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WATER MANAGEMENT AND CONFLICT: THE CASE OF THE MIDDLE EAST

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Middle Eastern societies have learned over millennia how to manage their scarce water resources and balance the competing demands of agriculture, animal, and domestic use. In the last 50 years industrialization, urbanization, and growing populations have caused the landscape of those demands to change. New competing demands, such as urban versus rural and human versus industrial, are complicating the scene.

Both rural areas and cities in the Middle East have seen significant population increases in the last 50 years, but urban growth has far outpaced rural growth. According to UN statistics, Saudi Arabian urban populations saw a more than 28-fold increase from 1950 to 2005, while rural populations didn't quite double. In Egypt during the same period rural populations grew by 185 percent, while cities saw a 354 percent increase; in Syria the growth figures are 287 percent and 800 percent, respectively. Urban populations in the region will continue to grow: Saudi Arabia's current urban population is likely to almost double by 2030.

Irrigation still accounts for the largest demand sector—over 90 percent—but growing cities are upsetting the traditional balance between agricultural and domestic uses.¹ In addition, attitudes toward water change with the coming of prosperity. Many people in developed societies would consider a daily shower and water to keep their lawns green basic needs. The thriving Gulf states have some of the highest per capita water consumption rates in the world: between 300 and 750 liters per person per day.² (The World Water Council reports that the average per capita daily use in the United States is 350 liters, in Europe 200 liters, and in sub-Saharan Africa 10–20 liters.) It is estimated that by 2050 all countries in the region except for Iraq will have water scarcity problems. The intersection of growing populations, changing and growing demand for water, and the looming threat of water scarcity in the Middle East has the potential to create conflict within the region.

Countries and territories in the Middle East can be divided into two groups: those that have low levels of renewable water resources, such as flowing rivers, and must rely on groundwater and desalination for most of their supply, and those that get much of their water from river systems they share with other countries. The former group includes Gaza, Kuwait, Oman, Saudi Arabia, Qatar, the United Arab Emirates (UAE), and Yemen. The latter group consists of Egypt, Iraq, Jordan,

Lebanon, the West Bank, and Syria. In order to meet the needs of growing populations and cities in the last 50 years, countries in both groups planned and developed large-scale infrastructure projects to source, control, and deliver water. These projects, such as dams, desalination plants, and river diversions, focused almost entirely on the supply side of water management; that is, they harnessed or created more water rather than conserved already existing supplies. While these large supply projects were meant to alleviate conflicting demands domestically, they often created conflict between states that share water resources, such as rivers.

In recent years a model of water management that considers conservation on the demand side, called integrated water resource management (IWRM), has been incorporated to different extents into national water policies in the Middle East. This paper will look at some past conflicts over water in the Middle East and examine how IWRM, which stresses cooperation between states in order to develop sustainable water use policies, is changing the ways in which states interact over water.

PAST CONFLICTS OVER SHARED WATER RESOURCES

Water resources come in two forms, renewable and non-renewable. Renewable resources consist of river systems and shallow aquifers that are replenished with rainwater, while non-renewable resources include the majority of deep aquifers (filled with fossil water), desalination, and wastewater reuse. More than three-quarters of underground aquifers are considered non-renewable because they would take many centuries or millennia to replenish naturally. The Middle East is one of the most arid regions in the world, with an average rainfall of 56 millimeters/year (to put this in perspective, the average rainfall in central Australia, another arid region, is 127 millimeters/year). Transnational rivers supply over 50 percent of renewable water resources in the Middle East, while underground aquifers and desalination plants make up the bulk of the non-renewable sources.

In the past 50 years much of the water-related conflict in the region has been over shared rivers. Upstream states often base their claim to a shared river on the concept of “absolute territorial sovereignty,” which lets them do what they want to the river regardless of the downstream effects. Downstream nations prefer an interpretation based on “absolute integrity of the river,” which denies upstream nations the right to do anything that disrupts its flow and water quality in the downstream portion. While it has long been considered customary law that “an upstream state is acting unlawfully if it changes the waters of a river in their natural condition to the serious injury of a downstream state,”³ this is not accepted by many upstream states.

The Jordan River

In the early years of Israel a significant part of the new country’s national goal was attracting immigrants and supplying them with a good standard of living, which included adequate water. The new state devised a National Water Carrier (NWC)

plan, meant to divert water from the Jordan River, which Israel shares with downstream riparians Lebanon, Syria, and Jordan, and the Sea of Galilee to the Negev Desert in the south. Israel considered harnessing the waters of the Jordan to be a key part of its national development plan.

From the Arab point of view, the NWC was part of Israel's plan to establish itself permanently in the region by achieving economic independence. Diverting the Jordan was seen as a plot meant to provide employment (farming) to 5 million new immigrants in the Negev region, whose presence was perceived as a security threat by neighboring states.⁴ Arab states, led by Syria and Egypt, devised their own diversion plan for the Jordan. Fully expecting the diversion operations to cause Israel to attack, they also began planning a Joint Arab Command with an Egyptian commander. In the years leading up to the Six-Day War in 1967, water became a defining characteristic of the Arab-Israeli struggle.

While the river was a rallying point of pan-Arab nationalism, it also became a bone of contention between Arab states when their respective internal conditions caused them to reevaluate their stances towards Israel. Egypt favored delaying confrontation but going ahead with diversion plans. Lebanon feared the issue could exacerbate domestic tensions between its Christian and Muslim inhabitants, creating instability, and began work on diversion plans only half-heartedly. Syria was the only country that favored immediate confrontation with Israel. Eager to bolster the legitimacy of the Ba'th Party, the president of Syria began full-scale diversion operations. From 1963 until the Six-Day War in 1967, these were the focus of repeated military incidents between Israel and Syria.

The Tigris and the Euphrates

Turkey controls the headwaters of both the Tigris and the Euphrates, which flow through Syria (or in the case of the Tigris, along the border) and into Iraq. Turkish leaders began discussing harnessing the waters of both rivers for the purpose of national development as early as the 1950s. The project, called GAP from its name in Turkish (*Güneydoğu Anadolu Projesi*; in English, the Southeastern Anatolia Project), began in the 1980s with plans for 22 dams and 19 hydroelectric power plants. The project will eventually divert enough water to irrigate 1.7 million hectares of land and provide 27 billion kilowatt-hours (kWh) of electricity annually. This will not only mean less water for Syria and Iraq, but will also give Turkey the power to cut off water to downstream riparians completely if a serious conflict were ever to occur. In 1990 Turkey did cut off the entire flow of the Euphrates for three weeks. Blackouts occurred in the Syrian towns that depend on the hydroelectric power generated by the river's flow.

The GAP project will predominantly benefit southeastern Turkey, which has high levels of unemployment and political instability, as well as being the center of the separatist Kurdish movement. In the 1980s Syria surreptitiously supported the Kurdistan Workers Party in its campaign against the Turkish government as a way of

sabotaging the GAP project. Turkey and Syria eventually reached an agreement in 1987, in which Turkey agreed to maintain a minimum flow of 500 cubic meters per second from its dams on the Euphrates in exchange for Syrian cooperation regarding the Kurdish rebels, but Turkish attitudes are far from compromising. At the opening of the Ataturk Dam in July 1992, future President Suleyman Demirel said, “Neither Syria nor Iraq can lay claim to Turkey’s rivers any more than Ankara could claim their oil. This is a matter of sovereignty. We have a right to do anything we like. The water resources are Turkey’s, the oil resources are theirs. We don’t say we share their oil resources and they cannot say they share our water resources.”

The Tigris and Euphrates river systems have also caused conflicts between Iraq and Syria. In the early 1970s, the filling of Lake Assad behind the Tabqa Dam in Syria (currently a major source of hydroelectric power) significantly reduced the flow of the Euphrates into Iraq. Iraq complained to the Arab League that Syria was withholding water. Syria soon withdrew from the negotiations, and in May 1975 closed its airspace to Iraq. Both countries began massing troops at their borders in preparation for a conflict, which was only averted when Saudi Arabia brokered a deal between the two countries in which Syria agreed to let 60 percent of the waters flow into Iraq.

The Nile

The situation of the Nile is somewhat different from that of the Tigris and Euphrates and the Jordan; in the case of the Nile it is the downstream riparians (Egypt and Sudan) that feel they have the dominant claim on the river. Although 85 percent of the Nile’s water originates in Ethiopia and the river passes through ten countries, it is Sudan and Egypt that have determined who “owns” the waters of the river, and how much. Both of these countries get less rainfall than other riparians further south and rely heavily on the Nile for irrigation. Together they use 94 percent of the Nile’s water.

Egypt and Sudan have almost come to blows over allocation of the Nile’s water between the two. When Sudan achieved independence in 1956, the first prime minister immediately requested that all previous agreements between the two countries be revised and lodged an objection to Egypt’s plan to build the Aswan High Dam. Egypt responded by withdrawing its support for Sudan’s reservoir project at Roseires on the Blue Nile. When Sudan stated it would not adhere to any past agreements at all, Egypt massed troops on the border in preparation for conflict.

The two countries eventually signed the Agreement for the Full Utilization of the Nile Waters (Nile Waters Treaty) in 1959, after a military takeover in Sudan resulted in a more Egypt-friendly government. Egypt, however, continued to experience conflict with its neighbors over water rights. In 1970 it threatened Ethiopia with war over the proposed construction of a dam on Lake Tana on the Blue Nile, and in 1979 President Anwar Sadat famously said, “The only matter that could take Egypt to war again is water.” The sentiment was echoed by Egyptian Foreign

Minister Boutros Boutros-Ghali in 1988 when he said that the next war in the Middle East would be over the waters of the Nile. In October 1991, Egyptian Defense Minister Lt. Gen. Mohammed Hussein stated that Egypt would not hesitate to go to war to defend its claim to the Nile River.

A potential future source of conflict is Ethiopia, whose population of 77 million is expected to reach 126 million by 2030, according to UN statistics. Poor access to clean water poses one of Ethiopia's greatest challenges: currently, only 22 percent of its population has access to safe drinking water, compared to 98 percent of the population in neighboring Egypt.⁵ While in the past Ethiopia has not contested Sudan and Egypt's claims to the Nile waters, if it is pressured by internal conflicts and instability due to the growing population and continued poverty, it could claim that the Nile belongs to Ethiopia, considering the majority of the headwaters originate there.

In 1997 the UN adopted the Convention on the Law of the Non-Navigational Uses of International Watercourses, which stipulates, in part, that rivers should be used in an equitable manner, and that upstream use cannot cause significant harm to other riparians. This does no more than codify what was already customary international law. In the past, when many Middle Eastern countries were experiencing the pressures of growing populations, internal instabilities, and the need for rapid development, customary water law did not prevent conflict—often armed—from occurring. It is unlikely a UN convention will help mitigate conflict in times of stress in the future.

What is needed is a fundamental change in how states manage and interact over water. In the past decade many Middle Eastern states have adopted a new approach to water management that focuses more on the human, ecological, and economic aspects of water. This approach, IWRM, fills in the legal framework with a concrete set of concepts on how to manage water resources and provides an opportunity to cooperate with neighbors over shared resources.

INTEGRATED WATER RESOURCE MANAGEMENT (IWRM)

As was examined in the previous section, international conflicts over water have often resulted from governments' attempts to mitigate political and ethnic tensions at a local or national level, and a supply-side focus on managing water exacerbated those conflicts. In recent years IWRM, which considers the relationship between supply and demand, has gained increasing attention as a better way to not only manage water, but also create cooperation between riparian states.

IWRM is a system for sustainable use of water resources. It is based on the philosophy that all uses of water are interdependent, and that water is a social and economic good. For example, agricultural runoff can pollute aquifers and rivers, which can lead to poor-quality drinking water and environmental degradation. Conversely, limiting agricultural water withdrawals for ecological reasons, such

as sustaining fisheries, can mean fewer crops or poor crops. These issues have security ramifications when they create or add to instability within a state or between states.

The perception of water management as having social, economic, environmental, and security ramifications began to gain mainstream attention in the 1990s. At the 1992 International Conference on Water and the Environment (ICWE), held in Dublin, some guiding principles for an integrated, more holistic approach to water management were proposed. The Dublin Principles, as they are called, can be paraphrased as follows:

- Water management requires a holistic approach that links social and economic development with the protection of ecosystems. Water management policies also must consider land use in the vicinity of the water source.
- A participatory approach to water management is needed, which includes raising awareness among both policy makers and the general public and involving stakeholders at all levels.
- Women, as primary providers and users of water domestically, need to play a pivotal role in water management.
- Water is an economic good, and as such should be managed efficiently and equitably, with special attention to conserving and protecting water resources.

These principles were presented at the United Nations Conference on Environment and Development (UNCED) later in the year, and echoed at the 1st and 2nd World Water Forums in 1997 and 2000, respectively. At the World Summit on Sustainable Development (WSSD) in Johannesburg in August and September 2002, which all countries dealt with in this paper attended, a target was set to develop national integrated water resource management and water efficiency plans by 2005. At the 4th World Water Forum held in Mexico in 2006, it was judged that of the Middle Eastern countries, Yemen, Palestine, Jordan, and Egypt had been the most successful in formally incorporating IWRM into their national water policies. Kuwait, Iraq, and Oman were judged to be the least successful.

The first challenge for most states in the Middle East was accepting water as something more than just a resource to be exploited for purposes of development and modernization. Part of this process included moving towards a recognition that water resources are limited and that water management needs to focus not just on finding new sources and exploiting current ones, but on educating water users on conservation techniques—that is, on demand management. In addition, before being able to effectively institute IWRM policies, many countries in the region had to deal with a fragmented control of water management characterized by overlapping responsibilities between different institutions and water-using sectors. At the same time, they suffered from a rigid, overcentralized control carried over from the previous 50 years of rapid development and large water infrastructure projects.

It was necessary to both locate water management in one ministry at the national level and involve stakeholders at municipal and community levels in order to encourage better management and conservation.

Egypt has been particularly successful in adopting these changes. In January 2005, the Egyptian Ministry of Water Resources and Irrigation issued the National Water Resources Plan, which is based on IWRM concepts. The first part of the plan aims at conserving current water resources rather than tapping or creating new supplies. The sustainable use of current resources includes changing the operation of the Lake Nasser reservoir to reduce evaporation, mining fossil water in the Western Desert with an eye to conserving the aquifers for future generations, harvesting rainfall and flashfloods, and utilizing desalination. On the demand side, the plan includes provisions for improving irrigation techniques to minimize waste. Specifically, in the West Delta area, Egypt has instituted a design, build, lease (DBL) system for farmers that involves constructing three major channels to deliver irrigation water. The idea is that local stakeholders will be more likely to conserve water if they feel they own the water delivery mechanism.

Jordan also provides a good example of how IWRM is being used in the region to cope with growing water scarcity. Jordan's Ministry of Water and Irrigation (MWI) reports on its information website that the country has 11 renewable aquifers, all of which are subject to over-pumping. Average annual withdrawals range from 146 percent of the renewable recharge in minor aquifers to 235 percent in major ones. In 2002 the MWI created the Water Demand Management Unit (WDMU), which (emphasis added) "aims at reducing the demand on fresh water in a serious attempt to match it with the available supplies *before* embarking on the development of additional water resources and supplies." The WDMU's responsibilities are divided into three general areas: educating the public and other entities on the importance of and methods for conserving water, monitoring water use and recommending enforcement and regulatory measures, and tracking water conservation.

By its nature IWRM encourages riparian states to cooperate through its focus on the sustainable and environmentally sound use of water resources, and many countries have used IWRM policies with the view of promoting regional cooperation. The star example of this regional cooperation involves the nine Nile Basin states (Uganda, Tanzania, Sudan, Rwanda, Kenya, Ethiopia, Egypt, the Democratic Republic of Congo, and Burundi), which instituted the Nile Basin Initiative (NBI) in 1999. The purpose of the NBI is to "develop the river in a cooperative manner, share substantial socioeconomic benefits, and promote regional peace and security."⁶ Projects the NBI is involved in include environmental protection, stakeholder education, and agricultural water use efficiency. The NBI prioritizes both the economic and the security ramifications of water management and shows a real shift in regional thinking about water.

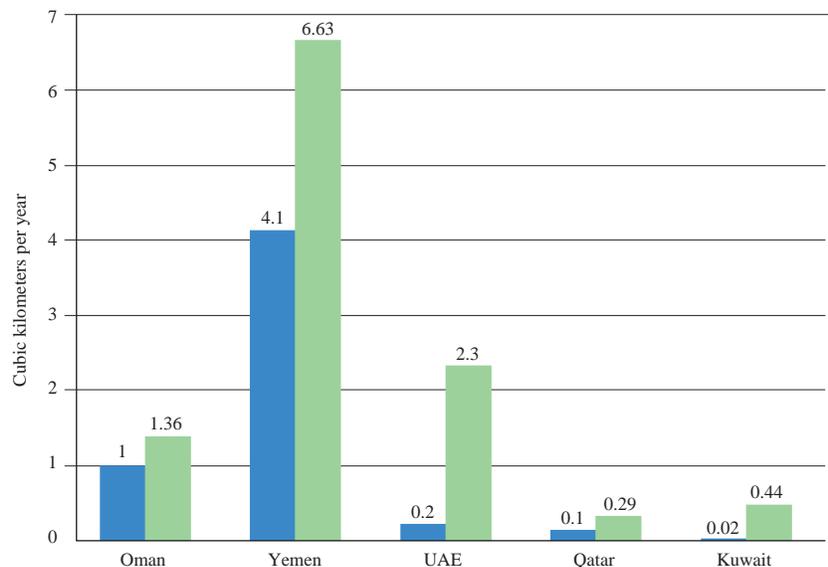
Several regional institutions are dedicated to encouraging IWRM cooperation in the region. One is the Arab Integrated Water Resources Management Network (AWARENET), which seeks to foster regional communication on how to incorporate IWRM into national policies. The Arab Water Council, established in 2004, is also concerned with supporting IWRM in the region and focuses particularly on a multidisciplinary approach to water management and the sharing of scientific information.

Bilateral agreements in the region are also beginning to reflect IWRM: the 2002 Agreement for Sharing the Water of Al-Kabeer Al-Janoubi River and for Building a Common Dam between Lebanon and Syria includes the implementation of the principles of integrated water resource management for the management of the waters of that river. The Al-Kabeer Al-Janoubi River is significant because it forms a border between the two countries, rather than beginning in one and ending in the other. The agreement is based on the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, which both countries ratified. The benefits that can be expected from this and other IWRM-based agreements between states sharing water resources include

- *Cooperation.* Cooperation between the two countries improves the management of the river, increases agricultural production and energy generation, and facilitates preparedness for disasters, such as floods and droughts.
- *Reduced costs.* Costs are shared between the two countries, and thus tension and conflict between them are reduced.
- *Security.* Cooperation in the management of water resources facilitates the improvement of political and economic relations between the two countries.⁷

For countries on the Arabian Peninsula, which get most of their water from aquifers, reservoirs, treated wastewater, and desalination plants (Saudi Arabia has the largest desalination capacity in the world), the conservation philosophy of IWRM is even more important. These countries' biggest water challenge is that they are currently using significantly more water than they have. Saudi Arabia suffers the biggest gap between supply and demand: it has only 2.4 cubic kilometers per year of renewable water resources, but uses 17.33 cubic kilometers per year. Figure 1 presents resources-to-withdrawals ratios of other countries in the region.

At the 4th World Water Forum held in Mexico in 2006, Yemen was the only Arabian Peninsula country judged to have successfully incorporated IWRM into its national water policy. In 2003 the newly created Yemeni Ministry of Water and Environment issued the IWRM-based National Water Sector Strategy and Investment Program, 2005–2009 (NWSSIP). Plans include involving farmers in water management by introducing cost-sharing investments in new irrigation techniques that conserve water, as well as reducing government subsidies for diesel fuel, used in the majority of water pumps, to encourage conservation.⁸ Sana'a University in Yemen has offered a master's of science degree in IWRM since 2004, offering courses on the

Figure 1: Water Resources (Blue) versus Withdrawals (Green)

Source: Compiled from sources in Peter H. Gleick, ed., *The World's Water 2006–2007* (Washington, DC: Island Press, 2006).

environment, gender in water management, and water value and economics. Of all the IWRM targets, recognizing the primary role of women in the use and allocation of water at the local level has received the least attention, and it is significant that it is part of the master's degree coursework at Sana'a University.

On the other end of the spectrum, at least according to the 4th World Water Forum documents, is Oman, which, along with Kuwait and Iraq, is judged to have been the least successful in incorporating IWRM policy into its national water plan. A careful examination of Omani water policies exposes the limitations of IWRM as the international standard of water management. It also reveals a virtually ignored aspect of water policy: the importance of cultural and religious values in water management.

THE CASE OF OMAN

Oman relies on precipitation to provide most of its renewable water resources. Rainfall, which replenishes shallow aquifers and reservoirs, provides 65 percent of Oman's water needs, and the country depends on desalination to provide the rest. Most rain in Oman falls during mid- and late winter. Amounts range from 20 to 100 millimeters a year on the coast and interior plains to 700 millimeters a year in the mountains in the north. Although some of the mountain rainfall seeps into aquifers that supply irrigation water for the plains, much of it runs down *wadis*

(gullies that are usually dry) in seasonal floods. Some of this water is caught in aboveground reservoirs, but these have a high evaporation rate.

According to the Omani Ministry of Regional Municipalities, Environment and Water Resources, water demand in Oman exceeds water supply by 25 percent. *The World's Water 2006–2007* estimates that demand to be 36 percent more than supply (see Figure 1). Desalination cannot be relied on to fill that gap because of the expense involved. Energy accounts for as much as one half of the cost of desalination, and Oman, unlike Saudi Arabia, is not a large producer of fossil fuel. Raw materials for building plants, such as steel, are expensive as well. Desalination plants also have significant environmental impacts that could contribute to future costs. These include the discharge brine that contains decaying organisms caught during in-flow and chemicals and heavy metals introduced during the desalination process. Cleanup and building more environment-friendly plants are likely to make desalination even more expensive.

The star of Oman's water management system has been, and to some extent still is, its *aflaj* system. *Aflaj* are water channels that take advantage of the earth's gravity and land incline to deliver water from underground sources. They have a history of thousands of years in the region and currently deliver one-third of the water from renewable sources for irrigation (wells account for the rest). Shares of *aflaj* water can be either owned or rented, and they are traditionally measured by complex calculations based on seasonal variations in the length of the day and night and the position of the stars. Conserving its *aflaj* has been a key part of Oman's modern water policies. In 1997 the Sultanate established the National *Aflaj* Inventory Project, which counted 4,112 *aflaj* in the country, of which about 74 percent are currently in operation. The Sultanate takes responsibility for the maintenance of both *aflaj* and wells (a parallel Well Inventory Project was initiated in 1992) and continues to fund research on desalination and other water-sourcing technologies, such as fog collection.

Oman is an absolute monarchy governed by Sultan Qaboos bin Said Al Said, who deposed his father, whom he accused of mismanaging the country, in 1970. The Sultan instituted a council of elected advisors in the early 1990s, and granted universal suffrage to his people in 2003. Even with the elected council, the Sultan still rules as an absolute monarch and has a great deal of power over policy making in his Sultanate. The Sultan of Oman has been far-sighted in his management of the country's water resources. In 1984 he created the Ministry of Regional Municipalities, Environment and Water Resources, which located water and environment issues at the level of municipal governance (and made Oman the first Arab state to have a ministry dedicated to environmental issues, according to the ministry website). In 1986 he strengthened these links by combining the council responsible for environmental resources and the council responsible for water resources to form the Council for the Conservation of the Environment and Water Resources. These steps were far ahead of their time in recognizing the relationship between local

governance, environment, and water management. They also reflect an understanding of the importance of maintaining a strong national authority that is not fragmented among various ministries, as well as decentralizing water management and involving stakeholders at lower levels. These were concepts that would only enter the international discourse some years later, at the Dublin Conference in 1992 and then in 2002 in Johannesburg.

The objectives of the water resources sector of the Ministry of Regional Municipalities, Environment and Water Resources include many of the same targets as plans formally incorporating IWRM: a focus on sustainable use, demand management, protection of the environment, and involvement of the public through education. The three objectives are as follows:

- Supplying sources of potable water and creating a balance between water utilization and renewable resources
- Enhancing water resources and protecting them against depletion and pollution and rationing water consumption
- Establishing water preservation principles and increasing awareness of the importance of rationing water use

In addition, the Ministry's website predominantly displays a "kids" section with activities and information aimed at teaching children about the importance of the environment and water conservation.

From an outside perspective—such as that of the 4th World Water Forum in 2006—Oman is behind other countries in the region in adopting IWRM. This interpretation of Oman's water management is based on the fact that Oman, unlike other countries in the region, has not developed a national plan incorporating IWRM concepts and terminology, like the one Egypt issued in 2005 that states at the beginning of its preface that it is based on an IWRM approach. In fact, Oman has incorporated IWRM-like policies into its water management for decades. This illustrates that international standards and targets, while useful in encouraging cooperation, can stand in the way of accurate understanding when only those standards and targets and their particular language are used as measurements.

The Sultan's 21st National Day speech in November 1991 perhaps best indicates his integrated view of water management, including its importance to regional, and global, security:

Of all the gifts with which God has blessed us, water is the greatest. . . . If extravagance is forbidden by Islam, it is even more applicable to water. Indeed, Islam emphasizes in its teaching that it is our duty to conserve it. We cannot stress too strongly the need to observe the conservation measures laid down by Government in this respect. The use of this vital resource throughout the world can have a great impact on future development strategies, and indeed could become a decisive factor in political tension and thus, world security. Our Government has

plans to increase our country's water resources to meet our national requirements without arduously affecting the demands of conservation.

Oman's emphasis on maintaining a traditional Islamic religious and cultural core to its modernization efforts sets it apart from other water-scarce states on the Arabian Peninsula in its own eyes.⁹ As the Sultan's speech indicates, modern water management and traditional Islamic values are far from incompatible. Water conservation and equitable distribution are core values in Islam. The Quran stresses the importance of not wasting water, even when supplies are plentiful. It also teaches that water belongs to everyone and cannot be owned: of the three people Allah will ignore on the day of resurrection, one is the man who had more water than he could personally use and refused to share it with travelers. The IWRM principle of involving all water stakeholders in decision making and development of water management is echoed in the Islamic principle of *shura*, which states that decisions that affect a community should take place within the community through group consultation and consensus.¹⁰

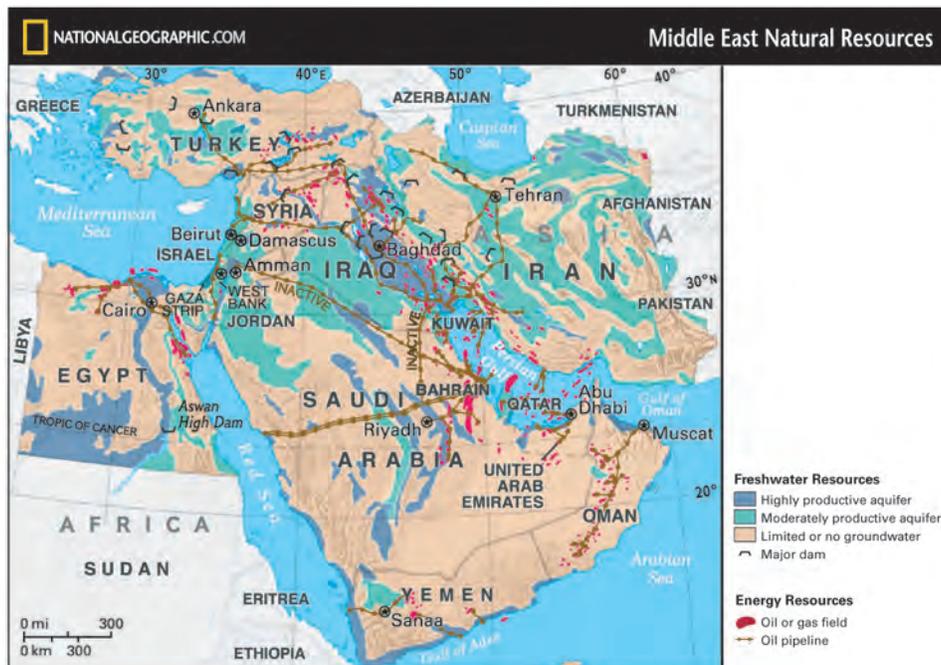
Many Islamic countries in the Middle East have, like Oman, used Islamic principles to further their water management goals. Perhaps the clearest example of this is the 1978 *fatwa* (a ruling on Islamic law issued by an Islamic scholar; contrary to Western interpretation, a *fatwa* is not a law, but rather an explanation or guide) issued by the Council of Leading Islamic Scholars (CLIS) of Saudi Arabia, which dealt with the issue of reusing wastewater. Water purity is extremely important in Islam, but in a water-poor country like Saudi Arabia, treated wastewater is an important water source. The *fatwa* stated, in part, that "impure waste 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, colour and smell, as witnessed by honest, specialized and knowledgeable experts. Then it can be used to remove body impurities and for purifying, even for drinking." Similarly, Jordan has been using Islamic teachings in its IWRM-based public awareness campaigns about water conservation for years,¹¹ a fact that was ignored in the 4th World Water Forum report that acknowledged Jordan's success at implementing IWRM.

These cases from Saudi Arabia and Jordan are examples of how traditional Islamic values can work with modern integrated water policy. It is important not to use international IWRM standards exclusively when judging a country's progress in integrated water management. Oman's case in particular demonstrates the importance of examining a nontraditional security concern in the Middle East, such as water scarcity, from a perspective that takes into account how it is viewed within the region. Oman's emphasis on incorporating Islamic values into its water policy conversation may turn off many Western observers, particularly in the current climate, but its success should not be discounted. As water becomes more of a security concern in the coming decades, it will become even more critical to understand the mechanisms with which integrated water management can take place from within an Islamic discourse.

CONCLUSION

Conflict involving transnational rivers has plagued the Middle East over the last 50 years, but river systems are not the only water resources shared by states in the region. Whereas only some of the states share significant rivers, all of them share underground aquifers with their neighbors. (See Figure 2.) The Mountain Aquifer shared by Israel and the West Bank, but primarily underlying the latter, is one example of how an underground water source has contributed to conflict within the region. The Mountain Aquifer is the sole source of water for the Palestinians in the West Bank. After Israel occupied the West Bank at the conclusion of the Six-Day War, it established strict control over the Mountain Aquifer in order to supply its growing immigrant population with water. Israel currently uses 80 percent of the aquifer water. Both Israel and Palestine feel they have historical and cultural claims to the territory of the West Bank, and thus to the water contained under it. The conflict over the aquifer is informed by the mutually perceived religious and ethnic differences between the Israelis and Palestinians and is part of the broader violent political conflict between the two groups. As this case demonstrates, shared aquifers are as likely as river systems to contribute to conflict in the region.

Figure 2: Underground Resources in the Middle East



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The past 50 years of supply-side water management have created some severe problems that could have long-range implications for regional security. The most obvious of these is water scarcity: water is a finite resource in all of these countries, and IWRM conservation and demand management policies cannot restore what has already been depleted. Another problem, and one that will become increasingly significant as water becomes more scarce, is pollution of existing sources. Pollution of rivers due to industrial and domestic runoff is well documented. Underground water sources face the same threat and are also vulnerable to salt pollution resulting from over-pumping. Saltwater intrusion is especially a problem in coastal aquifers, where even a 5 percent contamination of seawater can cause the water to become unusable for human, animal, and agricultural consumption.¹² Parts of the Mountain Aquifer under Israel and the West Bank passed their sustainable pumping levels in the 1970s, and some of the water is now so brackish it requires treatment before being used.¹³ While countries on the Arabian Peninsula, which depend on aquifers for freshwater, are beginning to conduct experiments with salt-resistant crops, salt pollution is only likely to continue increasing if aquifers continue to be overexploited. Desalination, another important source of water on the Arabian Peninsula, contributes to air pollution and pollutes land and coastal areas due to out-pumping of salt and contaminants introduced during the desalination process. It is not enough for a government to guarantee adequate water to its citizens. It must also guarantee clean water. Violent conflict due to polluted water sources has already occurred in other parts of the world: in 2005 citizens in China clashed with police after occupying an industrial complex they blamed for ruining their crops by polluting irrigation water.

As water scarcity grows in the Middle East, aquifers will become more important as sources of water. States will need to negotiate policies for extracting this water. Issues they will need to address include sustainable management of underground water and equitable allocation of water from shared aquifers. The important role underground water sources, and in particular fossil water reserves, will play in the security of the region in the next 50 years is largely unrecognized by the rest of the world. No international law has yet been set for underground water. While the 1997 UN Convention recognized the future importance of underground water sources and called for more study of the issue, it limited its application to underground water either “tributary to, or sharing a common terminus with, surface waters covered by the document’s Articles.”¹⁴ As mentioned earlier, three-quarters of underground aquifers are considered non-renewable because they take centuries or millennia to replenish. Aquifers connected to river systems or other aboveground water sources, and replenished by them, are in the minority. Most underground water is fossil water, which could aptly be called the final reserves of freshwater on the planet. It is possible that these may become the new “rivers” over which states experience conflict in the next 50 years.

Water in the Middle East is more than just a resource—it is tied to national, cultural, and religious identity. Oman’s case in particular demonstrates how intri-

cately entwined are water and culture. As conflict over river basins and shared aquifers such as the Mountain Aquifer underlying Israel and the West Bank illustrates, it is simplistic to view water conflict as involving only water. It is often the case that internal ethnic, cultural, or governance issues serve as a catalyst for conflict over water between states. While there is a better chance that countries in the region will be able to avoid water-related conflict if cooperation is institutionalized through the application of IWRM techniques, as long as there are ethnic, national, and religious tensions, the possibility for conflict over water remains.

8. International Labour Organization, "The ILO Code of Practice on HIV/AIDS and the World of Work," 2001, <http://www.ilo.org/aids>.
9. Business for Social Responsibility, "HIV/AIDS in the Workplace," Issue Brief, <http://www.bsr.org/insight/issue-brief-details.cfm?DocumentID=49032>.
10. The summarized results related to employment discrimination of a survey conducted in Vietnam and Thailand can found in Asia-Pacific Regional Office United Nations, Office of the High Commissioner on Human Rights, "Background Papers of Expert Meeting on HIV/AIDS and Human Rights in Asia-Pacific," Bangkok, Thailand, March 23–24, 2004.
11. Referenced in TBCA's annual reports and case studies at <http://www.abcon aids.org/ABC/>.
12. World Economic Forum, "Business & HIV/AIDS: A Healthier Partnership? A Global Review of the Business Response to HIV/AIDS 2005–2006," <http://www.weforum.org/en/initiatives/globalhealth/Business%20Surveys%20&%20Reports/index.htm>.
13. Asian Business Coalition on AIDS, "A Case Study: Thailand Business Coalition on AIDS," a TBCA Report, <http://www.abcon aids.org/ABC/asp/DispDoc.asp?DocID=294>.
14. Ibid.
15. TBCA annual report, 2004–2005.
16. Supanya Lamsam, "The Role of the Private Sector in HIV/AIDS Prevention," presentation remarks at the Asia-Pacific Alliance against AIDS: Public-Private Partnerships for AIDS Prevention in Asia-Pacific, Vancouver, British Columbia, Canada, July 7, 1996.
17. World Economic Forum, *Business and HIV/AIDS: Who Me? 2003–2004*, www.weforum.org/globalhealth.

Chapter 11

1. David Pollock, "Kuwait: Keystone of U.S. Gulf Policy," Policy Focus No. 76, Washington Institute for Near East Policy, November 2007, p. 41.
2. Ibid., p. 5.

Chapter 12

1. Mexico 2006: 4th World Water Forum, Middle East and North Africa Regional Document. Agriculture contributes a comparatively low amount to national GDPs due to the fact that most crops being produced are low-value. There is also a general cross-regional low efficiency of use of irrigation water, which contributes to the high percentage of water used for agriculture.
2. "Water Resources," *Green Gulf Report* (UAE: Gulf Research Center and Energy and Resources Institute, 2006), p. 44.
3. Ian Brownlie, *Principles of Public International Law*, 5th edition (Oxford: Oxford University Press, 1998), p. 268.
4. Moshe Shemesh, "Prelude to the Six-Day War: The Arab-Israeli Struggle over Water Resources," *Israel Studies*, vol. 9, no. 2 (Fall 2004).
5. Peter H. Gleick, ed., *The World's Water 2006–2007* (Washington, DC: Island Press, 2006), p. 240.
6. See the Nile Basin Initiative homepage at http://www.nilebasin.org/index.php?option=com_content&task=view&id=13&Itemid=42.
7. United Nations Economic and Social Commission for Western Asia, "Regional Cooperation between Countries in the Management of Shared Water Resources: Case Studies of Some Countries in the ESCWA Region" (New York: Author, 2006), pp. 11–16.
8. Gleick, *op. cit.*, pp. 52–53.
9. Mandana E. Limbert, "The Senses of Water in an Omani Town," *Social Text*, vol. 19, no. 3 (Fall 2001), p. 41.