the frequency of occurrence as a basis for natural events analysis. One common belief remains strong, though not necessarily spoken out, that when it comes to natural events, nothing is absolutely guaranteed. Despite lots of scientific efforts made to induce artificial rain, it is widely believed that human intervention to enhance rainfall could lead to minimal results.

People of different cultures and religious backgrounds have different perceptions related to the randomness of rainfall according to the degree of their faith. People with pragmatic mentalities take the world "as is". They react to existing rainfall conditions without implying any spiritual fact to the matter, trying to set water management plans based on abstract scientific and strategic theories. Religious people on the other hand find the randomness of rainfall very inspiring and faith confirming. Although, most of them would take the same essential scientific water management measures taken by pragmatic minded people, they strongly believe that their efforts will not see success without praying to God directly, asking his Glorious Might for rain. Most religions, and especially the three major celestial ones; Islam, Christianity and Judaism focus on the fact that God is the all mighty and human beings are weak, they can be strong on earth by their faith, knowledge and hard work, but they have to face moments of weakness to make them realize how small they are compared to God, regardless of any progress they achieved on earth. Praying to God and asking his merciful might for rain is a direct application to that concept. Mass rain prayers known as "Salat Istisqa'a" are a common practice among Muslims in arid

areas. It is a confirmed life practice “Sunna” of Prophet Mohamed (Peaces and Blessings of Allah be upon him).

From the religious prospective, water is a gift from God. Some communities interpret the lack of rainfall they suffer as a wrath from God; others see it as a test of their faith and endurance. Another group sees it as the need and/ or the cause that supports knowledge, wisdom, exploration and inventions.

In the next few lines, religious evidence that pertain to water rights and equity will be investigated in two religions that have the highest number of followers around the world and have significantly inspired their lives; Islam and Christianity.

Islam’s Holy Book “The Qura’an” has many verses assuring that water is the source of life and a gift from God.

“Tell them that water is shared, everyone in a certain time”

Holy Qura’an 54:28

The story behind the descendance of the last verse is the story of the prophet Saleh, Thamoud: the tribe that he was delivered to, and the miraculous camel. The message behind the verse is the equity in water between humans and other beings.

“And it is indeed Allah, who created heaven and earth in six days, and his throne was on water, to test thou and see who has better deeds, and if thou say there is eternal life ever after, the infidels would say it is nothing but obvious witchcraft”.

Holy Qura’an 11:7

The previous verse shows the absolute holiness of water as Allah has linked his glorious throne to it.

“Did the infidels not see that heaven and earth were blocked, and we unblocked them, and we made from water every living thing, that should make them believe in the unity of Allah”

Holy Qura’an 21:30

That was another verse from the holy book stating that water is the main source of life.

“Did you not see that God has descended water from the sky that took its path as springs in earth, it grows crops in different colors that bloom then turn yellow then to ashes, and these are evidences for those with thinking minds”

Holy Qura’an 39:21

The previous verse assures that the water that makes the crops grow is a gift from Allah; it also shows that Allah can deprive people from that gift at anytime. It can also be argued that the use of “in” rather than “on” in “in earth” refers to groundwater along with surface water. The term “in earth” could also be relevant to surface water as it usually runs in land depressions.

All the previous verses refer to the importance of water, and the need to appreciate and conserve it. The instructions of Islam are applicable to all times. Islam organizes the relationship between God, man and nature. Man is referred to as a trustee (khalifah). That choice made by God was objected by other celestial creatures, among them was Satan. God told them that he knows what they do not know. Being a trustee is more of a responsibility than a privilege. It entails being answerable to God as to how God’s gifts were managed and used in a wise and fair way. Hence, the necessity of proper water management and equity becomes clear.

While Islam, represented by the Holy Qura’an and the sayings and acts of Prophet Mohamed (PBUH) , gives a main framework for bettering life, it leaves lots of details to people wisdom (hikmah) , Muslims are strongly encouraged to utilize and benefit from accumulated experiences of other nations (Al-Jayoushi and Bino,2000).

Being a gift from God, water actually belongs to God, it could be implied that the issue of pricing water itself, would be a very controversial one in an Islamic community, given the way every individual thinks about water based on the Qura'an verses previously mentioned. However, pricing of the service of developing, purifying, and delivering water may be another issue.

One of the main concepts of Islam is the economic Integration between people with different income. As water is the most important element of life, it should be the first on the list of economic integration priorities. The Qura'anic verse says:

"So that life will not be a trade between the rich"

Holy Qura’an 59:7

The previous verse is a good example of economic integration, and shows the importance of equity in resources management.

While most Islamic Scholars agree that water sources such as rivers, canals and springs are public ownership and should be managed wisely for the welfare of the whole community, there is only one case where water can be privately owned and that is the full enclosure, the same way it can be enclosed in a jar or a pool (Caponera, 1985). According to that definition, groundwater can never be a private ownership.

Many scholars believe that giving privately owned water for free is a good deed that is strongly encouraged in Islam. However, the owner should not be forced or urged to do so (Zouhaili, 1992).

Some Islamic scholars have studied some of the sayings of prophet Mohamed (PBUH) that mentioned a story about a man purchasing a well, and accordingly concluded that water can be sold (Farouki et. al, 2002). However, it has been later confirmed that Prophet Mohamed has prohibited selling water. As for the purchased well, it was bought by a Muslim (Osmam Ibn Afan) from non-Muslims who do not adhere to the prophet's sayings. The official quote (hadeeth) from Sahih Muslim says" The Messenger of Allah, Prophet Mohamed (PBUH) has prohibited the sale of the gift of water" (Farouki et. al, 2002). Mentioning the word "gift" in the hadeeth makes the reason behind prohibition self explanatory. Another hadeeth says “ Muslims are partners in soil, water and fire” (Farouki et. al, 2002)

The common Islamic practice regarding irrigation water rights in Islam prioritize the owner of the land adjacent to the water source in a manner that does not interfere with the public welfare. There is no priority for using rain water for agricultural purposes (Farouki et. al, 2002).

As for rainwater, landowners can use the runoff on their lands in any manner possible, but not on others lands or public properties (Jouda, 1996).

It could be indicated that the personal use which is equivalent to the domestic sector in modern days was also the first priority during the time of Prophet, followed by the irrigation sector. Other contemporary sectors were not applicable at that time.

Jouda (1996) concluded that the Islamic perception of water rights is a cross between the riparian law and the prior appropriation doctrine.

Christianity in both the Old and the New Testament has always valued and cherished water. Because the Bible was written in a part of the world where water is scarce it is not surprising that water is a significant feature in the lives of the people. The scarceness of water and drought were often a result of the wrath of God. The prophets Elijah, Jeremiah and Haggai all predict drought as punishment from God (1 Kings 17:1, Jeremiah 14: 1-6 and Haggai 1: 10-11 respectively). Conversely rainfall is a sign of God's favor and goodness (Abrams, 2008).

Water was often associated with danger, as in the story of the Great Flood, the drowning of the Pharoes in the Red Sea and the fear of the sea and deep waters expressed by the Psalmists as in Psalm 32:6-(Abrams, 2008).

For this shall every one that is godly pray unto thee in a time when thou mayest be found: surely in the floods of great waters they shall not come nigh unto him.

Polluted and undrinkable water was also a serious issue. One of the plagues of Egypt was turning the waters of the Nile river to blood (Exodus 7:14-24). When the Israelites left the Red Sea and came to Marah they found the water there bitter and complained to Moses. God allowed Moses to perform the miracle of making the water sweet and restored the Israelites faith in Him (Exodus 15:22-27) -(Abrams, 2008).

Water is also symbolic of God's blessing and spiritual refreshment and is used many times in the Bible. The following are just a few examples:

Isaiah 35:6-7

*..for in the wilderness shall waters break out, and streams in the desert.
And the parched ground shall become a pool, and the thirsty land springs of water..*

Isaiah 41:17-18

*When the poor and needy seek water, and there is none, and their tongue faileth for thirst, I the LORD will hear them, I the God of Israel will not forsake them.
I will open rivers in high places, and fountains in the midst of the valleys: I will make the wilderness a pool of water, and the dry land springs of water*

The last psalm refers to the equity between the rich and the poor in water, with a big focus on the public ownership of water resources.

5. Water Rights and Equity in the Arab Region

The Middle East could be regarded as a region of many conflict causing water issues. The Arab region is somehow unified in terms of common culture, language and history. These similarities have a great effect in making decisions and resolving issues that relate to development and common welfare. However, many Arab countries share water bodies with non-Arab countries where the latter understanding based on common culture does not necessarily exist. Moreover, in many cases, these Arab countries are the downstream users. The upstream- downstream competition has always been a conflict- raising issue, not only on the riparian scale, but also nationally among local water users. The downstream users always play the role of the "complainer" with many possible complaints and accusations. Upstream users are capable of taking more than their agreed share; they can grow high water consuming crops, they can also increase their irrigated area. In some extreme cases, the upstream users are the "cold blooded" party in that everlasting struggle, their confidence is driven by the fact that they know they can "get away with it", as it is technically very difficult to stop them from over-using water. On the other hand, in some small communities, where virtues and ethics are essential assets in the human character build-up, regardless of what they "can" do and what they "can get away with", people strive to look fair and reputable, they will never take more than what they believe to be their share according to a verbal agreement. Sadly, there are many evidences that the latter case is the exception. In the agricultural land market, it is widely known that the price of agricultural land that is irrigated from upstream reaches of water bodies is higher than that land irrigated from downstream reaches (AbuZeid et. al, 2007) .This can only indicate that the market players know the "deal to the game". They know that land owners will prefer the land with access to more water, which would make the cultivation of high water consuming, yet profitable, crops

feasible. It is as if the market players implicitly recognize taking unfair advantage of the downstream as the norm.

Another common competition is that between surface water and groundwater. Many people fail to realize the hydrological connectivity between them. The rate of groundwater recharge can be significantly reduced by runoff diversion or by rain fed agriculture. Also, excessive pumping of groundwater may deplete springs. Conflicts over groundwater are more difficult to resolve compared to those over surface water. This, relative difficulty is mainly attributed to the fact that groundwater is invisible and only groundwater experts are fully aware of its principles (AbuZeid et.al, 2007).

Interference between groundwater wells causes some conflicts in parts of the Arab Region, specifying a minimum distance between wells is not the ultimate solution, in some cases, the proximity of irrigated lands might still force two separate wells owned by two different individuals to be close (AbuZeid et.al, 2007).

One of the increasing competitions that reflect the battle between tradition and modernization is that between different water use sectors. Tradition is represented by agriculture, while modernization is represented by industry. While the essentiality of agriculture is undeniable, its efficiency is often questionable. Hence, other water use sectors, lead by industry, are gaining the courage to ask for more water from the share allocated to agriculture. However, the indirect socio-economic benefit and return from agriculture is often underestimated.

Water pricing has always been a controversial issue in the Arab world; some consider that water is too significant to be priced, while others argue that water services should be priced. Abid (2005) concluded that water pricing is multi-faceted process that has to combine good financial and technical performances in order to succeed.

For all the previous competitions, a strict legislation system has to be set and fully enforced to guarantee conflict resolution and peaceful co-existence between all water users on both the local and riparian scale.

In the next few pages, Water rights and equity in selected Arab countries will be investigated and reviewed along with any conflicts and/or struggles that these countries encounter. The selected Arab countries are: Egypt, Jordan, Yemen, Tunisia, Morocco, Saudi Arabia and Palestine.

5.1 Egypt

Located in the arid zone of North Africa and suffering from scarce and inuniformly distributed rainfall, Egypt relies on its fixed share from the river Nile. Being one of the major activities in Egypt, Agriculture consumes about 85% of the 55.5 billion cubic meters per year that comprises Egypt's share from the Nile River, which in turn lead the country to a situation of eccentricity, as nearly 96% of the population occupies 3.5% of the country's area which is the Nile River valley.

Aside from the increasing population, the government is facing pressures from the industrial sector to increase their share in what could be considered as a practical example of the struggle between tradition and modernization. The ever increasing demand of the domestic sector is also putting pressure on agriculture water needs and aspirations for expansion.

Despite the different voices from different water use sectors asking to reduce the agricultural sector share, the government relies mainly on agriculture as a solution for the "eccentricity" problem. The government has proposed a plan to raise the agricultural land to 25% of the total area by the year 2017. The plan involves many water demanding national projects, the most famous of them is the Toshka project. By the year 2017, new communities would be established, away from the Nile River delta.

The main issue that raises water conflicts in the agricultural sector is the upstream-downstream competition on canal irrigation water. Another aspect is the diversity of crops, especially within a free cropping pattern policy, as some are more water demanding than others, like rice in the Delta and sugarcane in Upper Egypt (AbuZeid et.al, 2007).

On the local scale, lots of conflicts are resolved by unofficial means based on unwritten laws that rely mainly on kinship ties between water users. These ties work in different extents ranging from preventing the occurrence of a conflict to a state of "organized chaos" where all parties are satisfied at the end of the day.

Some of the water users problems, mainly those related to water shortage may require intervention from a higher authority. Farmers may complain to the irrigation engineer assigned to their area, or the parliament representative at their area or send their complaints directly to the Ministry of Water Resources and Irrigation (MWRI).

Although the agricultural sector has the major share followed by the industrial sector and then the agricultural sector, the official Egyptian water allocation policy prioritizes domestic water requirements over all other sectors. Both the domestic and industrial sectors have growing needs as the population is increasing, and the percentage of individuals switching careers from agriculture to industry is relatively growing. Navigational uses have a comparatively low priority, however, in low flow seasons, it sometimes require additional water releases. Water requirements for hydropower generation are released from the High Aswan Dam into the irrigation system on daily basis. Also, there is a governmental policy to control the cultivation of high water consuming crops like rice and sugarcane, however, there is a need to clearly identify and justify water rights given to farmers who cultivate these crops, and to better define the concept of equity when other farmers demand similar privileges.

The official Egyptian Law of Irrigation and Drainage devotes lots of attention to water rights and equity in many of its articles. Article 18 states that land owners who share a tertiary canal are entitled to water shares equivalent to the ratio of land they own. The Irrigation sector assigns inspectors and accepts appeals and complaints concerning the amounts of water allocated to every landowner. Additionally, Article 19 holds every land owner responsible for removing harmful plants and weeds that restricts water flow.

Article 40 in the Egyptian law of Irrigation and Drainage, deals with any possible water shortage complaints. The law states that if it appears to the authorities that the flow from a particular river reach is insufficient, the government is to make all necessary constructional adjustments to that reach on its own expense. Any additional processes will be made on the land owner's expense, if approved by the authority.

As for groundwater, Article 46 of The Egyptian law prohibits the construction of any well without prior permission from MWRI, while Article 47 prohibits exceeding the pumping limits for authorized well owners.

Articles 89 through 100 deal with the penalties and fines for not complying with the government policies. As the law was passed in 1984, and due to the change in the monetary value of the Egyptian pound, the fines may be too affordable to discourage individuals from violating the law. Hence, a new penalty system is currently under progress and is being reviewed among many other adjustments and changes to the Egyptian Irrigation and Drainage law.

Irrigation water is currently delivered to farmers at no direct cost; however, farmers pay land and crop taxes. There are many factors that might affect the disfavoring of charging for irrigation water. There are economical reasons, as many people are under the poverty line. There are also cultural reasons, as Egyptians take pride in the River Nile, paying for its water will never sound like a pleasant idea to them. However, what might sound possible is charging penalties for land owners who violate the law by cultivating rice or sugarcane, or charging costs for irrigation and drainage for enhancing the improvement of infrastructure.

While water tariffs is not applied to Irrigation water, the ministry of Housing and new communities has introduced a municipal water tariffing system based on income and life-line (ESCWA, 2003). The tariff differs from one area to another depending on the average income of individuals in any particular area. The highest tariff is charged to tourist villages and resorts.

The issue of water equity has grasped lots of attention and some popularity in many local scenes. The attention was seriously enhanced by the formation of non governmental organizations like the Egyptian Water Partnership (EWP), which has put water rights and equity as one of its main priority areas (EWP, 2005). Such organizations play a very important role in enhancing the public awareness, as "knowledge creates appreciation". When people who have always taken water for granted know the consequences associated with its scarcity, they will most likely appreciate such a privilege and follow all the rules and suggestions pertaining to saving it. EWP made lots of public awareness efforts related to the water rights and equity issue. A workshop was organized in September 2005 and came to many conclusions and recommendations. One of the recommendations was reconsidering the fees and taxes charged to landowners who cultivate high water consuming crops. It also focused on the importance of decentralization in applying integrated water resources management, and how it will help achieve equity and fair water rights. The workshop recommendations also touched many international issues, as it showcased factors dictated by the Helsinki rules for equitable water use (EWP, 2005).

An extensive research effort was made in 1993 to achieve an economically reasonable cost recovery plan for Egypt's irrigation network. The costs of operation, maintenance, and replacement of the irrigation network were determined under the budget policy of that time and also under a hypothetical adequate budgetary allocation. The proportion of costs assigned to the different sectors was calculated by the Separable Cost-Remaining Benefit (SCRB) method. The study considered 4 different scenarios with respect to possible changes that may occur to some sectors, mainly the possible increase of the irrigated land. Table.1 shows the allocation results of the study, the ranges shown are the minimum and maximum percent of the four considered scenarios (ISPAN, 1993).

Benefactor	Range of cost Recovery Share (%)
Existing Agriculture	75.2-83.1
Proposed Agriculture	0.0-8.7
Rural Water Supply	0.2
Navigation	3.6-4.9
Hydro-Power	1.8-2.8
Ground Transport (Bridges)	1.1-1.6
Tourism& Recreation	5.7-10.3
Fishery	0.2
Flood Control	0.5-0.8

Table.1 Ranges for water allocation proportions for different sectors for 4 different scenarios (modified from ISPAN, 1993).

It is to be noted that volumetric cost recovery, coupled by targeted subsidies and sectoral tariffing could lead to reasonable equity.

On the riparian scale, there have been some agreements involving Egypt and the Nile River countries. These agreements were supposedly meant to insure fair water allocation for all riparian states. However, some of these agreements were affected by the European colonization that prevailed in the 19th and early 20th century. In Egypt's case, agreements, such as the 1929 agreement, were made to assure that downstream countries such as Egypt remain to get its natural river flow of the Nile; however, upstream countries saw these agreements as assuring Britain's supremacy, and the servitude of its needs.

The more significant and meaningful River Nile agreement was that between the two independent states of Egypt and Sudan in 1959. The agreement featured many articles that focused on the mutual benefits between both countries. The agreement recognized the "established rights" of both parties (Majzoub, 2000). It defined the water allocation to both countries as 18.05 billion cubic meters per year to Sudan and 55.05 billion cubic meters per year to Egypt. Sudan agreed to the construction of the High Aswan Dam, while Egypt agreed to any works deemed necessary for Sudan to exploit its share, like the Blue Nile Roserries Reservoir (Majzoub, 2000). Moreover, Sudan at the time, agreed to undertake many future projects that would help increase the river flows by decreasing the evaporation losses in the marshes of Bahr elghazal, Bahr elgebel, and Bahr elzaraf and also the Sobat River and its branches, or wherever applicable (Majzoub, 2000). The agreement was a great move in terms of applying water equity

and rights on the portion of the Nile River basin waters that naturally flows in Northern Sudan and Egypt in the downstream part of the Nile. Although, some argue that the agreement left out the other eight countries that share the Nile, it is not clear how their inclusion would have made a difference to the shares of the most downstream countries of the natural flow of the river that is currently being fully utilized.

5.2 Jordan

One of the arid countries in the middle east, neighbors countries with the highest on-growing political tension in the world. Not only the water resources are scarce, but also shared with other countries and often disputed. The Jordan River basin is shared between five different political entities. These countries are: Lebanon, Syria, Palestine (West Bank), The Hashemite Kingdom of Jordan and Israel. Historically and religiously, it is considered to be one of the world's most sacred rivers. It is 251 kilometers (156 miles) long. Before being diverted almost completely into Israel, It used to flow into the Dead Sea.

The Yarmouk River is the second largest river in the region in terms of annual discharge and its waters are a vital resource to supply municipal, agricultural, and industrial needs. It is considered as the largest tributary of the River Jordan. Land use in the Yarmouk watershed is primarily agricultural, with some industrial and residential land use in the cities. In general, the water quality of the Yarmouk River is acceptable.

Even the groundwater sources in Jordan are shared with other countries. The Wadi Araba groundwater aquifer is shared with Israel. It is located east of the Jordan Rift Valley and Wadi Araba, water at depths of a few hundred meters below land surface generally is saline. Within these areas of generally high salinity, it is possible that a local source of acceptable, relatively fresh water exists. Heavy pumping in some areas has led to water-level declines and changes in flow directions in the aquifers. In some cases, this has induced saline water from the Dead Sea or deep brines, to move into and contaminate the aquifer.

Another shared aquifer is the Basalt Aquifer, Jordan shares it with Syria. Both countries are individually studying the possibility of utilizing that aquifer as a new source for water supply (Al-Jayoushi and Bino, 2000). However, it is likely that groundwater extraction from that aquifer might cause some negative impacts such as saltwater intrusion.

As the water resources are scarce, the water allocation trends in Jordan tend to achieve equity by the highest economically efficient techniques. Lots of efforts are made to save water and only use it in an economically profitable purpose. Each household is entitled to 15 cubic meters of water per month at subsidized prices (ESCWA report, 2003); this secures the basic needs for personal and sanitation uses.

The Jordanian law honors any previously owned water rights under one condition, the water source has to be registered with the piece of land of interest. Hence, that source can be used for the direct irrigation of that piece of land. Otherwise, the government issues water use permits to land owners and other sectors. (Caponera, 1973).

As for sectoral water allocation, agriculture consumes about 80% of the water. However, it only contributes to the national GDP by 3 to 5 % (ESCWA report, 2003). It has been estimated that a small reduction in the agricultural share would highly enhance the industrial sector, if directed towards it.

Existing water policies stress on the need for wise water management, and protecting water resources from degradation, depletion and pollution. These policies also stress on achieving the maximum efficiency in conveyance.

Officially, the Jordanian government has developed 4 water allocation related policies; one for irrigation water, another for groundwater and also a policy for wastewater management and finally a water utility policy. The irrigation policy is the most developed; it has lots of specifications regarding improving the tariffing system of water, controlling high water consuming crops, monitoring the quality of irrigation water, and the development of new sources for water such as treated waste water (ESCWA report, 2003).

The kingdom faced a huge economic crisis in 1988 that led to the reform of many governmental sectors including the agricultural sector. The reform was accompanied by a change in cropping patterns. The new policy leaned towards exporting crops with high monetary value and less water consumption like strawberries, and importing high water consuming crops. Moreover, a linear programming model was formulated. Its objective functions are the net agricultural income of every region. As there are many possible land uses for each region, the model predicts the appropriate land use and the corresponding water tariff that should be charged to land owners.

The Jordan valley Authority is the only authority capable of changing Irrigation water tariffs and water policy implementation in general. The water tariff for the industrial and domestic use is significantly more expensive than that for irrigation purposes.

On the riparian scale, water allocation to Jordan is dictated by many international agreements. The water conflict over the waters of the Jordan basin dates back to the late 1800s and reflects the Arab-Israeli ever growing struggle. The Jordan River has been an additional reason for escalating the conflict caused by Israel's claims to the riparian states waters.

There was always the tendency to reach a fair agreement, these agreements were either not completed or not implemented owing to the oscillating political tension between different parties. Lots of efforts for peace were made by the Jordan River riparian countries with the political aid of outsider countries. It was not till the 26th of October 1994 that a treaty was signed between Jordan and Israel. The parties agreed mutually to recognize the rightful allocations of both of them in the Jordan River, the Yarmouk River, and the Wadi Araba groundwater aquifer with the agreed acceptable quantities, qualities and principles that was detailed in one of the annexes of the treaty (Majzoub, 2000).

5.3 Yemen

Located in the south of the Arabian Peninsula, it is the biggest agricultural country in it. Due to the high rate of population growth, and accordingly the expansion of the irrigated area, water demands are growing. It is one of the few Arab countries that rely on rainfall as the primary water source. The Agricultural sector consumes about 90% of the country's water.

Rainfall is the main source for surface water in the country. Most of the wadis are ephemeral, only a few have minor base flows that may be seasonal or permanent, but only in a limited part of their channels. The wadi beds are dry most of the time, and infrequent runoff peaks quickly occur and disappear. Flood peaks are often quick and infrequent because of sparse vegetation and mostly impermeable nature of the soil in the catchment areas. Surface water resources have been estimated at 2.1 billion cubic meters, but this quantity corresponds to the runoff from major wadis and does not include the runoff produced within the smaller catchments (Alhumiari, 2006).

During the last 20 years, groundwater resources in Yemen have been subject to severe exploitation to meet a continuously increasing water demand for irrigation and domestic use. Thousands of new bore holes were drilled and many existing dug wells were deepened, when they became dry because of over abstraction. This rapid and uncontrolled ground water development did not run parallel with a proper ground water management. Therefore, ground water resources have not been adequately quantified (Alhumiari, 2006).

There are two main crops that Yemen cultivates. One is recognized worldwide, the other is peculiar to the local culture. The Yemeni coffee is among the worlds finest, while "qat" is Yemen's favorite guilty pleasure. As global food prices continue to rise, Yemen is hoping a fundamental rethinking of its agricultural priorities will alleviate the pressure on its people. The debate on "qat" cultivation has recently resurfaced and fuelled resistance from a society that views the controversial narcotic as a traditional necessity. Despite the economic crisis the country is facing, giving up qat that costs \$5 a day on average is out of the question. In a country where the World Bank says half the population lives on less than \$2 a day, householders continue to spend 10 per cent of their income on qat, which the government now says is consuming Yemen's most fundamental resources.

Like most of the countries affected by the current global food shortages, Yemen's increasing dependence on external food supplies has also been exacerbated by climate change and population growth. It has been reported by the country director of the World Food Program (WFP) in Yemen that severe droughts have affected water resources considerably and reduced arable lands to only three per cent of the overall territory.

In addition to this agricultural shortage, the country has experienced a demographic boom, which further reduces its ability to feed the population. Yemen's population has increased by 600 per cent in the last 40 years, and is currently the sixth fastest growing population in the world. In the

past few years, Yemen has dropped to 153rd among the 177 countries listed in the UN's human development index (WFP, Yemen).

Qat consumes more than 20 per cent of the total water use in Yemen and draws out water equivalent to at least five times the rate of natural recharge of the Sana'a basin (Alarishi, 2008). Yemeni authorities are aware that the most efficient way to save the country from starvation is to promote the renaissance of its own agricultural industry by restoring a healthy balance between qat and food crop cultivation. The recently launched national food security policy is leaning in that direction. Government officials have put in place a series of strategies aiming to enable Yemen to meet the growing demands for food crops (Alarishi, 2008). The authorities are promoting the cultivation of coffee and grapes, which are Yemen's most valued food assets. In parallel, they are trying to discourage farmers from growing qat by imposing a tax on qat production, forbidding qat cultivation in Yemen's most fertile areas and launching anti-qat advertising campaigns throughout the country.

The government has recognized the problem of depleting water resources and has designed a program to address it. A new water law was established in 2002. Article 20 of that law states that domestic uses has the highest absolute priority. Article 21 of the same law assigns the second priority to five sectors. Although, it is not explicitly mentioned, it can be indicated that the law gives equal priority to those five sectors. The five sectors are: animals, public buildings, irrigation, industry and other environmental needs.

Article 27 says that water rights are granted to individuals under the condition that they use it in a manner that doesn't affect the public benefit or the prevailing traditions in a certain area. The same article also states that all outstanding or gained rights, before or after the implementation of the law, are protected and shall not be violated unless there is a maximum priority, in such event a fair compensation shall be awarded. It could be well noticed that Article 27 needs further detailing.

Article 29 honors any previously awarded rights concerning groundwater and spring water given that it remains to be used for its initial purpose. It could be implied from this article that groundwater and some other water resources are private ownership and the government's role is to organize the use of these resources in a manner that makes it non-excessive.

Article 30 allows individuals and landowners to collect rainwater anyway they can. This article does not apply in government protected areas.

The infamous upstream/downstream conflict occurs in a slightly different way in Yemen. Instead of traditional rainfall water direction devices, the government has constructed concrete direction dykes. Although these structures have enhanced the overall water availability, yet it favored the upstream landowners. Despite, article 21 referred to earlier, water allocation between different sectors takes a strongly informal manner in a way that not only violates equity, but sometimes leads to a water crisis in some areas (Ministry of Water and Environment, 2004).

There is a huge "underground" water market in Yemen. It is well established, but operated by the "wrong" people who has no official rights to the water they supply. On the other hand there are no explicit regulations or restrictions on individuals digging wells or obtaining water by any other mean. Applying an official water tariff for the domestic and industrial sector is currently under study (Ministry of Water and Environment, 2004).

5.4 Tunisia

Located in North Africa between Libya and Algeria, The total volume of water resources is about 4.7 billions cubic meters: 2.7 billions cubic meters of surface waters, 80% of which are in the north; and 1.998 billions cubic meters of groundwater. In Tunisia, the total surface suitable for irrigation is about 400,000 ha, 32% of which are in the North East, 31% in the Central West, 22% in the North- West, 9% in the south and 6% in the Central East. Vegetable farming, large scale crops (cereals, farming industry, fodder crops and leguminous plants) and fruits stretch out from year to year around dams and drillings. This extension is greater in the Center west and the South in comparison with the other regions (FAO report, 2006).

Direct rainfall is the main source of water in Tunisia. As it is highly variant, the country has suffered from many droughts over the years. The government has issued a mobilization plan that aims to enhance the efficient use of water (Tunisian Ministry of Agriculture, 2002).

80% of the water is allocated to agriculture and the demand for water by other sectors is highly increasing (UNDP, 2005). The next prioritized water use sectors are the domestic sector, the industrial sector and tourism respectively.

As the government plan focuses mostly on the wise exploitation of water resources, which lead to the development of the national irrigation water efficiency program, such a plan was more emphasized by introducing tariffing mechanisms for drinking and irrigation waters (Tunisian Ministry of Agriculture, 2002). Many local experts believe that water markets can improve water use efficiency through the transfer of water to users who can obtain the highest marginal return from using it. Existing water markets are implemented among farmers or between farmers and urban water companies or hydropower companies.

5.5 Morocco

Located in the western corner of Africa, it represents a rare intermediate state between the desert and the wet area. Morocco relies mostly on erratic rainfall, which corresponds to the wide variety of climate that the country faces and leads to many situations of drought in some areas (Ministry of national soil, water and Environment, Kingdom of Morocco, 2003).

Morocco is one of the countries known for its enthusiasm concerning resolving water issues and developing effective water policies. It hosted the first World Water Forum in Marrakech , along with many other international water events that were directly sponsored by the king.

Morocco's history clearly shows that its people have always tried to manage its water supply in order to survive times of drought and famine. Traditional collectives were formed long ago for water management purposes, and have continued to this day, in spite of modernization efforts undertaken by administrations during the French protectorate years and after independence (Bennis and Sadeq, 2007).

The survival of this management method can be explained by the ingenuity of the works construction, the respect given to the precepts of Islam, local customs, the principle of water rights for each irrigator in the collective, and the operational rules of the management group, based on justice, equity, voluntary service, and penalties for delays.

Each ethnic faction chooses its delegate to manage its canal. The water men and assistants are paid in kind or in water allowance. At the beginning of the Protectorate, in 1914, a water commonality law was passed. This law was followed in 1924 by another law creating Favored Agricultural Syndicate Associations, adapted to the needs of the colonials, i.e., institution of water tariffs, implementation of voting rights according to property size, etc. After independence in 1958, a general law was passed to encourage creation of associations for the promotion of popular participation in all areas of development. This law coincided with the implementation of major irrigation programs, and the government took the opportunity to create its own irrigation associations (Bennis and Sadeq, 2007).

Results did not meet expectations, and in 1990 the government passed a new and more specific law, creating Agricultural Water-Users Associations (AUEA). These associations were intended to take charge of irrigation works created by the government. As had been the case in the past, the government took the initiative, defined the rules of the association in its own way, and maintained the right of oversight of the associations' operations.

The most recently passed law (1995) introduced new options, such as the anti-pollution campaign. It confirms the previous law, but does not allow its effective implementation. It does not yet cover all aspect of water management, equity and rights. The law retains traditional structures, but does not designate a specific supervising ministry, allowing for decentralization and introducing basin agencies using government workers (Bennis and Sadeq,2007). A National Water Council headed by the king is also established.

The main national concern is to decrease the water availability gap between the rural and urban areas as the current water allocation is strongly proportional to rainfall areas. More than 13 million people living in the rural areas rely on non-renewable groundwater for both domestic and Irrigation uses. The current water use situation in Morocco is chaotic as individual benefits are more favored than the common benefit. Moreover, the government lacks the appropriate financial and human resources to inspect or assure the enforcement of the law. The 1995 law needs further additions focusing on water rights and equity (Ministry of national soil, water and Environment, Kingdom of Morocco, 2003).

Many events of unfair use of water have been reported, but the most significant of them is the unmanaged exploitation of water resources in the oasis areas that has a very high cultural value.

These violations occur, although the 1995 water law states that any water management related decision should be open to discussion between authorities and representatives for different water-use sectors. Moreover, the law states that violators should be fined.

There are private companies that manage drinking water in Morocco.

5.6 Saudi Arabia

The kingdom of Saudi Arabia occupies the major part of the Arabic peninsula. A mostly desert country with a small but significant agricultural activity. Saudi Arabia presents a different case of a religiously based constitution. The country is ruled by the Islamic law (Shari'ah) which would certainly have many reflections on water rights and equity.

Water is God's property, it is his gift to mankind, and therefore it is free to all. Private ownership of water is only applicable when the water source is fully enclosed, the same way it can be enclosed in a jar or a pool. Otherwise, the possession of water is not valid, although the right to use water is. Beds of wadis are in full governmental control as it is a matter of public interest (Caponera, 1978).

There are two general traditional modes of water rights in the kingdom; the first is the mode of acquisition where the land-owner has the right to use the adjacent water source, and the more formal mode where use permits are issued to certain individuals with the approval of the members of the community. However, the kingdom's local water code recognizes all water sources as national wealth and supports the joint water right for all Saudi nationals (Caponera, 1978).

Islamic law gives first priority to domestic uses, followed by animal uses and then agriculture. According to the water code industrial uses come fourth and recreational uses come fifth. Any other uses deemed important by authorities come next (Caponera, 1978).

The government is implementing a series of measures to reallocate water to other sectors to cope with the increasing demand in these sectors, mainly the agricultural sector. The government approach is based on the efficient use of water (ESCWA, 2003).

The government has a certain policy in setting priority for digging wells. Permanent settlements have the highest priority. The priority is also given according to the number of inhabitants benefiting from the well. Consideration is also given to the proximity of the well to the community and the availability of water in each settlement. The minimum quantity per person per day was set to 10 to 15 gallons. The minimum spacing between wells was set to be 500 meters (Caponera, 1978).

Within the agricultural sector, the government is trying to achieve equity between users by reducing the area of high water consuming crops and setting tariffs to water used in excess of the specified water requirement for a certain crop (ESCWA, 2003) .

5.7 Palestine

It is one of the most troubled spots on earth, with the political tension growing everyday; having impacts on all aspects of life.

Aside from the water struggle with Israel, The Palestinian Water Authority (PWA) that was established in 1996 has managed to issue the water law in 2002. Article (3) of that law considers all water resources as public ownership. Article (4) prohibits any exploitation of water without permission. Article (5) sets the water use priorities among different sectors. The domestic sector comes first, followed by the agricultural sector, then the industrial sector, the commercial sector and finally the recreational sector and any other sector deemed necessary. Furthermore, an approval has to be granted if a user from one sector plans to switch to another.

Article (26) is concerned with the pricing of water services, which is the authority's responsibility. Article (31) considers any area containing groundwater as a national protected area. Article (34) states that certain personnel should be assigned to work as water law enhancement officers. Violators will be charged heavy fines according to Article (35).

The situation is not as simple on the riparian level; the everlasting struggle with the Israelis has taken its toll on all shared resources. Both nations belong to the Jordan River basin as discussed earlier.

The Palestinians assert that their historical rights to the water were always protected during the Ottoman, British, Egyptian and Jordanian Rules. They further make the claim that only under the Israeli occupation have these rights been denied. (Rouyer, 2000).

The heart and soul of the Palestinian legal claim to water resources of the Gaza Strip and the West Bank rests on the international law of "belligerent occupation". Based on international law, the Palestinians criticize both the existence of Israel in the Gaza Strip and the West Bank and Israel's practice of exploiting surface and groundwater in these territories as being illegal. Conversely, attempting to indemnify their actions, the Israelis often deny the applicability of these laws equating their argument with the denial of the term "occupation" (Abukhater, 2008). The problem appears to be an endless loop and takes more than water experts to solve.

It has been concluded that most of the water rights for Palestinian people are in the hands of Israeli authorities, who are encroaching on the Palestinian water right which is a tributary to the right of self determination (Biswas et. al, 2008).

6. Conclusions:

Water rights and equity have been explored on many levels. The international law was investigated with many examples on policy application in some international, Middle Eastern and North African Countries.

Internationally, the two main common practices of water rights are the riparianism and the prior appropriation. Both doctrines have their pros and cons, especially when applied to the Middle East and North Africa (The MENA region).

It could be indicated, that both doctrines did not foresee many potential future conflicts, along with many other issues related to the progressing development at the time they were established.

The riparianism doctrine sounds ethical; however, it needs much detailing to suit every country, or even more, specific regions within the same country. Theoretically, it appears to be fair, but, in its current form, it is still too flexible in a way that makes it easily interpreted in different ways to serve an individual interest rather than the public benefit, or some countries over other that might have the need for the shared water resource. In some cases the riparianism is misused to put political pressures on riparian countries.

The prior appropriation doctrine on the other hand, honors old settlements which supports existing communities and enhances their development activities, but it does not sound fair on an abstract scale, especially in countries with growing population and developmental expansions.

The upstream/ downstream conflict needs more than a law or a policy to be efficiently resolved on the national scale. It needs a shared vision and understanding, in addition to joint monitoring and development projects.

The international law is not well established in issues related to groundwater rights. There has been no international law that is peculiar to groundwater till 2007. Groundwater rights need more attention from the international legislating community.

In many of the countries featured in this study, water laws are not essentially respected, which leads to the conclusion that establishing a law enforcement policy in these countries is equally important. Extensive research is needed to serve that matter.

On the riparian scale, agreements between countries sharing the same water bodies are a normal reflection to the political situation between these countries. It has been argued that many of these agreements are not ethical as they were made under pressure. It is an expansion to the classic upstream/ downstream conflict where the downstream party is always the one under pressure. Many research efforts could be made to explore the possibility of assigning an international organization that organizes and supervises such agreements to assure justice and equity.

In all the Arab countries featured in this study, the agricultural sector is the primary water consumer, with many voices within these countries wondering about possible future consumption reduction and reallocation to the domestic and industrial sectors. The domestic sector has the first priority in all these countries, the increase of its share will be a normal consequence to the population growth and the establishment of new communities. The same increase is expected for the industrial sector. As long as the reallocation corresponds to society changes, it is equitable.

Many of the Arab countries are applying shifts to their cropping patterns and/or charging tariffs for excessive cultivation of high water consuming crops. Taking Yemen as an example, an outsider would think that the country needs such a change in cropping pattern, particularly reducing the “qat” production (Alarishi, 2008). Such a decision may not be widely accepted by locals. Hence, it could be concluded that the agricultural habits in every country differs the same way cultures differ. Lots of public awareness efforts have to be done for that purpose. Also, when shifting the cropping patterns, it has to be in a way that does not increase the calorie supply gap between developed and developing countries that the WWAP referred to.

Water markets are not regarded in the same manner around the world, but their acceptance may differ in Arab countries. They are officially present in some countries like Tunisia, unofficially in Yemen.

After some religious arguments, the majority of Arabs are leaning towards the conclusion that selling water does not comply with the Islamic Jurisprudence (Shari’ah). This conclusion is enough to close the door to any future discussions or negotiations concerning that issue. On the contrary, water services pricing could be discussed, as it involves paying money to get a service. The options could be either charging a flat rate on all users, or a subsidized rate that divides users into categories according to their income. There is a third option which is charging tariffs according to the quantities delivered. In that latter case, the cost of operation and management will be charged by unit volume.

Setting tariffs in water services is a good approach to achieve equity within the same sector and among different sectors, and is also meant to reduce the excessive use of water in the first place. Assigning water rights and achieving equity need continuous efforts, and dynamic policies and frameworks corresponding to the changes of water needs.

Recommendations:

Based on the previous conclusions. Many recommendations can be made. All aspects of Water rights should be clearly identified and respected in the Arab Region.

An efficient law enforcement mechanism is absolutely important in preserving water rights.

Achieving equity must relate directly to people's needs and consider their social and economic conditions. That should be the basis of water allocation among different sectors.

Assigning the first allocation priority to the domestic sector should always be reassured, in support of the achievement of the millennium development goals.

Water allocation within the irrigation sector should not be in excess to high water consuming crops on the expense of other crops.

Countries sharing a common water resource should agree on many terms defining the equitable and reasonable use of the water body in a more practical way.

Water is a public good. It is not for sale. Water rights are privileges awarded to those who deserve it for a specific purpose, trading them is not necessarily fair or ethical. .

Applying Irrigation cost recovery and charging for water services are reasonable measures for achieving equity. Charging for the domestic water services has to categorize by income, and maybe waived for individuals below a certain wealth limit.

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