

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
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1. REPORT DATE (DD-MM-YYYY) 01-03-2012		2. REPORT TYPE Master of Military Studies Research Paper		3. DATES COVERED (From - To) September 2011 - March 2012	
4. TITLE AND SUBTITLE Water Scarcity as a Catalyst for Instability in the Jordan River Basin				5a. CONTRACT NUMBER N/A	
				5b. GRANT NUMBER N/A	
				5c. PROGRAM ELEMENT NUMBER N/A	
6. AUTHOR(S) Major Christopher M. Coble, USMC				5d. PROJECT NUMBER N/A	
				5e. TASK NUMBER N/A	
				5f. WORK UNIT NUMBER N/A	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USMC Command and Staff College Marine Corps University 2076 South Street Quantico, VA 22134-5068				8. PERFORMING ORGANIZATION REPORT NUMBER N/A	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A				10. SPONSOR/MONITOR'S ACRONYM(S) N/A	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) N/A	
12. DISTRIBUTION / AVAILABILITY STATEMENT Unlimited					
13. SUPPLEMENTARY NOTES N/A					
14. ABSTRACT Freshwater is becoming a scarce natural resource in the Middle East. While the Middle East has never been a water-rich region, decreasing water tables, a burgeoning population, and increasing freshwater pollution will combine in the near-future to increase instability. Additionally, the effects of global warming are predicted to decrease precipitation in the Middle East while increasing surface evaporation and saltwater intrusion into coastal aquifers. There already exists great tension along the Jordan River Basin between Israel and its Arab neighbors. Several small conflicts and, arguably, the 1967 Six-Day War were fought over water. Without water, nations and humanity cannot exist. Already, Israel and its neighbors live on less water than is recommended for health by the United Nations and the World Health Organization. The United States sees water scarcity as a growing problem, and numerous publications, including the National Security Strategy, direct leaders and planners to be alert to non-traditional causes of conflict escalation.					
15. SUBJECT TERMS Water Scarcity, Israel, Jordan River Basin, Ecological Refugees					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 48	19a. NAME OF RESPONSIBLE PERSON Marine Corps University/Command and Staff College
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code) 703-784-3330 (Admin Office)



*United States Marine Corps  
Command and Staff  
Marine Corps University  
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Marine Corps Combat Development Command  
Quantico, VA 22134-5068*

MASTER OF MILITARY STUDIES

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**TITLE:**

**Water Scarcity as a Catalyst for Instability in the Jordan River Basin**

SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF MILITARY STUDIES

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## **Executive Summary**

**Title:** Water Scarcity as a Catalyst for Instability in the Jordan River Basin

**Author:** Major Christopher M. Coble, United States Marine Corps

**Thesis:** Water scarcity will exacerbate existing tensions between Israel and the surrounding Middle Eastern Arab nations, thereby increasing instability in the region.

**Discussion:** Freshwater is becoming a scarce natural resource in the Middle East. While the Middle East has never been a water-rich region, decreasing water tables, a burgeoning population, and increasing freshwater pollution will combine in the near-future to increase instability. Additionally, the effects of global warming are predicted to decrease precipitation in the Middle East while increasing surface evaporation and saltwater intrusion into coastal aquifers. There already exists great tension along the Jordan River Basin between Israel and its Arab neighbors. Several small conflicts and, arguably, the 1967 Six-Day War were fought over water. Without water, nations and humanity cannot exist. Already, Israel and its neighbors live on less water than is recommended for health by the United Nations and the World Health Organization. The United States sees water scarcity as a growing problem, and numerous publications, including the National Security Strategy, direct leaders and planners to be alert to non-traditional causes of conflict escalation.

**Conclusion:** As populations grow and water sources diminish in the Jordan River Basin, water scarcity may soon be the principle catalyst for regional instability. Water not only sustains livelihoods, it is essential for governmental national interests and survival. The lack of water will exacerbate existing political, ideological, and cultural tensions between the Israeli state and the surrounding Arab nations. Peace may be difficult to maintain as the lack of food and water aggravates anger against Israel. Palestinians within the occupied territories forced to migrate to neighboring Middle Eastern states as ecological refugees may cause greater instability and an increase in extremism and violence. Finally, the United States will be required to maintain a political and military presence in the region and be prepared to respond to the threats and suffering aggravated by an increasingly water scarce Jordan River Basin.

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### *Preface*

I became aware of water scarcity while living in Yuma, Arizona, the past few years. The sparkling canals taking water to Mexico through the desolate Imperial Sand Dunes provided the only color other than desert tan for over one hundred miles. While the United States is gifted with natural resources, to include water, many Americans do not realize how dry the southwestern United States and northern Mexico are. While our two states are unlikely to experience armed conflict over water scarcity, many regions in the world, already deficient in human security and adequate governance, face enormous challenges in the near future as populations soar and water becomes scarcer. In fact, the Center for Strategic and International Studies foresees water, not oil, as the primary future cause of instability in the Middle East.<sup>1</sup> We should not underestimate a state's or people's desire and will to survive; water will continue to play a substantial part in international relations.

Below is a quote which I think clearly states water's role in life

*"Water, not unlike religion and ideology, has the power to move millions of people. Since the very birth of human civilization, people have moved to settle close to water. People move when there is too little of it; people move when there is too much of it. People move on it. People write and sing and dance and dream about it. People fight over it. And everybody, everywhere and every day, needs it. We need water for drinking, for cooking, for washing, for food, for industry, for energy, for transport, for rituals, for fun, for life. And it is not only we humans who need it; all life is dependent upon water for its very survival." -Mikhail Gorbachev (2000)<sup>2</sup>*

I would like to acknowledge Dr. Edward Erickson and Dr. Adam Cobb, both members of the U.S. Marine Corps Command and Staff College faculty at the Marine Corps University, for their guidance with this thesis.

*When the well is dry, we learn the worth of water.*  
-Benjamin Franklin<sup>3</sup>

*Water, water, everywhere, And all the boards did shrink;  
Water, water, everywhere, Nor any drop to drink.*  
-Samuel Taylor Coleridge, *The Rime of the Ancient Mariner*<sup>4</sup>

## **Introduction**

The intent of this paper is to provide the reader with an understanding of humanity's decreasing access to freshwater sources, specifically as it relates to instability between the state of Israel and the surrounding Arab states. We are inculcated to think of oil as the defining diminishing global resource, irreplaceable in terms of its importance to the global economy and our everyday lives, but what about water? Only in the twentieth century has oil temporarily replaced water as the crucial international resource.<sup>5</sup> Life is not possible without the substance, and military planners cannot overlook its importance. A state's security not only includes national sovereignty, it must also consider basic human needs and financial security, each of which is affected by water availability.

While water has been one casual factor in many complex, lingering disagreements, it will likely lead to increased instability in the future. In assessing the future of security in the Middle East, Oli Brown and Alec Crawford, both former senior researchers at the International Institute for Sustainable Development (IISD), discuss several climate change-induced threats to security in the region, to include increased water scarcity, reduced food levels, stagnant economic growth, and forced migration.<sup>6</sup>

Numerous global regions are already considered water-stressed. With more than 300 freshwater basins lying on or across international borders, and considering water's importance for human survival, industry, and energy production, the potential for instability cannot be



underestimated.<sup>7</sup> Rising populations, climate change, pollution, and wasteful practices will result in making freshwater one of the critical resources of this century. Benjamin Franklin's quote above from *Poor Richard's Almanac* may be quite prophetic.

This thesis will first provide the reader with a brief analysis of the current and predicted state of global water supplies. In this section, the essay will discuss how water scarcity is increasingly related with climate change and global warming and analyze the regions most susceptible to water stress. The next section will evaluate the effects of water scarcity on international and state security. The body of the thesis will analyze the water conflict in the Jordan River Basin, to include the history and future of confrontations caused by water stress. Finally, this paper will discuss the implications of water scarcity between Israel and its neighbors, with an analysis of new methods that Israel may use to produce freshwater and what the lack of water in the Middle East will mean for American national security. Note that while the intent of this essay is not to discuss the impact of climate change on future conflict, water scarcity and global warming are interrelated and must be considered dependent variables within the theory of climate change.

This thesis will attempt to answer several questions concerning Israeli and Middle Eastern instability as it relates to water scarcity. Primarily, this paper will assess:

- a. To what extent will water scarcity cause or perpetuate instability between Israel and its Arab neighbors?
- b. Has water insecurity contributed to past armed aggression in the Jordan River Basin?
- c. To what extent will climate change affect the nations relying on the Jordan River's water?
- d. How can Israel and the states dependent on the Jordan River prepare peacefully for a water-stressed future?

## **Thesis Statement**

Water scarcity will exacerbate existing tensions between Israel and the surrounding Middle Eastern Arab nations, thereby increasing instability in the region.

## **Significance of the Study**

Water appears to be everywhere. It is difficult, especially for United States citizens used to abundant sources of water, to believe that there is a global freshwater shortage. The passage from *The Rime of the Ancient Mariner* at the beginning of this essay succinctly describes humanity's dilemma. Stuck in the doldrums, the sailors of the sailing vessel in the poem are dying from dehydration, ironically surrounded by countless gallons of salty water that they cannot consume. This reflects the ratio of water on the Earth, where 70% of the globe's surface is water, yet very little is accessible as freshwater to sustain life. In fact, of the water on Earth, 97.5% is saltwater; of the remaining 2.5% freshwater stocks, only about 0.25-1.0% is actually accessible freshwater (lakes and rivers vice ice caps and glaciers).<sup>8</sup> See figure (1) for a graphical depiction of the Earth's freshwater distribution.

Of even greater concern for regional stability, the Middle East and North Africa are extraordinarily dry, possessing only 1% of the world's freshwater resources while being home to over 450 million individuals.<sup>9</sup> It is possible in the near future that lack of freshwater may be the catalyst or spark for armed conflict in many global regions. Given American foreign policy and national interests, military planners and Foreign Service professionals must be able to identify non-traditional causations for instability and have the knowledge to identify global flashpoints; water shortage in the Jordan River Basin is such a place.



## **Global Water Scarcity- a Diminishing Resource**

*“Those who control water, control people.”*

–Interpretation for the Chinese character for “political order”<sup>10</sup>

The world is warming. The most salient theory for climate change is the increase in anthropogenic, or man-made, gases since the beginning of the industrial age. Projected increases for greenhouse gases associated with the production of energy are 2% annually for the next 30 years, resulting in a gradual global temperature increase.<sup>11</sup> The change in the earth’s atmospheric and sea-surface temperatures will result in changes within the environment. Specifically, climate change is expected to diminish human security and exacerbate tension and conflict over water, especially in regions such as India and Pakistan, North Africa, and the Middle East where global warming will increase surface-water evaporation, lessen soil moisture, decrease snow melt, and decrease precipitation.<sup>12</sup> While some prominent American leaders, such as Sarah Palin, Rick Perry, and Michele Bachmann, perceive anthropogenic-induced global warming as a hoax or an unproven theory, the consensus of the United Nations-sponsored Intergovernmental Panel on Climate Change (IPCC) is that climate change is a result of man-made carbon dioxide emissions.<sup>13</sup>

Water-scarce regions are defined as those areas that provide less than 1,000 cubic meters of water per capita per year (a cubic meter equals approximately 264 U.S. gallons); regions defined as water-stressed have an annual supply of renewable freshwater between 1,000-1,700 cubic meters per person.<sup>14</sup> It is estimated that almost one-third of the world’s population already lives in water-scarce conditions.<sup>15</sup> This number includes between 1.4 and 2 billion people, and combined with expected population growth and a warming climate, the individuals affected could reach an additional one billion. Absolute or physical water scarcity may soon be common in many more states; this term applies to areas that simply have not enough water for the

population (less than 500 cubic meters per person); additionally, many regions may be described as experiencing economic water scarcity, where water is available, but it may be too expensive for most individuals to afford.<sup>16</sup>

Additional data concerning human security and inadequate sources of freshwater are staggering. “[M]ore than 2.4 billion people,” according to Environmental Policy Research Center associate Simone Klawitter and the non-governmental organization (NGO) Tiri’s program director Hadeel Qazzaz, “lack access to adequate sanitation...[and m]ore than 2.4 million people die annually from water-related diseases due to an absence of a qualitatively safe water supply.”<sup>17</sup> In comparison, individuals in the United States enjoy around 1,700 cubic meters (cm) of water annually, while persons in the Middle East each have less than 500 cm each year. Figure (2) shows the global population in water-scarce and water-stressed countries (1995-2050); map (1) shows affected states within the Middle East and North Africa.

Many of these individuals live in developing countries which are susceptible to environmental changes such as drought or flooding that stress the ability of the government to protect its citizens. By 2030, the world’s population is expected to grow to over eight billion (from its current 6.8 billion); 95% of the population growth will occur in developing countries.<sup>18</sup> Growing economies in the developing nations will likely lead to an increasing demand for resources such as oil and water, likely exceeding global availability and leading to unrest. This is especially true in developing countries such as China and India where newcomers to the middle class will demand Western lifestyles that use more resources like water and fossil fuels per capita.<sup>19</sup> Global resources will be strained further by this bulge in demand.

Developing countries often suffer the most from water scarcity and are at great risk from climate change. United Nations Secretary-General Ban Ki Moon maintained that much of the



crisis in Sudan's Darfur region stemmed from the lack of water between the farmers and pastoralists.<sup>20</sup> Additionally, as early as 1980, United States intelligence agencies assessed ten global hotspots where lack of water could cause armed aggression; most of these hotspots were in the Middle East and Arabian Peninsula. The Middle East already has the highest cost per capita of freshwater, making it difficult to fund new methods of wastewater reclamation or desalination.<sup>21</sup>

Additionally, water scarcity generally results in poor water quality. Aquifers and rivers polluted with human and industrial waste often results in skin diseases, lower caloric consumption, malaria, dysentery and "...other disease vectors that are the scourge of the poor."<sup>22</sup> The result is an environment that perpetuates instability and the cycle of poverty. Water scarcity induced volatility is most likely where underlying social and political problems such as economic disparity, conflicting ideologies, poverty, over-congested urban areas and religious fault lines already exist.

While water scarcity is a global phenomenon, several regions are of particular concern. Yearly glacial and snow melt in the Himalayas provides the majority of freshwater in many of Asia's largest rivers. As the Earth warms, the glacier and snow packs may disappear by 2035, taking away the main source of water from the Ganges, Indus, Yangtze, Mekong, and Yellow rivers, and thus robbing nearly 2.4 billion people of their main source of freshwater.<sup>23</sup> In the Middle East and other dry regions, the Intergovernmental Panel on Climate Change predicts a 10-30% decrease in average river runoff and water availability by mid-century.<sup>24</sup>

The Mediterranean Basin is showing the effects of global warming as wintertime droughts become more frequent. This region, which includes Israel, relies on wintertime rain, as most of the annual rainfall usually occurs during the winter months. Yet in the last twenty years,

according to Joe Romm, Senior Fellow at the Center for American Progress, “...10 of the driest 12 winters have taken place in the lands surrounding the Mediterranean Sea.”<sup>25</sup> Climate modeling and weather simulations predict that this region will receive less precipitation within the next several decades. Map (2) provides a visual depiction of the countries most affected by the Mediterranean Basin’s wintertime drought.

The information in table (1) is part of a database from The Pacific Institute which contains 175 entries from 40 existing countries. This list “...highlights disputes over water sources and identifies local populations and rebel groups that have attacked dams, dikes, and other water infrastructure to prevent the diversion of water.”<sup>26</sup> As an example of aggression caused by water scarcity, only violent, modern-day events between Israel and its Arab neighbors are listed in table (1). Violent incidents of water conflict between the modern state of Israel and its neighbors have occurred since the founding of the state in 1948. While water scarcity is more likely to cause regional Middle Eastern instability and internal conflict rather than be the main casual factor in an intrastate war, the civil instability will likely lead to greater violence and expanding conflict. Several factors that are exacerbated by water scarcity, including “...upstream/downstream relationships, disputes over tribal boundaries and wells, religious and ethnic animosities, and population growth”, can be found in the Jordan River Basin.<sup>27</sup> The deliberate targeting of water facilities by regular and terrorist forces, as an example, highlights the importance that the belligerents place on water within Middle Eastern history and on its importance in national security.

Another result of global warming will be the continued melting of the Greenland and Western Antarctic ice sheets, both of which hold tremendous volumes of freshwater. In 2007, the Greenland ice sheet summer melt exceeded the previous high mark by more than 19 billion



tons, and for the first time in recorded history, the Northwest Passage temporarily became a navigable waterway.<sup>28</sup> Rising sea levels will pollute coastal and inland aquifers with saline water, making it unsafe for human consumption or agricultural use while simultaneously damaging the food chain. Depending on coastal soil and sand composition, "...brackish water can extend as much as 50% further inland than saltwater on the surface."<sup>29</sup> As an example, overuse of the aquifers underneath the Gaza Strip has resulted in contamination of these critical freshwater sources from salt water leaching into the groundwater from coastal areas. This also places Israel's Coastal Aquifer at risk, which provides nearly 25% of the nation's freshwater.

### **Water Scarcity in the Jordan River Basin - an Accelerant for Instability**

*"The only matter that could take Egypt to war again is water."*

-Egyptian President Anwar Sadat (Spring, 1979), after signing a peace-treaty with Israel

Historians generally agree that modern history and civilization began around 10,000 years ago in a region known as the Fertile Crescent. The Fertile Crescent included most of the modern-day states of the Middle East, to include those of the Levant or Jordan River Basin - Jordan, Israel, Palestine, Syria, and the occupied Palestinian territory. The Jordan River, according to Peace and World Security Studies (PAWSS) professor Michael Klare, helped play "...a crucial role in the original development of irrigated agriculture, and later in the rise of urban settlements and stratified social systems."<sup>30</sup> The Jordan River's freshwater provided the farmland with the means to produce agricultural sustenance; as the population in the Jordan River Basin grows and water becomes scarcer, crops irrigated from this river will be insufficient to feed the local population. Unfortunately, deforestation, overpopulation, pollution, and salinization have combined with severe drought to destroy many of the world's oldest

farmlands.<sup>31</sup> See maps (3) and (4) for a map of Israel and a map of the Jordan-Yarmuk River Basin.

Israel views the Arab-Israeli conflict as a struggle for survival and considers the current, relative peace in the Middle East as part of a “‘dormant war’”.<sup>32</sup> Arab nations typically view the nation of Israel as an illegal, unjustified state. Jerusalem’s geopolitical importance in the region cannot be overemphasized, and the conflict between Muslims and Jews cannot be discounted as a simple misunderstanding of ideology. Jerusalem, according to former Army War College faculty member Davis Hansen, is “...the locus of holy sites for three of the world’s major religions...[and] is the political and religious center of the *de jure* Jewish state and the *de facto* religious and political center of the aspiring state of Palestine.”<sup>33</sup>

Water plays an important and intricate role in Middle Eastern politics. The Jordan River is critical to the water interests of Israel, Jordan, Lebanon, the Palestinian Authority, and Syria.<sup>34</sup> Most of the water used for irrigation in Jordan and Israel comes from this source. The Jordan River is small when compared to such rivers as the Nile, and it suffers from heavy salinity due to overuse; its average flow of 1,200 million cubic meters is only about 2% of the Nile’s.<sup>35</sup> Originating in the mountainous, border region of Israel, Lebanon, and Syria, three springs (the Hasbani, Banais, and Dan Rivers) meet six kilometers within Israel to create the Jordan. The river flows south to the Sea of Galilee and is then joined by the Yarmuk River on its way to the Dead Sea.

Water scarcity within the Jordan River Basin, according to Rutgers University faculty member Michael Greenberg, “...is probably the most threatening to public health, environmental, and economic stability.”<sup>36</sup> Of the four nations and the occupied areas comprising the Levant, only Syria and Lebanon fall above the water scarcity threshold.<sup>37</sup> Just as President

Sadat commented on water as a catalyst for Egypt going to war, King Hussein of Jordan remarked in 1990 that "...water was the only issue that could take him to war with Israel."<sup>38</sup>

Overuse and diversion projects have resulted in the near-destruction of the Dead Sea (which has a salt content seven times greater than the ocean and is shrinking by over one meter a month) as water entering the now-salty inland sea has been reduced by eight-fold of its pre-1950's inflow (see table 2). One result of the death of the Dead Sea is increased salinization of aquifers adjacent to the sea, rendering them unfit for human consumption. The reduction in water entering the Dead Sea exemplifies the shortage of water in this politically volatile region. The country of Jordan is especially dependent on freshwater from the Jordan River. The nation receives 80% of its water from this river, and 83% of the population, including most of its industry and agriculture, depend on its flow.<sup>39</sup>

The West Bank aquifer provides between 25-40% of Israel's freshwater (with an additional one-third coming from Lake Kinneret, also known as the Sea of Galilee), however all statistics concerning water are closely guarded by Israel as they consider such information to be a state secret.<sup>40</sup> What is known is that Lake Kinneret in February, 2009, was at its lowest point in 70 years.<sup>41</sup> Continued overuse and pollution may destroy the ecological balance in this critical water source much as the Dead Sea is effectively dead, making the water too salty and unsafe to drink without desalination. Palestinians claim that Israel does not provide enough freshwater to West bank residents for agricultural purposes.

Ownership and mutual sharing of the mountain aquifers of the Jordan River Basin are another source of great tension as these aquifers are essentially the only water source for most Palestinians. Israel has been accused of taking water from the West Bank using slant drilling while denying the Palestinians the right to dig new wells or to replace old ones. Amid lessening

amounts of water per capita each year and rising water prices, the Palestinians accuse Israel of “hydrological apartheid”, allowing the Israelis to take the lion’s share from the territory they annexed after the Six-Day War.<sup>42</sup> Table (3) shows that except for Lebanon, the Jordan River riparians are removing more freshwater from the environment than is returned through natural means. With the population growing at great speeds, more methods of water reclamation must be sought to avert disaster and conflict.

The inhabitants of the occupied Palestinian territories face a dire future concerning their water. Over 40% of the Palestinian localities suffer from a water shortage, and poor overall public health is attributed to lack of clean water for drinking, sanitation, and hygiene; additionally, very little water is available for agricultural use, exacerbating economic inactivity and local food shortages.<sup>43</sup> Israel has been blamed for diverting most of the water from ever reaching Gaza. Ironically, Israel blames the severe shortage of water in Gaza on over-pumping by the Egyptians before the 1967 war. The poor socio-economic and living conditions, especially in the Gaza Strip, combined with the perceived lack of compassion from Israeli authorities, enhances the hatred and mistrust between the Muslim and Jewish inhabitants in the occupied territories.

Just behind Kuwait in terms of water scarcity, the residents of Gaza (over one million individuals) have the lowest per capita availability of freshwater on the Earth.<sup>44</sup> Water-poor regions like the Palestinian territories have some of the fastest growing populations in the Middle East, and the lack of freshwater has already led to food shortages, unemployment, and local clashes with Israeli authorities.<sup>45</sup> There may be a period in the near future when residents of Gaza and the West Bank are displaced to other countries as ecological refugees when the water runs out. Much of the blame for the forced migration may be placed on Israel, whose goal to



transform the mostly desert nation into irrigated cropland uses 70% of the country's water annually while further leaching freshwater from the mountain aquifers and the Jordan River. Much of the water in these aquifers is considered fossil water and not renewable through seasonal rainfall and runoff.

The Six-Day War had a profound effect on Israeli's control of the sources of water within the Jordan River Basin; this war is often described as the largest modern water war. Before the conflict, only around 10% of the Jordan River's basin was within Israeli borders, yet by the end of the war, Israel controlled nearly the entire basin.<sup>46</sup> Much of the water entering the Sea of Galilee was diverted to a system of pipes and canals called the National Water Carrier (NWC), which transports water throughout Israel and nearly to the Egyptian border. The NWC remains Israel's largest source of freshwater, and according to former *New Scientist* editor Fred Pearce, "...[t]he pumps that run the [NWC] take an eighth of the entire output of Israel's power systems. A similar canal was constructed in Jordan to take water from the wetter northern mountains to the dryer southern regions; this is the East Ghor or King Abdullah Canal. The NWC allows Israelis to maintain what they perceive as a civilized, Western lifestyle which they consider critical for their national security, even if it means less water for the other nations within the basin.

Water conflict became an international issue for the Jordan River riparians in the early 1960's when disputes over water rights turned into armed aggression. Israeli foreign minister Golda Meir warned his Arab neighbors that any effort to divert the Jordan River would be considered as an attack on Israel itself.<sup>47</sup> In 1964, Israel completed its eleven-year construction of the NWC and began to divert water from Lake Kinneret. Arab leaders sought to counter what was regarded as Israeli expansionism by building a dam on the Hasbani River in Syria.

Additionally, the Israeli diversion of the Jordan River meant that even less freshwater would flow to the increasingly-saline Dead Sea.

The Arab League also strengthened its military option for countering the NWC by establishing a Unified Arab Command, which had authority over all Arab state's armies.<sup>48</sup> Israel's insistence that water was its lifeblood and pumping of the Jordan to the NWC would continue was interpreted by the Arab states as Israeli expansionism. On November 13, 1964, Israel attacked Syrian engineering equipment constructing the counter-diversion dam on the Hasbani and continued to use land and air forces to destroy dam construction throughout 1965. In April, 1967, the Israeli air force conducted a massive attack on Syria with 130 airplanes with the intent to punish Syria for its support of terrorist acts against Israeli water facilities and for the Syrian army firing at Israeli farmers and workers.<sup>49</sup>

The tensions culminated in the Six-Day War in June, 1967, in which Israel won a stunning victory over its Arab neighbors. At the conclusion of armed conflict, Israel, according to former U.S. Senate foreign policy advisor Jonathon Oakman, "...wrested control of the Golan Heights from Syria, the West Bank from Jordan, and Gaza and the Sinai from Egypt."<sup>50</sup> While Israel claimed that its possession of these lands was not a result of desiring control of the waters of the Jordan River Basin, Arab leaders understood the reality of what they had lost. Turkish President Demirel, in 1995, summed up Israel's possession of the land. "It's the same with water as it is with oil..." according to President Demirel, "[w]hoever is sitting on its source has a right which no-one can deny him."<sup>51</sup> One small (60 km<sup>2</sup>) area appears to hold little geopolitical value, yet possession of the Golan Heights will continue to strain Israeli and Syrian relations. Israel is afraid to leave the Golan Heights in fear of Syria diverting the river or poisoning it.

Not only was geopolitics changed nearly overnight in the Middle East with Israel's victory, but the nation's territory expanded fourfold while making it the hydrological powerbroker within the Jordan watershed.<sup>52</sup> After the Six-Day War, Jordan lost much of its foreign-exchange earnings in tourism, as well as 80% of its total fruit-growing and 45% of its vegetable-growing land.<sup>53</sup> Occupation of the Golan Heights provided Israel with control of the headwaters of the Jordan River, while control of the West Bank provided the state with crucial control of the Western Aquifer. Israel views the Palestinians living in the West Bank as mere tenants of Israeli land with no rights over land and water.<sup>54</sup> An Israeli water officer, as a representative of the Israeli Water Commissioner, gives permission to Palestinians who seek to dig new wells. Tensions from Israel's lack of decision-making concerning their water rights forced the Palestinians to begin a new intifada against the occupiers. Terrorist attacks against Israel only perpetuated animosity between the Israeli Defense Force and Palestinians. As an example, Israeli soldiers were accused of shooting holes in rainwater catchments and cisterns in the West Bank settlements in retaliation for a Palestinian suicide bomber who blew himself up on Christmas Day, 2003.<sup>55</sup>

Israel controls the flow and price of over half of the domestic water into the West Bank through Mekorot, the Municipality of Jerusalem and the Water Department. Palestinians have accused Israel of using water as a political and social weapon by decreasing its flow during periods of tension, such as in 1989 and 1991 during the intifada. Israeli roadblocks and military checkpoints often impede the transportation of water via tanker trucks to points in Gaza and the West Bank, which is frequently the only source of water during the summer months. Israelis often enjoy eight to ten times more water annually than the Palestinians, which has been an ongoing source of tension.<sup>56</sup> Over 150 Palestinian villages (215,000 people) under Israeli

responsibility are not hooked up to the water system and are denied the ability to dig or repair wells.

The inequality of daily water allowances is not lost to the Palestinians or other Arab states; Israeli's use an average of 348 liters per day as compared to 70 liters per day among West Bank and Gaza Palestinian residents.<sup>57</sup> Mekorot also routinely denies outsiders access to the raw data concerning how much water flows into the West Bank and how much it actually costs the organization to provide the Palestinians freshwater.<sup>58</sup> Israel views protection of the West Bank and the Golan Heights as a military problem vital to national security; without these water sources, Israel's annual water supply would be cut by almost two-thirds. Additionally, many Arab states and the Palestinians see the construction of the West Bank Barrier wall, which includes many wells on the Israeli side of the barriers, as a means for Israel to permanently annex existing water resources located along the border of Israel and the West Bank. The wall also frequently separates many farmers (nearly 6,000 farms) and families from their land and water sources.<sup>59</sup>

Particularly troublesome for maintaining stability in the Jordan River Basin is the relationship between water usage and agriculture. Agriculture already uses the most water, between 65%-80% of freshwater in the region. Food demand will increase as the population rises, yet in order to maintain subsistence for their populations, states will be forced to use over 100% of their water supplies.<sup>60</sup> Water scarcity, by exacerbating food insecurity, will force ecological refugees from areas such as Gaza and the West Bank into neighboring Arab states who are unable to adequately provide food and water for existing populations. Already heavily dependent on imported food items, tensions among Israel and its neighbors will increase as food once exported from China, India, and Pakistan remains in these nations to feed their ever-



growing populaces.<sup>61</sup> Yet the population is expected to continue to increase. The Middle Eastern culture encourages large families; currently about 40% of the population is under 15 years old, and the population is expected to increase from 226 million to 395 million by 2025; the surplus of working-age adults who cannot find employment in ever-growing urban areas will add to insecurity within the world's most politically volatile region.<sup>62</sup>

Water scarcity may force thousands of Palestinians to emigrate to increasingly resentful neighboring states reluctant to accept the refugees. The youth bulge within the population, combined with food and water scarcity, unemployment, and poor conditions in displaced persons camps, leads many Muslim Arabs to blame their plight on Israel and its Western-influenced culture. Already burdened with millions of Palestinian refugees and camps, the governments of nations like Jordan, Syria, and Lebanon will be tasked to find food, water, employment, healthcare, education, and shelter for these additional individuals. "Jordan," according to Mediterranean Migration Observatory co-director Martin Baldwin-Edwards, "possesses the highest refugee ratio in the world, with a total population of 5 million... [Palestinians compose 40% of this refugee population]."<sup>63</sup> This will add to the tensions and instability simmering within the region, especially in the West Bank. It is possible that the Gaza Strip may be nearly abandoned if current population increases and water scarcity predictions remain valid for the near-future; there simply will not be enough freshwater to support life in Gaza. Table (4) depicts the official camps and registered Palestinian refugees as of January 1, 2011, according to the United Nations Relief and Works Agency for Palestinian Refugees (UNRWA). Ecological refugees from drought-ridden northern Africa will also likely add to the unrest and instability within the Jordan River Basin.

While the United Nations and Arab governments attempt to provide basic services to Palestinian refugees, the Palestinians do not enjoy many of the benefits that citizens receive. Lack of water may easily exacerbate existing instability as citizens' basic needs are often provided first. Ten percent (around 400,000) of Lebanon's population are Palestinian refugees; according to the UNRWA website, "...they do not have the right to work in as many as 20 professions...[and since the] refugees are not formally citizens of another state...they are not able to claim the same rights as other foreigners living and working in Lebanon."<sup>64</sup> In another example, Palestinian refugees living in Jordan do not have the right to vote and cannot receive full citizenship or work for the government.<sup>65</sup>

The return of Palestinian ecological refugees to Israeli to escape water scarcity within the West Bank and Gaza will likely not be tolerated. For Israeli, which has often ignored the refugee problem, "...the possible return of masses of Palestinian refugees is disconcerting as they view any such return as analogous to the effacement of Israel's Jewish character."<sup>66</sup> Palestinian resentment of Israel's apathy towards their needs has morphed many refugee camps into sites for political unrest and activism and as training locations for terrorists and paramilitary forces. School and youth organizations within the camps in particular have been targeted by Muslim extremists for recruiting of angry, disenfranchised children who are jealous of what they see as theft of their natural resources, especially water, by Israelis.<sup>67</sup> Many of these paramilitary organizations and troubled youth have access to weapons that are currently being stockpiled in Gaza.<sup>68</sup>

It is possible that Egypt may exploit Israel's dependence on Egyptian exports of natural gas, of which Israel receives over 40% of its natural gas requirements, to attempt to force the Israeli government to provide for the ecological refugees that are likely to come from Gaza.<sup>69</sup>

Water insecurity could easily destabilize the area- weapons, hostility, and deep-seeded ambivalence between the Arabs and Jews already exists. It is doubtful that Egypt will acquiesce to recognizing Palestine as an independent state, so instability and distrust will remain high.

Iranian ties with Syria and Lebanon, through such organizations as Hezbollah, will constantly seek to destabilize Arab League and international consensus on the global perception of the Palestinian plight and Israel's perceived ambivalence. Lebanese and Syrian unrest could easily spill into Jordan, affecting that state both economically and politically. Despite Jordan's pro-western orientation and its attempt to maintain peace with Israel (and thus the United States and Saudi Arabia), depletion of the region's water sources would only encourage anti-Israeli feelings.<sup>70</sup> Conflict may result from civilian protests or military action. As the 2011 edition of Flashpoints states, "[c]ivilians are playing an increasingly important and complex role in armed conflicts, both as victims and as perpetrators."<sup>71</sup> Fighters will often be militarily-inexperienced, young children manipulated by local warlords.

Food insecurity in the Jordan River Basin will be one of the most visible results of water scarcity. Global food reserve shortages, resulting from water stress, will exacerbate water and food scarcity in Israel and the surrounding nations, increasing food prices dramatically and causing severe shortages in many areas. "Already," according to Brown and Crawford, "the Middle East as a whole is the world's most dependent region on wheat imports."<sup>72</sup> Thus the relationship between decreasing access to freshwater will also influence the availability of food, resulting in the great potential for civil unrest and possibly intrastate conflict as individuals and nations seek the basic needs for life.<sup>73</sup>

## **Climate Change, Water Scarcity, and United States National Security – Does the United States See a Threat?**

*“When one man drinks while another can only watch, doomsday follows.”*  
-Turkish proverb<sup>74</sup>

Climate change and water scarcity are discussed in multiple United States national security documents which guide our nation’s government and defense agencies in preparing for future conflict. These documents (listed below) are derived from guidance provided by the President and the Secretary of Defense and should be used by military and foreign service planners when determining where global conflict may arise and help develop operational plans for the deployment of American forces or agencies. The fact that these guiding documents of our military and defense strategy highlight climate change and water scarcity as potential catalysts for armed conflict cannot be overlooked. The Center for Naval Analysis additionally predicts that multiple, unconventional security threats caused by climate change, such as inadequate freshwater resources, may act in a domino-effect manner, cascading towards armed conflict and drawing the United States into war.<sup>75</sup>

The Jordan River riparian states currently exist in a water-stressed environment; as water becomes scarcer in the near future, the United States may be forced to provide assistance to stave off violence or provide reconstruction assistance for the belligerents.<sup>76</sup> While water scarcity’s role in causing armed aggression may be argued, an understanding of how resource depravity may lead to instability, especially in the Jordan River Basin, must be understood.

- a. *National Security Strategy (NSS) 2010* - promulgated as guidance from the Commander-in-Chief, the NSS is the senior document guiding the United States government in creating and shaping decisions that affect our national security and interests.

Government destabilization as a result of climate change, particularly in the developing



world, is discussed numerous times within the document. Access to clean water, according to the NSS, is a basic human right necessary for survival.<sup>77</sup>

- b. *National Defense Strategy (NDS)* - as guidance from the Secretary of Defense, the NDS represents the Secretary's intent for focusing Defense Department agencies on meeting the nation's future challenges. The document points out that states in the near-future will face myriad, non-traditional governance challenges related to resource shortfalls and environmental and climate change.<sup>78</sup>
- c. *National Military Strategy (NMS) 2011* - the NMS provides the joint force with the Chairman of the Joint Chiefs of Staff's vision for how the United States military will defend the nation. The Chairman visualizes changing demographics within the strategic environment, particularly growing urban populations, as potential areas of unrest. "Population growth and urbanization in the Middle East, Africa, and South Central America," according to the NMS, "will contribute to increased water scarcity and may present governance challenges."<sup>79</sup>
- d. *Quadrennial Defense Review (QDR) 2010* - climate change, according to the QDR, is expected to increase poverty, destroy already weakened ecological systems, and contribute to increasingly water-stressed regions.<sup>80</sup> While not necessarily the root cause of conflict, water scarcity may act as an accelerant for armed aggression against fragile governments or neighboring states. The North Atlantic Treaty Organization (NATO) also designates lack of water as a threat to international security.
- e. *Joint Operating Environment (JOE) 2010* - The 2010 JOE, written by the United States Joint Forces Command, provides guidance for joint force concept development and future planning. Highlighting how the Jordanian and Syrian attempt to dam the Jordan River

was a principal cause of the Six-Day War, the JOE informs planners and commanders that “[o]ne should not minimize the prospect of wars over water.”<sup>81</sup> Cooperation for water resources will become strained as annual freshwater deposits are unable to meet demand, especially in the West Bank and Gaza Strip. Although military commanders rarely need to find methods to combat pollution, the JOE argues that conflict in urban areas spawned by water pollution and water-vector pathogens will force leaders to deal with sick and displaced persons as a result of contaminated drinking sources.<sup>82</sup>

- f. *USMC Vision and Strategy 2025* - the Commandant of the Marine Corps assesses the future global security environment as one dominated by a growing population primarily living in urban domains with large youth bulges in the developing world. While disappearing sources of oil are a concern, USMC Vision 2025 envisions freshwater and food scarcity as possibly surpassing fossil fuels in their importance. In the Middle East, there is perhaps over 100 years of oil reserves available while water resources are much scarcer. Presently, more than a billion people lack access to adequate sources of fresh water; this number is expected to encompass half the global population by 2025.<sup>83</sup>

It is difficult to predict where water scarcity will induce armed conflict, but planners can analyze certain variables that may affect weak governments. As far back as the 1950's, the Eisenhower administration realized that water conflict between Israel and its Arab neighbors could allow further Soviet manipulation and influence in the region.<sup>84</sup> Eric Johnston, acting as a special ambassador for the United States, attempted to set up a water-sharing agreement in the Jordan River Basin similar to the Tennessee Valley Authority; unfortunately, continuing conflict in the region prevented all parties from reaching a final consensus.

Currently, the Department of State has established environmental hubs in global regions where environmental degradation and resource scarcity may lead to political unrest; of the six hubs, four concern water scarcities, with one hub located in Amman, Jordan.<sup>85</sup> Journalist Steven Faris notes that the social, physical, and political geography of a state should be studied when planning where climate or water induced instability may arise.<sup>86</sup> Furthermore, the United Nations Security Council, on April 17, 2007, recognized the link between societal stress and conflict as a result of climate change and water scarcity.<sup>87</sup>

### **Future Ecological Security- Does Less Water Necessarily Mean More Conflict?**

*“Whiskey is for drinking, water is for fighting over.”* –Mark Twain<sup>88</sup>

Differing viewpoints on whether water is truly a cause of armed conflict exist and are not uncommon. University of Hamburg Professor of Climate Change and Security Jürgen Scheffran argues that despite the Jordan River Basin’s vulnerability to water-induced aggression, Israel and Jordan have been moderately successful in establishing water agreements.<sup>89</sup> Despite continued hostility in the Middle East and general resentment of the Israeli state, Brown and fellow IISD environmental risk analysts Anne Hammill and Robert McLeman, reason that it is only one of many potential triggers and not a significant casual factor for violence.<sup>90</sup> Most optimists, even with the depletion of non-renewable, fossil water aquifers, see water conflict as an ineffective and inefficient means to solve the problem; regardless of ideological and historical animosities, cooperation will result in the most success. Additionally, some hydrologists argue that as long as the Middle East has oil revenue, it can continue to turn oil sales into water production, using fossil fuel revenue to fund expensive canal and desalination projects.

Jordan and Israel signed a historic peace treaty on October 26, 1994. Annex II of the peace treaty specifically relates to water allocation between the two riparians from both the Jordan and Yarmouk rivers and the Araba/Arava ground waters. The treaty states that Israel and Jordan will build a system of storage reservoirs along the Jordan River and a diversion/storage dam on the Yarmouk River; the two states will protect the Jordan River from pollution and continue to monitor its water quality through a Joint Water Committee. Additionally, Israel agreed to provide Jordan with 50 million cubic meters of water annually from the northern portion of the Israeli state.<sup>91</sup> The cooperation between these two states shows that it is possible that arbitration instead of aggression can be used to settle water disputes. In fact, researcher Clifton Coles argues that the cooperation between Jordan, Israel, and the Palestinians should be seen as an international model of cooperation and peaceful administration.<sup>92</sup>

Israel has conducted extensive research into new methods of wastewater reclamation, wetlands reconstruction, and desalination. Seventy percent of the treated wastewater in the state is reused, most of which is used for water-intensive agricultural irrigation; this amounts to more than 290 million cubic meters of treated water equaling almost 40% of the reclaimed water used in the entire European Union.<sup>93</sup> Eventually, Israel desires to reuse 100% of its wastewater, and the nation continues to conduct research to meet this goal. While Israel's agriculture equates to only about 2% of the state's gross domestic product while consuming the most water, the nation is reluctant to depend entirely on imported food.<sup>94</sup> As Israeli Ramat Hasharon Municipality council member Raphael Bar-El points out though, Israel will have to reduce its dependence on freshwater for irrigation or reduce its agricultural activity in order to provide water to the quickly expanding population.<sup>95</sup>



In an attempt to prevent the Dead Sea from leaching more salt water into adjacent freshwater aquifers, Israel is seeking support for the creation of the Red-Dead Canal, which would pump water from the Red Sea to the Dead Sea. Another alternative canal would possibly transport water from the Mediterranean to the Dead Sea, using the 450 meter drop in elevation to create hydroelectric energy or force water through reverse-osmosis membranes.<sup>96</sup> Additionally, Israel may purchase excess water from Turkey, using tankers or large, reusable bladders pulled by tugs.

Regional stability may depend on Israel's ability to develop new methods of desalination and wastewater treatment that are less-expensive and more efficient than are currently available that can meet the needs of the Jordan River Basin's expanding population. Unfortunately, desalination is extremely expensive. Construction costs for the desalination facilities are very expensive, and freshwater from the plants must be transported by truck, canal, or other infrastructure means to the areas that need it. As an example of such costs, plans to pump desalinated water from the Pacific Coast of California to Las Vegas to offset that city's water shortage would cost over \$400 million annually.<sup>97</sup> The Levant nations are generally poor in energy sources and economic power, making it difficult to acquire water, such as those sources located far underground; as Brown and Crawford argue, nations in the Levant are often dependent on both transboundary water and imported energy supplies, decreasing the governments' ability to increase their regional influence.<sup>98</sup>

Desalination also requires the use of large volumes of fossil fuels to either separate freshwater from seawater through heat or to push it through reverse-osmosis membranes at high pressure. "A typical reverse-osmosis plant," according to Pearce, "consumes six kilowatt-hours of electricity for every 265 gallons of water it produces."<sup>99</sup> Not only does desalination eject

more carbon monoxide into the atmosphere, but the salt extracted from the process is often dumped back into the sea, upsetting the ecological balance of environmental life next to the plants. Through new drip irrigation methods, planting less water-intensive crops, and conducting research on plants that can survive in high-salinity water, Israel has bolstered its near-term water security and may assist the entire Middle East in solving its water crisis..

## Conclusion

*“The Jordan River’s waters were as vital to [Israel’s] existence as blood was to man’s.”*  
-Israel’s view on the Jordan River as essential to its survival (prior to the Six-Day War)<sup>100</sup>

Instability due to rapidly decreasing sources of freshwater cannot necessarily be simplified into a battle between the haves and have-nots; competition for water will be a means to sustain livelihoods and national interests.<sup>101</sup> While some critics perceive that aggression over water sources will remain at the individual or small group level, the antagonism between Israel and its Arab neighbors is a struggle residing on multiple conflicting levels: cultural, political, religious, resource sharing, and territorial. As humans overwhelm the Earth’s carrying capacity, or ability to support life through its natural ecosystems, it will be more difficult to maintain peace in water-starved areas.<sup>102</sup> General Anthony Zinni, former Commander of the United States Central Command, argues that while the world has seen fuel wars, water wars will be next.<sup>103</sup> The Levant, overpopulated and with inadequate food and water resources, may become a breeding ground for instability, leading to extremism and violence.<sup>104</sup>

The Middle East, with its vast resources of fossil fuels and strategic location, will remain a zone of turmoil.<sup>105</sup> The United States will need to keep forces prepared to respond to conflict lest it spread to all parts of the Middle East. Solutions to instability over water will require

military and Foreign Service leaders to engage assistance from all agencies of the government and the international community. Water-usage, according to U.S. State Department water consultant John Kolars, "...is a zero-sum game: if one party increases its allotment, another must go with less."<sup>106</sup> The historic peace treaty between Israel and Jordan, though promising on paper, could not take into account unknown political dangers associated with nature. A drought in 1999 threatened regional security and Israel's ability to divert waters from Lake Kinneret to Jordan.<sup>107</sup>

"Water security," argues Global Water Summit Initiative chairman Joyce Starr, will soon rank with military security in the war rooms of defense ministries."<sup>108</sup> Despite the creation of over 3,600 water-related treaties in history, lack of water wars in the past cannot discredit water as a principal source of aggression in the future; the disagreement between Israel and Lebanon in 2001 is a good example of "hydro-hysteria", where a four-inch pipe and the perceived illegal tapping of a water source nearly caused armed conflict.<sup>109</sup> Israel threatened military action if Lebanese engineers (and the associated militant southern Lebanese Shiites) continued to take water from the headwaters of the Hasbani during a drought.

The main question for the future, as posed by Klare, is if cooperation among Israel and its neighbors concerning water-sharing agreements can be peacefully accomplished before food shortages, decreasing water supplies and quality, population growth, and nationalism cause further instability or a new water war.<sup>110</sup> Freshwater availability is finite; if one nation or activity takes more water, then something or someone else suffers. This is the main point of the growing water shortage and its potential to cause instability in the Jordan River Basin. Agreements to peacefully allocate and conserve scarce water resources require collaboration between hostile and conflicting ideologies, while cooperation is difficult due to the mutual

distrust of the belligerents.<sup>111</sup> Most important to remember is a state's desire to maintain its international position and its power. Planners should not underestimate the steps a government will take to maintain legitimacy, to provide its citizens the basic necessities for life, and to secure its vital interests and survival.

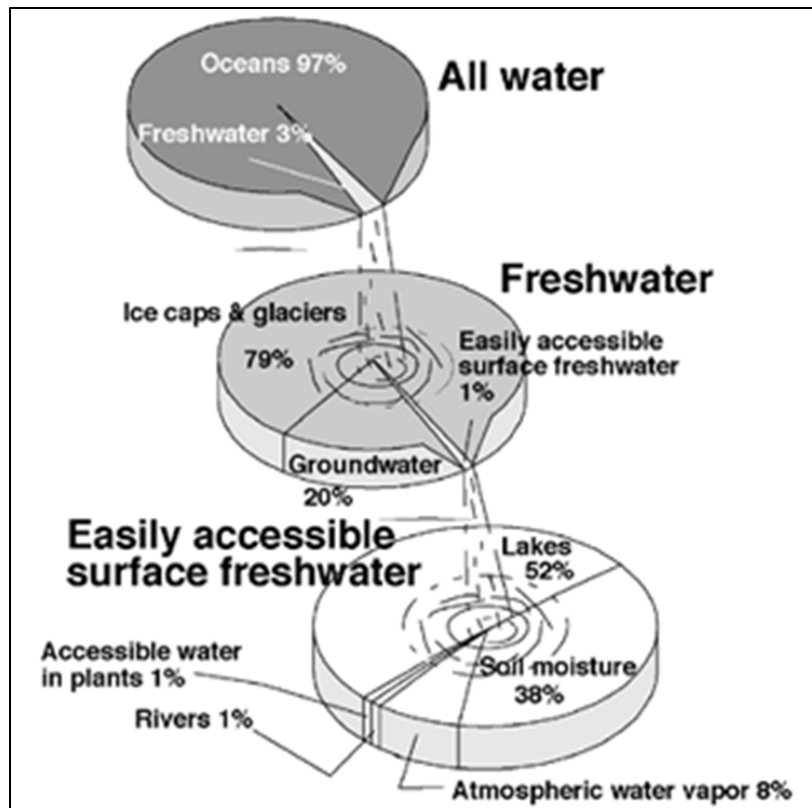


Figure (1) The Earth's Freshwater Distribution<sup>112</sup>

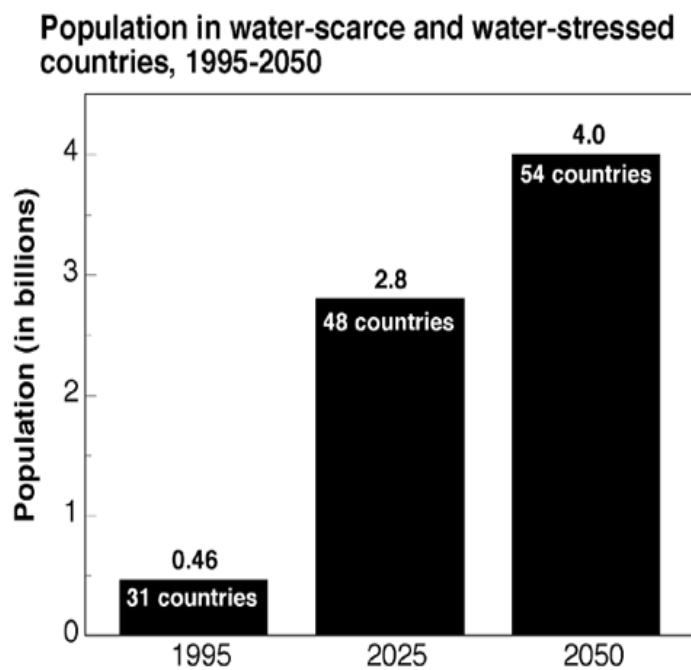
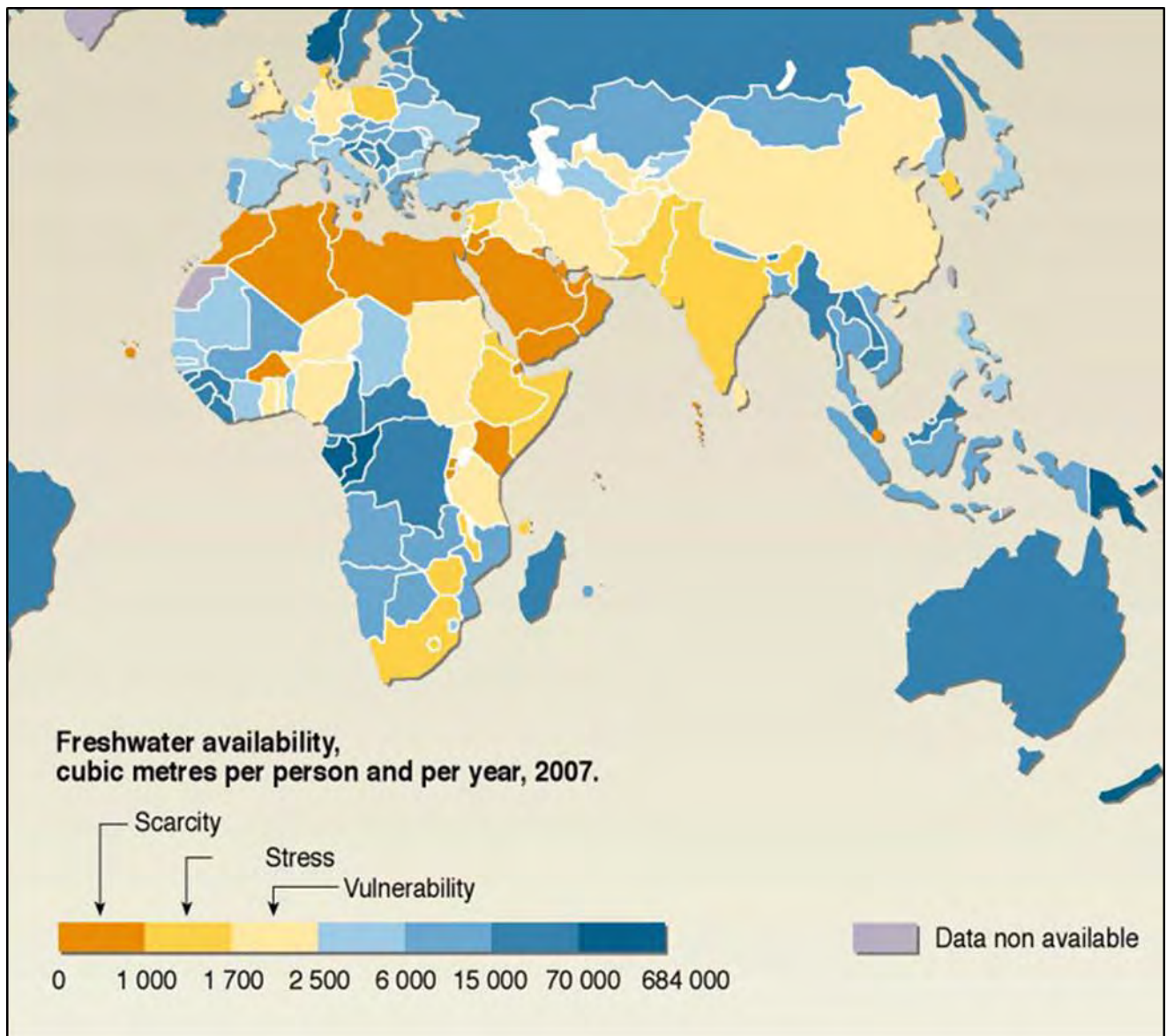
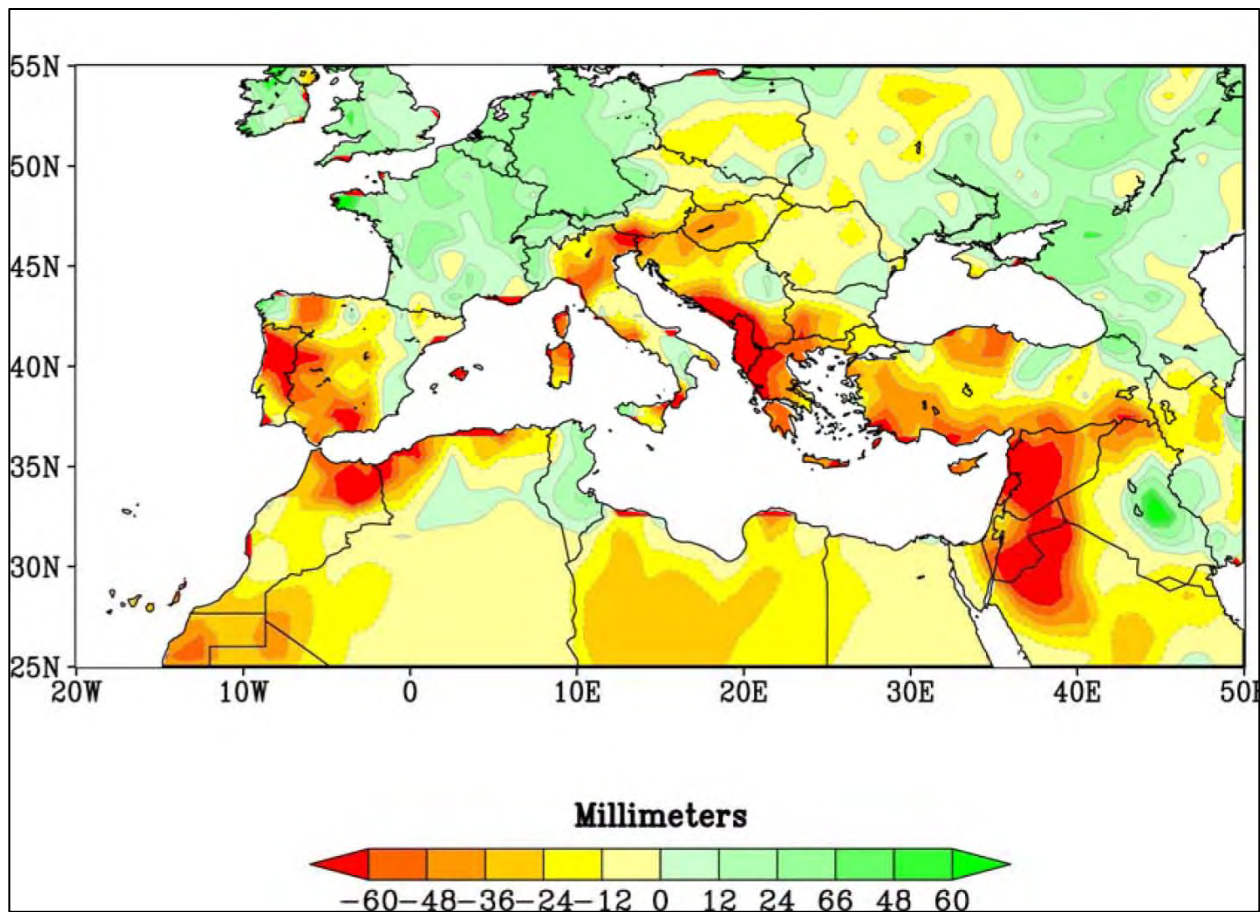


Figure (2)<sup>113</sup>



**Map (1) Nations Currently Determined as Water Scarce or Water Stressed (MENA Region)<sup>114</sup>**



**Map (2) Mediterranean Basin Wintertime Drought.** The red and orange colors, according to the National Oceanic and Atmospheric Administration (NOAA), “... highlight lands around the Mediterranean that experienced significantly drier winters during 1971-2010 than the comparison period of 1902-2010.”<sup>115</sup>





Map (3) Israel<sup>116</sup>



Map (4) Jordan-Yarmuk River Basin<sup>117</sup>

<b>Date</b>	<b>Parties Involved</b>	<b>Basis of Conflict</b>	<b>Description</b>
1948	Arabs, Israelis	Military tool	Arab forces cut off West Jerusalem's water supply in first Arab-Israeli war.
1948	Arabs, Israel	Military tool	Water and food supplies were cut off during Arab siege of Jerusalem from December 1, 1947, to July 10, 1948. Arab forces blocked the road to Jerusalem, in an attempt to defeat Jewish Jerusalem. Shortages cause Israelis to begin rationing water on May 12, limiting each person to 2 gallons per day (8 L), of which 4 pints (2 L) were for drinking.
1951	Israel, Jordan, Syria	Military tool; Development dispute	Jordan makes public its plans to irrigate the Jordan Valley by tapping the Yarmouk River; Israel responds by commencing drainage of the Huleh swamps located in the demilitarized zone between Israel and Syria; border skirmishes ensue between Israel and Syria.
1953	Israel, Jordan, Syria	Development dispute; Military target	Israel begins construction of its National Water Carrier to transfer water from the north of the Sea of Galilee out of the Jordan basin to the Negev Desert for irrigation. Syrian military actions along the border and international disapproval lead Israel to move its intake to the Sea of Galilee.
1962	Israel, Syria	Development dispute; Military target	Israel destroys irrigation ditches in the lower Tarfiq in the demilitarized zone. Syria complains.
1964	Israel, Syria	Military target	Headwaters of the Dan River on the Jordan River are bombed at Tell El-Qadi in a dispute about sovereignty over the source of the Dan.
1965	Israel, Palestinians	Terrorism	First attack ever by the Palestinian National Liberation Movement Al-Fatah is on the diversion pumps for the Israeli National Water Carrier. Attack fails.
1965–1966	Israel, Syria	Military tool; Development dispute	Fire is exchanged over “all-Arab” plan to divert the Jordan River headwaters (Hasbani and Banias) and presumably preempt Israeli National Water Carrier; Syria halts construction of its diversion in July 1966.
1967	Israel, Syria	Military target; Military tool	Israel destroys the Arab diversion works on the Jordan River headwaters. During Arab-Israeli War Israel occupies Golan Heights, with Banias tributary to the Jordan; Israel occupies West Bank.
1969	Israel, Jordan	Military target; Military tool	Israel, suspicious that Jordan is over-diverting the Yarmouk, leads two raids to destroy the newly-built East Ghor Canal; secret negotiations, mediated by the U.S., lead to an agreement in 1970.
1982	Israel, Lebanon, Syria	Military tool	Israel cuts off the water supply of Beirut during siege.
1983	Israel	Terrorism	The Israeli government reports that it had uncovered a plot by Israeli Arabs to poison the water in Galilee with “an unidentified powder.”
2001	Israel, Palestine	Terrorism; Military target	Palestinians destroy water supply pipelines to West Bank settlement of Yitzhar and to Kibbutz Kisufim. Agbat Jabar refugee camp near Jericho disconnected from its water supply after Palestinians looted and damaged local water pumps. Palestinians accuse Israel of destroying a water cistern, blocking water tanker deliveries, and attacking materials for a wastewater treatment project.
2006	Israel, Lebanon	Military target; Terrorism	Hezbollah rockets damaged a wastewater treatment plant in Israel. The Lebanese government estimates that Israeli attacks damaged water systems throughout southern Lebanon, including tanks, pipes, pumping stations, and facilities along the Litani River.
2007	Israel, Palestine	Development dispute	Israel's sanctions against Gaza cause water shortages and a growing public health risk. In particular, restrictions on fuel, spare parts, and maintenance equipment threaten the functioning of Gaza's already limited water and sanitation system.

**Table (1) Violent Conflict in the Jordan River Basin<sup>118</sup>**

	<b>Pre-1950s Mm<sup>3</sup></b>	<b>Mid-1970s Mm<sup>3</sup></b>	<b>Early-2000s Mm<sup>3</sup></b>	<b>Predicted Mid-2020s Mm<sup>3</sup></b>
<b>Flows out of Lake Tiberius</b>	<b>605</b>	<b>70</b>	<b>70</b>	<b>70</b>
<b>Discharges into the Dead Sea</b>	<b>1,370</b>	<b>505</b>	<b>275</b>	<b>170</b>

**Table (2) Dead Sea Inflow (Mm<sup>3</sup> = million cubic meter)<sup>119</sup>**

	<b>Annual Renewable Water Resources (km<sup>3</sup>/yr)</b>	<b>Total Freshwater Withdrawal (km<sup>3</sup>/yr)</b>	<b>Current Per Capita Withdrawal (m<sup>3</sup>/p/yr)</b>	<b>2010 Population (millions)</b>	<b>2025 Population (millions)</b>
<b>Israel</b>	<b>1.8</b>	<b>1.95</b>	<b>268</b>	<b>7.29</b>	<b>8.0</b>
<b>Syria</b>	<b>16.8</b>	<b>16.69</b>	<b>742</b>	<b>22.51</b>	<b>24.0</b>
<b>Jordan</b>	<b>0.9</b>	<b>0.94</b>	<b>145</b>	<b>6.47</b>	<b>11.9</b>
<b>Lebanon</b>	<b>4.5</b>	<b>1.31</b>	<b>308</b>	<b>4.25</b>	<b>4.4</b>

**Table (3) Freshwater Withdrawal and Growing Population Comparison<sup>120</sup>**

<b>Field of Operations</b>	<b>Official Camps</b>	<b>Registered Refugees in Camps</b>	<b>Registered Refugees</b>
Jordan	10	350,899	1,999,466
Lebanon	12	227,718	455,373
Syria	9	149,822	495,970
West Bank	19	206,123	848,494
Gaza Strip	8	518,147	1,167,361
<b>UNRWA Totals</b>	<b>58</b>	<b>1,452,709</b>	<b>4,966,664</b>

**Table (4) Palestinian Refugees within the Jordan River Basin<sup>121</sup>**



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