



Friends of the Earth Middle East



Climate Change: A New Threat to Middle East Security

Prepared for the United Nations Climate Change Conference
Bali, Indonesia

EcoPeace / Friends of the Earth Middle East
Amman, Bethlehem, and Tel-Aviv
December 2007



International Task Force
on Preventive Diplomacy



EASTWEST INSTITUTE

**NGO in special consultative status with the Economic and Social Council (ECOSOC) of the United Nations*

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Friends of the Earth Middle East (FoEME) is a unique organization that brings together Israeli, Palestinian and Jordanian environmentalists. Our primary objective is the promotion of cooperative efforts to protect our shared environmental heritage. In so doing, we seek to advance both sustainable regional development and the creation of necessary conditions for lasting peace in our region. FoEME has offices in Tel Aviv, Bethlehem, and Amman. It is a member of Friends of the Earth International, the largest grassroots environmental organization in the world.

Please visit the climate change section of FoEME's Internet site at: www.foeme.org for more information on the work of FoEME and climate change concerns for the Middle East.

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EXECUTIVE SUMMARY

With the Middle East being the world's most water-stressed region, climate change, which is projected to cause sea level rise, more extreme weather events, such as droughts and floods, and less precipitation, will contribute to even greater water stress in the region. Governments, policy makers and the general public, through the media, must realize that the climate crisis is therefore a new and real threat to the Middle East with severe environmental, economic, political and security implications. When people lack adequate safe, clean drinking water, and water resources are shared across political boundaries, the risk of evoking political conflict increases. For a region that already possesses some of the greatest political tensions in the world, the climate crisis and its potential physical and socioeconomic impacts are likely to exacerbate this cross-border political instability.

Climate change is likely to act as a “**threat multiplier**” – exacerbating water scarcity and tensions over water within and between nations linked by hydrological resources, geography, and shared political boundaries. Poor and vulnerable populations, which exist in significant numbers throughout the region, will likely face the greatest risk. Water shortages and rising sea levels could lead to mass migration in the Region. Scenarios conducted by the United Nations Environment Programme (UNEP) and other organizations indicate that a 0.5 meter (approximately 19 inches) rise in sea level, for example, could displace nearly 2-4 million Egyptians by 2050. The drinking water of 1.5 million Palestinians in Gaza would be further contaminated by rising sea levels leading to sea water intrusion of their only water source, the Coastal Aquifer. Economic unrest across the region, due to a decline in agricultural production from climate impacts on water resources, also could lead to greater political unrest, which could threaten current regimes, thereby affecting internal and cross-border relations. These factors place greater pressure on the entire region and on already-strained, cross-border relations, and potentially foster more widespread heightened tensions and/or conflicts.

The following factors will play a role in determining the likelihood for conflict or cooperation in the region as climate impacts become more significant:

- The existence of water agreements, and their degree of *sustainability*, including the ability of Parties to deal with extreme circumstances, such as longer periods of drought;
- The influence of destabilizing economic and political factors, e.g., unemployment and mass migration due to agricultural decline and the large scale flooding of agricultural areas;
- The extent of national economic and political development, including the degree to which local institutional structures and infrastructure exist;
- A given political entity's ability to mitigate and/or adapt to climate change;
- Power relationships between the Parties involved; and
- Whether it is politically expedient at a given time to cooperate (or continue to cooperate) over water resources.

However, dealing with climate change and recognizing the looming crisis provides opportunities for local, cross-border and international cooperation to ameliorate the

problems that are already occurring and that are projected to intensify. Improving local demand- and supply-side water and energy management policies is essential and will only become more critical as the needs increase due to climate change. Israel as a developed economy must join OECD country commitments to reduce greenhouse gas emissions. Third-party donor assistance will play an important role in facilitating adaptation in countries, such as Egypt, Palestine and Jordan. Near-, medium-, and long-term planning efforts are needed, which necessitate cross border cooperation. The ability to provide technological clean energy and water solutions domestically could enable the countries of the region to become part of the broader solution for addressing global climate change.

With renewed U.S. leadership in the Middle East peace process successfully witnessed at the Annapolis meetings in November 2007, U.S. leadership is also essential at the United Nations Climate Change Conference in Bali, Indonesia, if we are to avoid the most severe implications that the climate crisis presents to the Middle East. The U.S. must take on concrete commitments now to reduce greenhouse gas concentrations in the atmosphere in the post-2012 period to levels agreed upon by scientists to prevent dangerous consequences. It is time for the U.S. to join the rest of the world in addressing this problem, rather than remaining the lone outsider. Europe has taken on emissions reductions commitments already, but must follow through on these. The major industrializing nations, such as China, India, and Brazil, also should recognize their role and responsibility in addressing global climate change by agreeing to concrete commitments for the post-2012 timeframe, albeit while continuing to receive assistance from Europe, the U.S., and Japan in doing so. Without the combined local and international commitment to deal with the climate crisis, climate change will become the new and real threat to Middle East security with spill-over security implications for the rest of the world.

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Introduction

The Middle East is the world's most water-stressed region.¹ Climate change is projected to cause sea level rise, more extreme weather events, decreased precipitation and, ultimately, less surface and ground water availability, all contributing to even greater water stress in the region, with severe environmental, economic, political and security implications.

Water security is defined as maintaining water resources such that "every person has reliable access to enough safe water at an affordable price to lead a healthy, dignified and productive life," while also sustaining ecosystems that provide and depend on water.² Water security is an integral part of the broader concept of human security. Lack of water threatens water security, as well as human health and economic development, and can lead to additional environmental stress.³

A lack of an adequate, safe, clean water supply constrains a society's opportunities for economic development, and thus endangers political stability within a state, and, when water resources are shared across political boundaries, with its neighbors. Thus, the risk of evoking political conflict increases. "In fact, the enormously intricate water politics of the [Middle East] region have been aptly described as a 'hydropolitical security complex.'"⁴

The current water situation in the Middle East is inadequate to address each country's internal agricultural, domestic and other desires/needs, let alone to meet transboundary water agreements, where such commitments exist. For a region that already possesses some of the greatest political tensions in the world, the climate crisis is likely to exacerbate this cross-border political instability. Geographically, this paper will focus primarily on Egypt, Palestine, Israel, and Jordan.

Climate change provides both challenges, and opportunities for cross-border cooperation to ameliorate and prevent the problems that are already occurring and are projected to further intensify. For this reason, water issues have been an important part of all peace talks in the region.

Climate Change: Background

Climate change is "any change in climate over time, whether due to natural variability or as a result of human activity."⁵ Concentrations of greenhouse gases, including carbon dioxide, methane, water vapor, nitrous oxide, and fluorinated

¹ UNDP, *Human Development Report 2006 (HDR) – Beyond Scarcity: Power, poverty, and the global water crisis*, p. 135. Water-stressed countries are defined as those capable of providing less than 1,700 cubic meters to each person per year, according to this report, p. 14; other reports have somewhat different levels.

² HDR, p. 3.

³ HDR, pp. 3, 13.

⁴ Campbell, Kurt, John Podesta, Peter Ogden, Leon Fuerth, James Woolsey, et. al., "The Age of New Consequences: the Foreign Policy and National Security Implications of Climate Change," a project of the Center for Strategic and International Studies (CSIS) and the Center for a New American Security (CNAS), November 2007, p. 60, available at: http://www.csis.org/media/csis/pubs/071105_ageofconsequences.pdf; hereinafter referred to as: CSIS/CNAS report.

⁵ U.S. Government Accountability Office (GAO) report, "Financial Risks to Federal and Private Insurers in Coming Decades are Potentially Significant," March 2007, p.2 (based on IPCC definition), available at: <http://www.gao.gov/new.items/d07285.pdf>.

gases, such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, in the atmosphere are essential for life to exist on Earth.⁶ However, increases in greenhouse gas concentrations, largely due to human activity, are causing the Earth's surface to warm. Atmospheric concentrations of carbon dioxide, in particular, have increased to levels that are higher than previously seen in reliable recorded history.⁷ Global warming impacts will likely include surface and ocean temperature increases, sea level rise, glacial melt, and more extreme weather events, such as droughts and floods, and less precipitation in some areas, including in the Middle East, with greater desertification.

The concentration of greenhouse gases in the atmosphere is higher than it has been for the last 650,000 years.⁸ These concentrations are expected to reach 560 parts per million (ppm), or double the amount of pre-industrial concentrations, between 2040 and 2065.⁹ Many scientific experts believe that such concentrations represent a "tipping point," beyond which it would be extremely difficult (if not impossible) and/or costly to mitigate or adapt to the climatic changes that could result.

Currently, average *global* temperatures are projected to increase by about 1.1-6.4 degrees C for 2090-2099, relative to 1980-1999 levels, with the average warming predicted to be about 3 degrees C, assuming a doubling of carbon dioxide (CO₂) emissions in the atmosphere.¹⁰ Even if greenhouse gas emissions were to have been kept constant at 2000 levels, a warming of approximately 0.1 degree C per decade would still be expected.¹¹ Sea level is predicted to rise globally, on average, between 18 and 59 centimeters by the end of the century.¹²

So, there is a need to slow, stabilize, and reverse the concentration of greenhouse gas emissions in the atmosphere, for example, through alternative, clean

⁶ U.S. Environmental Protection Agency (EPA), "Climate Change, Greenhouse Gas Overview," available at: <http://www.epa.gov/climatechange/emissions/index.html>.

⁷ "Joint Science Academies' Statement: Global Response to Climate Change," available at: <http://nationalacademies.org/onpi/06072005.pdf>.

⁸ Alley, Richard, et. al., "Climate Change 2007: The Physical Science Basis," Summary for Policymakers, Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), Geneva, Switzerland, 2007, p. 2, available at: http://ipcc-wg1.ucar.edu/wg1/docs/WG1AR4_SPM_Approved_05Feb.pdf; hereinafter referred to as IPCC Fourth Assessment Report, Summary for Policymakers, 2007. The IPCC is the leading authoritative body of approximately 1,500 experts on climate change.

⁹ Pe'er, G., U. Safriel, "Climate Change: Israel," National Report, Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Sde Boqer, 2000, available at: <http://www.bgu.ac.il/BIDR/rio/Global91-editedfinal.html>.

¹⁰ Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, A.T. Gaye, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao, 2007: Global Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 749, available at: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch10.pdf.

¹¹ IPCC Fourth Assessment Report, Summary for Policymakers, 2007, p. 12 (see footnote 8 above).

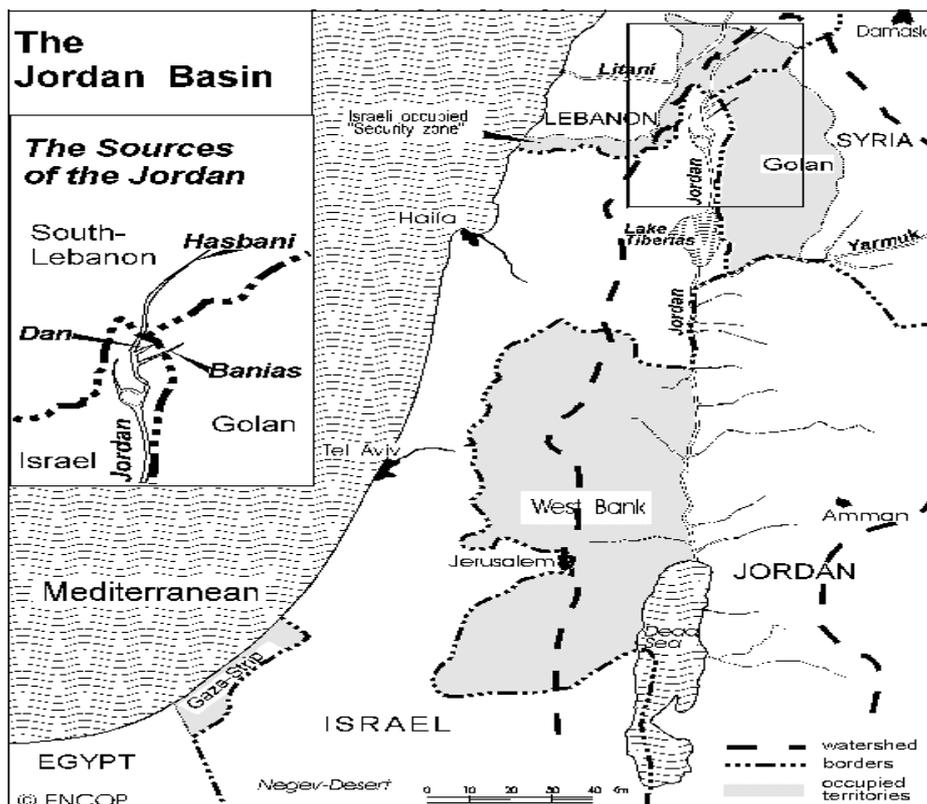
¹² Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, A.T. Gaye, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao, 2007: Global Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 750, available at: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch10.pdf.

transportation and electric supply policies, increased efficiency, and demand-side management tools.

The Shared Nature of Water Resources in the Middle East

A key water source in the region is the Jordan River system/basin. The **Upper Jordan** is fed primarily by the **Dan**, the **Hasbani**, and the **Banias Streams** that combine to become the **Upper Jordan River**. The Dan Stream lies entirely within Israel. The Banias Stream originates in Syria but has been under Israeli control since 1967.¹³ The **Wazzani Stream**, originating in Lebanon, is the main source of the Hasbani. The Hasbani alone supplies about 25 percent of the Jordan River's water. The Upper Jordan then flows into the Sea of Galilee (Lake Tiberias).¹⁴

Another important river in the region is the **Litani River**. This basin lies entirely within Lebanon.¹⁵ The Litani presently is not fully utilized. It is one of the only rivers in the area that continues to flow into the Eastern Mediterranean. Though not a shared water resource, the existing flow in the Litani River has reduced the need for Lebanon in the short term to divert greater quantities of water from the Wazzani and the shared basin of the Upper Jordan River.



Source: S. Libiszewski, 1995.

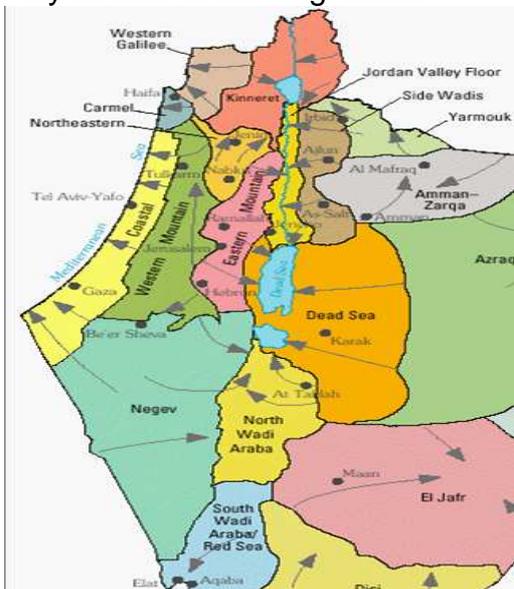
¹³ Libiszewski, Stephan, *Water disputes in the Jordan Basin Region and their role in the resolution of the Arab Israeli Conflict*, 12, Center for Security Studies and Conflict Research, 1995, p. 12, available at: http://www.mideastweb.org/Mew_water95.pdf; hereinafter referred to as: Libiszewski.

¹⁴ ICE Case Studies, "Jordan River Dispute," Case Identifier: Jordan1, available at: <http://www.american.edu/TED/ice/westbank.htm>.

¹⁵ Libiszewski, p. 16.

The **Yarmouk** is the most significant tributary of the Lower Jordan River and reaches the River just below the Sea of Galilee/Lake Tiberias, which then flows to the Dead Sea (seven basins form the major Dead Sea Basin).¹⁶ The Yarmouk supplies all of the water of the King Abdullah canal, which supplies water for Jordan, largely for agriculture. The Yarmouk “drains territories in Syria and Jordan” and forms the border between Jordan and Syria. Further downstream, it forms the border between Jordan and Israel shortly before its confluence with the Lower Jordan River.¹⁷ From this point on to the Dead Sea, the Lower Jordan forms the border between Jordan and Israel, and then between Jordan and the Palestinian West Bank.¹⁸ Because “Israel, Jordan and Syria divert 95 percent of the water” that is supposed to feed the Lower Jordan River, the Lower Jordan has almost completely dried up. The flow that remains is fed by a few tiny springs and consists primarily of sewage and agricultural runoff, and is therefore quite polluted.¹⁹ The Jordan River Valley and the Dead Sea are cultural, religious, and heritage sites for the world. The Dead Sea has already shrunk by one-third of its size in the past 50 years, and without these flows, these sites will not remain as such.

Though it is the shared surface waters of the Jordan Basin that historically have attracted the greatest political attention, it is in fact shared, cross-border **groundwater** resources that supply most of the drinking water for Jordanians, Palestinians and Israelis. The **Mountain Aquifer**, divided into the Western, Northeastern and Eastern Basins, is shared by Israel and the Palestinian West Bank. However, Israel utilizes 80 percent of the Mountain Aquifer’s water.²⁰ The Coastal Aquifer, which follows the coastal plain of Israel and Gaza, also is shared. For the 1.5 million Palestinians living in Gaza, the Coastal Aquifer is presently their only source of drinking water.



Source: EXACT Project, <http://exact-me.org>

¹⁶ Salameh, Elias, and Munther Haddadin, “The Population—Water Resources Equation,” in *Water Resources in Jordan: Evolving Policies for Development, the Environment, and Conflict Resolution*, Haddadin, Munther J., (Ed.) Issues in Water Resource Policy Series, Ariel Dinar, (Series Ed.), 2006, pp. 10-11; hereinafter referred to as: Haddadin.

¹⁷ Haddadin, p. 11.

¹⁸ Libiszewski, p. 12.

¹⁹ Bromberg, Gidon, “Will It Save the Dead Sea?,” 24 June 2005, in Middle East Roundtable, Edition 23, Vol. 3, bitterlemons-international.org, available at: <http://www.bitterlemons-international.org/inside.php?id=362>.

²⁰ Gray, Alice, “‘Positive Conditions:’ The Water Crisis in Gaza,” Countercurrents.org Newsletter, 9 August 2006, available at: <http://www.countercurrents.org/pa-gray090806.htm>.

Jordan relies heavily on 12 groundwater basins that can be divided into: the Deep Sandstone Aquifer Complex, the Upper Cretaceous Aquifer Complex, and the Shallow Aquifer Complex.²¹ Here, too, the **Azraq Aquifer** is shared with Syria, and the **Disi Aquifer** is shared with Saudi Arabia.²²

Water-Sharing Agreements

The Middle Eastern governments understand that a lack of water will constrain their opportunities for development and thus endanger domestic political stability as well as relations with their neighbors. This fact has meant that efforts have been underway since the early 1950s to achieve agreements over water, despite larger ongoing political tensions/conflicts. And, water has played an important role in all conflicts and peace talks between the various Parties ever since (even if water agreements – or peace agreements – do not yet exist in all cases).²³

Jordan-Israel

Jordan and Israel signed a peace treaty in 1994 that contains a water-sharing provision that aims to achieve a “comprehensive and lasting settlement of all the water problems” between the two countries through mutual recognition of their “rightful allocations” to water from the Jordan River and the Yarmouk River.²⁴ It also aims to achieve mutual cooperation in the development of existing and additional water resources. Specifically, it allocates:

- **For Israel – 45 million cubic meters (mcm)/year from the Yarmouk River**, as follows: 25 mcm/year, plus 20 mcm/year pumped in winter in exchange for transferring the same amount (i.e., 20 mcm/year) to Jordan in the summer from the Jordan River. Israel may use up to 3 mcm/year of added storage capacity (which would make its total water allocation 48 mcm/year).²⁵
- **For Jordan – 60 mcm/year from the Jordan River**, as follows: 40 mcm/year from the Jordan River, of which 20 mcm/year is in fulfillment of the storage exchange noted in the previous bullet; and 10 mcm/year of desalinated water (from 20 mcm/year available from saline springs). Israel also will also transfer 10 mcm/year to Jordan outside of summer, subject to “maximum capacity of transmission.”²⁶
- **For Jordan – Jordan and Israel cooperate to try to find an additional 50 mcm/year of potable water for Jordan**, and develop a plan within one year (from the time of the Treaty signing) to do so.²⁷ Finding this supply for Jordan has not yet happened.

²¹ Haddadin, pp. 13-14.

²² Haddadin, p. 16.

²³ Brauch, Hans G., *Security and Environment in the Mediterranean: Conceptualizing Security and Environmental Conflicts*, Springer, (Ed.), 2003, p. 729.

²⁴ Israel-Jordan Peace Treaty, Article 6, Water, available at: http://www.kinghussein.gov.jo/peace_6-15.html.

²⁵ Israel-Jordan Peace Treaty, Annex II, Water Related Matters, available at: http://www.kinghussein.gov.jo/peace_annexII.html.

²⁶ Ibid.

²⁷ Ibid.

Reputed to be “one of the most creative water treaties on record,” the agreement has Israel using and “storing” water for later transfer to Jordan.²⁸

Nevertheless, tensions mounted in 1999, when a severe drought caused Israel to indicate that it was unable to meet its water delivery schedule to Jordan and, therefore, to raise the possibility that it would not transfer the requisite water allocation. Jordan in turn threatened to take “appropriate actions” against Israel.²⁹ This incident highlights a significant weakness in the water agreement, and thereby illustrates the need for water-sharing agreements to be able to foresee and address extreme circumstances, i.e., to be flexible in nature, to make the treaty more sustainable and help avoid potential conflict.³⁰ In more recent years, Jordan has accused Syria of diverting excessive amounts from the Yarmouk, making Jordan unable to meet its water transfer commitment to Israel. The water-sharing agreement also does not contain a provision for including other riparians (i.e., the Palestinians), an omission which, in the future, might lead to additional controversies. On the other hand, if the treaty were to include other riparians, that might also contribute to making the treaty more sustainable and to fostering broader regional cooperation. A multilateral water-sharing agreement will be required in the future.

Israel – Palestine

In 1995, Israel and the Palestinian Authority (PA) signed an Interim [peace] Agreement (Oslo II Accords).³¹ Because of the already-existing political tensions and the need to share increasingly-scarce water resources, Annex III, Article 40 of the Interim Status Agreement was designed to address water and sewage issues by recognizing Palestinian water rights. It allocated 28.6 mcm/year to the Palestinians for domestic consumption and recognized that the PA will need approximately 70-80 mcm/year of water in the future.³² The Palestinians, however, had requested 450 mcm/year of water.³³ Water ultimately was left as one of five major issues to be addressed later, i.e., in the Final Status negotiations, because it remains so highly contentious.

²⁸ Medzini, Arnon, A. Wolf, “Towards a Middle East at Peace: Hidden Issues in Arab–Israeli Hydropolitics,” in *Water Resources Development*, vol. 20, 2004, pp. 193-204, available at: http://www.transboundarywaters.orst.edu/publications/Medzini_&_Wolf_04.pdf.

²⁹ Berland, Allison, “The Water Component of the Peace Process between the Israelis and the Palestinians,” Master’s Thesis, Fletcher School of Law and Diplomacy, May 2000, Chapter 4, available at: http://www.transboundarywaters.orst.edu/publications/related_research/berland/berland_toc.html.

³⁰ Based on personal conversation with Dr. Itay Fischhendler, Lecturer, Department of Geography, and Head of Environmental Planning and Policy Program, Hebrew University, November 2007.

³¹ This agreement followed the previous [Declaration of Principles](#) of 1993, which established the Palestinian Water Administration Authority (PWA), and [the Gaza-Jericho Agreement](#) of 1994, which stipulates that all water and sewage systems and resources in the Gaza and Jericho areas shall be operated, managed and developed by the PWA. Accordingly, the PWA committed to pay Mekoroth Water Co. (the Israeli water company) for the costs of water supplied and for the real expenses incurred in supplying water from Israel and to the PA. Libiszewski, pp. 85-6.

³² Article 40 of the Israeli-Palestinian Interim Agreement, available at: <http://www.mfa.gov.il/MFA/Peace+Process/Guide+to+the+Peace+Process/THE+ISRAELI-PALESTINIAN+INTERIM+AGREEMENT++Annex+III.htm#app-40>.

³³ Palestinian Academic Society for the Study of International Affairs (PASSIA), Jerusalem, Facts and Figures, Ch. 7, Water and Environment, p. 294, available at: <http://www.passia.org>.

Jordan-Syria

Jordan and Syria have a water allocation agreement.³⁴ It has been renegotiated several times under circumstances detrimental to Jordan, such that Jordanians feel that their interests have been compromised. Consequently, tensions are often high between Jordan and Syria over water allocations of the Yarmouk River and ground water.

Egypt and the Nile Basin Riparian Countries

With Egypt being physically located on the African continent, though sharing a political boundary with and being a neighboring state of the Near East, its water resources are not linked to those of the above-mentioned Near Eastern countries. However, Egypt is similarly highly dependent on shared water sources. Egypt is in fact dependent on other nations to meet 95 percent of its water needs.³⁵ The Nile River Basin runs through ten riparian states and has been one of the most disputed basins in the world.³⁶ The 1959 Nile Waters Agreement between Egypt and Sudan allocated about 66 percent of Nile River waters to Egypt, “22 percent to Sudan, 10 percent to losses, and none to upstream riparian countries.”³⁷ As upstream countries required more water, the potential for conflict increased. This situation served as the basis for the Nile Basin Initiative to try to facilitate cooperation, rather than conflict, over this critical Basin.³⁸ Today, the Nile Basin Initiative often is looked to as a model for cooperation in other trans-boundary basins where water resources are scarce and political tensions exist.

Israel-Syria-Lebanon: No Peace Treaties or Water-Sharing Agreements

There is no peace treaty or water agreement between Syria and Israel or Lebanon and Israel. Closed door and secret talks between Israel and Syria have taken place several times since the Madrid Peace Summit. With 30 percent of the waters of the Sea of Galilee originating in the Golan Heights, the return of the Golan to Syria and the water issues at stake are intricately linked.

³⁴ Syria is about 80 percent dependent on other countries for its renewable water sources, as noted by Dr. Nimrod Raphaeli, Senior Analyst, The Middle East Media Research Institute (MEMRI), in “A Briefing Paper to the Staff of the Senate Foreign Relations Committee on Potential Water Conflicts in the Middle East”; Arabic News.com, “Syria, Jordan sign al-Yarmouk water agreement,” 24 November 1998, available at: <http://www.arabicnews.com/ansub/Daily/Day/981124/1998112415.html>.

³⁵ Alavian, Vahid, Rankin International, “Shared Waters: Catalyst for Cooperation,” available at: http://www.ucowr.siu.edu/updates/pdf/V115_A2.pdf.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Ibid.

Projected Climate Impacts on the Middle East Region

The climate crisis is already being witnessed today in the Middle East. And the situation is projected to become more severe. For the Eastern Mediterranean, for the 2080 timeframe, “projected mean temperatures might increase between 3 and 5 degrees C.”³⁹ Additional projected climate change impacts for the region are as follows:

- A 20 percent decline in precipitation by the end of the century.⁴⁰
- “Reduced stream flow and groundwater recharge might lead to a reduction in water supply by 10 percent or greater by 2050.”⁴¹
- An increase of evapotranspiration by nearly 10 percent.⁴²
- Greater seasonal temperature variability.
- More severe weather events, such as droughts and floods.
- Significant sea level rise: the Mediterranean is predicted to rise between 30 cm and 1 meter by the end of the century – causing flooding to coastal areas along the Nile Delta.⁴³
- Mediterranean biomes are expected to shift 300-500 km northward, if a 1.5 degree C warming were to occur, which could mean that Mediterranean ecosystems in Israel, the PA and Jordan would become more desert-like.
- An increase in vector-borne diseases and pests, mortality.

Because of the effects climate change is having – and is predicted to have – on water resources, particularly in areas that already are arid or semi-arid, such as the Middle East, “climate change is transforming the nature of global water insecurity.”⁴⁴

Implications for Political Stability

Population in the region is growing dramatically, as are water needs. In Jordan, for example, population is expected to nearly double to more than 10 million by 2035.⁴⁵ Egypt's population is projected to increase approximately 84 percent from 2000 figures by the year 2065.⁴⁶ With such growth, water demand is projected to increase

³⁹ Refers to the months of July-September. Brauch, Hans G., “Impacts of Global Environmental Change for Water Resources of Israel and its Neighbors: New Security Dangers and Shifting Perceptions,” in *Water Resources in the Middle East: Israel-Palestinian Water Issues – From Conflict to Cooperation*, Hillel Shual and Hassan Dweik (Eds.), Springer, Vol. 2, Hexagon Series on Human and Environmental Security and Peace, 2007, p. 366; hereinafter referred to as Shual and Dweik.

⁴⁰ According to the Intergovernmental Panel on Climate Change (IPCC). Meehl, G.A., T.F. Stocker, W.D. Collins, P. Friedlingstein, A.T. Gaye, J.M. Gregory, A. Kitoh, R. Knutti, J.M. Murphy, A. Noda, S.C.B. Raper, I.G. Watterson, A.J. Weaver and Z.-C. Zhao, 2007: Global Climate Projections. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 768, available at: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch10.pdf.

⁴¹ Shual and Dweik, p. 364.

⁴² Israel's First National Communication on Climate Change – Submitted under the UN Framework Convention on Climate Change, Jerusalem, November 2000, Executive Summary, available at: <http://www.sviva.gov.il>.

⁴³ 30 cm – 1 m figure from Arab Environment Monitor, “Egypt's Nile Delta Threatened by Climate Change,” 27 August 2007, available at: www.arabenvironment.net/archive/2007/8/304072.html.

⁴⁴ HDR, p. 15.

⁴⁵ Jordan Department of Statistics, “Jordan in Figures, Selected Indicators for 2005,” available at: http://www.dos.gov.jo/dos_home/jorfig/2005/jor_f_e.htm.

⁴⁶ HDR, 2006, available at: http://hdr.undp.org/hdr2006/statistics/countries/data_sheets/cty_ds_EGY.html.

across the region, thereby further increasing the pressure on already-scarce water and land resources.⁴⁷

Agriculture consumes significant amounts and in most cases the lion's share of water resources in the region. In Jordan, over 70 percent and, in Israel, approximately 50 percent of water resources are allocated to agriculture, despite their comprising a smaller and smaller percentage of GDP, that is, it "ranges from 2-10 percent" of GDP for Jordan and is about 2 percent for Israel.⁴⁸ However, water allocation for this sector is difficult to alter for political and ideological reasons.⁴⁹ In the case of the Palestinians and Egyptians, agriculture is still a major component of peoples' economic livelihoods, particularly in the predominantly rural areas.

Significantly, when one adds climate change and its potential physical – and socioeconomic – impacts into the already volatile political setting of the Middle East, one recognizes that political stability could be in even greater jeopardy.

That is, climate change is likely to act as a "**threat multiplier**" – exacerbating water scarcity and tensions over water within and between nations linked by hydrological resources, geography, and shared political boundaries.⁵⁰ As at least one expert has noted, "human economic behavior and global environmental change may pose for people with a high degree of societal and environmental vulnerability a `survival dilemma.'"⁵¹ Other experts have realized that "the redefinition of notions of security which have taken place throughout the world, to include energy, food, . . . or global environmental change, are not considered part of the `security' discourse as such" in the countries being examined in this study, though they should be, and will likely need to be, in the near future.⁵² This will become increasingly the case, as water shortages and rising sea levels could lead to mass migration in the Region.⁵³

The following factors will play a role in determining the likelihood for conflict or cooperation in the region as climate impacts become more significant:

⁴⁷ E.g., Palestinian water demand projections found in Palestinian Academic Society for the Study of International Affairs (PASSIA), Jerusalem, Facts and Figures, Ch. 7, Water and Environment, p. 295, available at: <http://www.passia.org>.

⁴⁸ figure for Jordan from FAO-IBD Meeting, "National Agricultural Development Strategies and Food Security Challenges in the Near East," Jeddah, 8-9 October 2003, FAO Corporate Document Repository, available at: <http://www.fao.org/DOCREP/MEETING/007/AD386E/ad386e03.htm>; 2 percent figure for Israel from ICBS, Statistical Abstract of Israel, 2006, Agricultural Area: Basic Data, available at: http://www1.cbs.gov.il/shnaton57/st19_01.pdf; and CBS, Statistical Abstract of Israel, 2006, available at: http://www1.cbs.gov.il/shnaton57/st14_03.pdf.

⁴⁹ Bromberg, Gidon, et al., *Middle East Environmental Security: The Jordan River Basin Area Case Study*, FoEME, September 2001, available at: http://www.foeme.org/docs/Environment_Security_Case_Study.pdf; states that "[t]he power of the agricultural lobby in Israel (as in Jordan) is the greatest impediment to sustainable water practices taking place in the [Jordan River Basin]. Because of their political power they continue to be guaranteed both large water quotas and heavily subsidised water prices." Hence, in all countries of the basin, "water allocation to the farming sectors has remained remarkably high as compared to contribution to GDP."

⁵⁰ The CNA Corporation, "National Security and the Threat of Climate Change," 2007, p. 24, available at: <http://securityandclimate.cna.org/report/National%20Security%20and%20the%20Threat%20of%20Climate%20Change.pdf>

⁵¹ Shuval and Dweik, p. 361.

⁵² Shuval and Dweik, p. 368.

⁵³ Letter from The Israeli Knesset's Socio-Environmental Caucus to Members of the U.S. Senate Environment & Public Works Committee, 23 October 2007.

- The existence of water agreements and their degree of *sustainability*, including the ability of Parties to deal with extreme circumstances, such as longer periods of drought;
- The influence of destabilizing economic and political factors, e.g., unemployment and mass migration due to agricultural decline and the large scale flooding of agricultural areas;
- The extent of national economic and political development, including the degree to which local institutional structures and infrastructure exist;
- A given political entity's ability to mitigate and/or adapt to climate change;
- Power relationships between the Parties involved; and
- Whether it is politically expedient at a given time to cooperate (or continue to cooperate) over water resources.

Worldwide, examples already exist of climate change-exacerbated or induced conflicts. The Darfur conflict has been cited as induced by climate change; possibly also as beginning an era of conflicts triggered by climate change.⁵⁴ This conflict, in which more than 200,000 people have been killed and which has resulted in over 2.5 million refugees, is generally classified as an ethnic one.⁵⁵ However, soil degradation and severe water shortages linked to climate change have acted as exacerbating agents.⁵⁶

Several U.S. security experts have noted that “in the developing world, even a relatively small climatic shift can trigger or exacerbate food shortages, water scarcity, destructive weather events, the spread of disease, human migration, and natural resource competition. These crises are all the more dangerous because they are interwoven and self-perpetuating: water shortages can lead to food shortages, which can lead to conflict over remaining resources, which can drive human migration, which, in turn, can create new food shortages in new regions.”⁵⁷ In addition, political tensions could rise over environmental migrants or “refugees,” and meeting their basic human needs, as noted. Along these lines, the question will arise as to whether such persons or refugees will be allowed to enter other countries, and how these issues will be addressed.⁵⁸

The Darfur crisis has resulted in populations that have migrated “in search of new water supplies, moving within and across borders, creating the conditions for social or political upheaval along the way” – and “its effects were felt throughout the entire region.”⁵⁹ More specifically, Egypt and Sudan, for example, have an agreement to allow nationals from each other's countries to enter.⁶⁰ But the Sudanese entering Egypt still have to find jobs and food. Some that have not succeeded in doing so have tried to migrate further to Israel. However, Israel recently has imposed a quota on the number of Sudanese that can enter its borders.

⁵⁴ Perry, Alex, “How to Prevent the Next Darfur,” Time Magazine, 26 April 2007, available at: <http://www.time.com/time/magazine/article/0,9171,1615171-2,00.html>

⁵⁵ Ibid.

⁵⁶ UNEP, *Sudan: Post-conflict Environmental Assessment*, 2007, available at: http://sudanreport.unep.ch/UNEP_Sudan.pdf.

⁵⁷ CSIS/CNAS report, p. 56.

⁵⁸ Based on personal conversation with Neil Grungras, Israel Director, Hebrew Immigrant Aid Society (HIAS), 14 October 2007.

⁵⁹ CSIS/CNAS report, p. 60.

⁶⁰ Based on personal conversation with Neil Grungras, Israel Director, HIAS, 14 October 2007.

To make matters worse, loss of productive agricultural lands in Egypt due to climate change could lead to a 20 percent drop in wheat and maize production by 2050.⁶¹ Such a decline, combined with growing populations and water demands, will increase competition for food and water resources, and could cause Egyptians to move from one area to another within Egypt (or beyond). An Organization for Cooperation and Economic Development (OECD) study points out that “any medium-term adverse trends regarding the reliability of water supplies . . . will have a critical impact” on densely-populated areas and could affect the welfare of the entire country.⁶² Taking migrants into account that already exist from Sudan and possibly from other areas in the future (also likely due to climate change) will lead to an exacerbation of these pressures and possibly to additional conflicts along the lines of what we have witnessed in Darfur.

In the Middle East, as in other parts of the world, political solutions to resource shortages have occurred. However, climate change impacts will likely make such solutions more difficult to reach and to fulfill in the future. Dr. Hans Gunter Brauch, a German climate expert, recently noted that “the peoples of the Middle East and North Africa face serious environmental threats and a mindset of cooperation is needed toward addressing the effects of global climate change.”⁶³ Others have underscored the need for governments of the region to act now domestically to address anticipated climate impacts, particularly future water needs. And, the magnitude of the projected problems in the Middle East, as with Africa, is such that bi-lateral and multi-lateral cooperation will be needed.⁶⁴

Israel-Jordan Peace Treaty

With the various predicted climatic changes, Israel and Jordan will almost certainly find it increasingly difficult to fulfill their water sharing obligations. In particular, decreased precipitation and more evapotranspiration (and/or more extreme weather events) mean that the average storage volume in surface reservoirs reportedly could decline by as much as 25 percent by 2100.⁶⁵ Israel and Jordan already are not finding an additional 50 mcm of potable water per year that they agreed in the Peace Treaty to cooperate to try to find for Jordan’s use.

The fact that there is a water-sharing agreement in place is an important factor in considering the two countries’ abilities to fulfill water-sharing agreements in light of projected climate impacts, as well as population and demand growth projections, and might help avoid potential conflict in the future. Noting that difficulties already are being faced in fulfilling commitments on both sides raises some questions as to the agreement’s sustainability, given these expected changes. Each country’s

⁶¹ Egyptian Government’s First National Communication to the UNFCCC.

⁶² Shardul Agrawala, et. al., “Development and Climate Change in Egypt: Focus on Coastal Resources and the Nile,” Organization for Economic Cooperation and Development (OECD), 2004, p. 15, available at: www.oecd.org/dataoecd/57/4/33330510.pdf.

⁶³ Porth, Christian, “Green Wars’ links conflict with environmental issues,” Special to the *Daily Star*, Lebanon, 5 November 2007 (referencing a conference by the same title held in early November in Beirut).

⁶⁴ Reuters AlertNet, “Climate Change to Create African Refugees – Scientists,” 22 March 2006, available at: <http://www.alertnet.org/thefacts/reliefresources/114303555233.htm>.

⁶⁵ Israel’s First National Communication on Climate Change – Submitted under the UN Framework Convention on Climate Change, Jerusalem, November 2000, p. 94, available at: <http://www.sviva.gov.il>.

relative ability to mitigate and adapt to climate change will also affect the Treaty's sustainability.

More specifically, new demand-side and supply-side water management policies are essential to help mitigate and adapt to climate change, continue to meet water-sharing obligations, mitigate tensions, and restore the Lower Jordan River. For example, the overall treaty could be jeopardized due to increased political instability if alternative investments are not made in support of diversifying farmer incomes away from agriculture, toward more economically and environmentally sustainable land uses, e.g., agricultural and eco-tourism. This is the case, particularly in Jordan, where rural communities are important to the support of the Hashemite Kingdom. The late King Hussein of Jordan said that "water is the one issue that could drive the nations of this region to war."⁶⁶ The extent to which water-intensive agricultural products – and thereby "virtual water" – are being exported out of the Region also needs to be re-examined to ensure other water resource needs can continue to be met into the future.

Israel-Palestine Interim Agreement

Climate change impacts will likely exacerbate difficulties between Israel and Palestine, particularly since final water agreements are not yet in place. Israel and the PA identified future Palestinian water resource needs at 70-80 mcm/year in the Interim Agreement.⁶⁷ However, these needs were identified over a decade ago and, according to the Palestinians, referred only to the Mountain Aquifer.

More extreme weather events will mean rainwater will run more quickly over the surface of the land. Consequently, much less water will be absorbed into the Mountain Aquifer. This will make it more difficult for Israel and the PA to share the water of the Mountain Aquifer, as there will simply be less water available. Overexploitation is a real concern. In the Coastal Aquifer, because of overpumping to date, increased salinization already has occurred. If the groundwater resource is overpumped beyond the "safe yield," this could increase the salinity of the Mountain Aquifer and affect the recharge potential, which ultimately could lead to permanent damage. And, while the PA is presently restricted in extracting water from the Mountain Aquifer without prior Israeli approval, as water resources become increasingly scarce, the necessity and likelihood of doing so increases.

Because of domestic and agricultural needs, the PA will be seeking larger amounts of water from the Mountain Aquifer and access for the first time to Jordan River waters, particularly as negotiations on such key outstanding issues are expected to resume following the November 2007 Israeli-Palestinian "peace talks" in Annapolis, Maryland, USA. Nevertheless, the Lower Jordan River has had all of its fresh water diverted and little more than sewage today makes its way to the Palestinian West Bank. Climate change is predicted to reduce precipitation in the Jordan Valley, making it *impossible* for Israel to maintain current agricultural practices, as well as for Israel to supply water to the Palestinians, and for riparians to leave a sufficient supply to restore and sustain the River itself. Independent and joint actions by the

⁶⁶ National Environmental Trust (NET), "Global Warming in the Middle East and Central Asia," 2005, p. 19.

⁶⁷ Article 40 of the Israeli-Palestinian Interim Agreement, available at:

<http://www.mfa.gov.il/MFA/Peace+Process/Guide+to+the+Peace+Process/THE+ISRAELI-PALESTINIAN+INTERIM+AGREEMENT+-+Annex+III.htm#app-40>.

two Parties will be needed to address climate impacts and water needs. Israel, in particular, will have to make significant reforms in these regards.⁶⁸ At the same time, the PA and Israel remain at odds over the issue of water rights and the basis for allocations. The fact that there is an Interim Agreement in place and that negotiations toward Final Status appear to be resuming could signal an opportunity for the two Parties to eventually reach a sustainable water-sharing agreement.

Syria-Jordan and Yarmouk Water Agreements

Jordan claims that Syria's usage of water from the Yarmouk has been 236 mcm/year, on average, "compared with its share of 90 mcm/year, an overrun of 146 mcm. Of this overrun, 65 mcm belonged to Jordan . . . and 81 mcm to the West Bank. It is believed that in 2005, Syrian uses of the Yarmouk sources were even greater."⁶⁹

As with Israel and Jordan, the fact that an agreement is in place can be of assistance. And, the media both in Jordan and Syria cover the issue of water agreements extensively. However, the extent of violations, and anticipated reduced water availability due to climate change, mean that such tension can only be expected to grow, and thereby call into question the agreement's sustainability.

Lack of Water Agreements: Syria, Lebanon, and Israel

Currently, there are no formal agreements between Israel and Syria or between Israel and Lebanon. Both Lebanon and Syria currently have adequate water supplies.⁷⁰ However, with projected climate impacts, including reductions in precipitation, altered rainfall distribution patterns, and increased evapotranspiration, as well as with projected population growth, available water resources will decline and likely will be insufficient to meet projected demand. For example, available water resources are expected to decline by 15 percent for Lebanon by 2020.⁷¹ The Litani is no longer expected to flow into the Mediterranean and reports have predicted that Lebanon will be unlikely to be able to meet local demand in the coming 10-15 years.⁷²

With these projected changes, Lebanon will likely seek to extract more water out of the Wazzani, which is one of the tributaries of the Jordan River that is shared with Israel. This is likely to lead to greater political instability between these two nations. Several years ago, Israel said that Lebanese attempts to divert water were a "casus belli" or cause of war.⁷³ This "incident" required third party intervention to prevent a heightened conflict.

⁶⁸ Tagar, Zecharya, "Nature, Agriculture and the Price of Water in Israel," 2007.

⁶⁹ Haddadin, Munther, "Conflict Resolution and Regional Cooperation," in Haddadin, p. 256 (see footnote 17).

⁷⁰ Tropp, H., Jagerskog A., "Water Scarcity Challenges in the Middle East and North Africa," United Nations Development Programme (UNDP)/Stockholm International Water Institute (SIWI), Stockholm, 2006.

⁷¹ Nurse, Leonard A., Ph.D., "Climate Change: Some Implications for Children's Development," presentation for Annual Meeting of the Consultative Group, Early Childhood Care & Development, Santiago, Chile, 16 October 2007; Dr. Nurse is an IPCC Lead Author for the Fourth Assessment Report, 2007 and is based at the University of the West Indies, Barbados.

⁷² Ray, Patrick, "Multi-Objective Optimization Model for Examination of Water Reuse Potential in Lebanon," Tufts University, Civil Engineering, 25 May 2004, p. 1, available at: www.tufts.edu/tie/pdf/ray.pdf.

⁷³ Deconinck, Stefan, "The Wazzani incident in the summer of 2002 – a phoney war?", July 2006, available at: http://www.waternet.be/jordan_river/wazzani.htm.

Syria, like the other riparians of the Jordan, is already using about 95 percent or more of its “annual renewable freshwater supply.”⁷⁴ Syria is expected to experience water shortages by 2020.⁷⁵ Syria and Israel share the resources of the Jordan River and the Sea of Galilee. The key issue in any future peace treaty between Syria and Israel will involve the issue of the return of the Golan Heights to Syria and what that means in terms of control over local or shared water resources for the water and physical security of both sides. As climate change becomes a “threat multiplier” by making scarce water resources more so, and by tending to lead towards increased tensions over resources in the Region, the lack of formal water-sharing agreements now between these countries could make the possibility of achieving such agreements in the future much more difficult.

Exacerbating Factors: Internal Economic Issues Affecting Political Stability

With climate change impacts on water resources, the agricultural sector, generally heavily dependent on irrigated agriculture, will be hardest hit. Already-poor, Jordanian and Palestinian farmers, will have their livelihoods threatened further. For Palestinians in Gaza, the rising sea level could be the end of agricultural productivity, because of the likely loss of the Coastal Aquifer as a water supply for agricultural and domestic purposes. Rising sea levels will likely cause massive flooding of rural and urban areas. In the case of Egypt, the major city of Alexandria will likely be inundated, although several hundred million dollars are being spent to build protective walls.⁷⁶ Flooded rural areas in the Nile Delta will lead to the loss of agricultural livelihood for millions of Egyptians.

Governments will face increasing difficulties fulfilling the needs of their rapidly-expanding populations. The anticipated growing resource shortages, due to the climate crisis, in turn, could lead to greater dissatisfaction with government authority and a rise, beyond what already exists, of extremist groups, and/or potential changes in – or overthrows of – government regimes or failed states. U.S. military experts have underscored these facts by explaining that climate is likely to exacerbate conditions for those already living in marginal conditions and thereby lead to greater political instability and “the likelihood of failed states.”⁷⁷

In the Palestinian West Bank, up to 30 percent of GDP is presently dependent on subsistence agriculture. Less water recharge in the Mountain Aquifer will result in less water output in springs, the West Bank’s main water source for agriculture. With no industry or tourism, and few job opportunities in neighboring states, Palestinians are increasingly dependent on subsistence agriculture for their livelihood. As noted above, they – with assistance from their neighbors in the region and abroad – will need to learn alternate land use practices, such as eco-tourism, to

⁷⁴ Jutro, Peter, Jason Morrison, Dr. Aaron Wolf, “Environmental Water Security: Lessons from the Southwestern U.S., Northwestern Mexico, and the Middle East,” U.S. Global Change Research Program (USGCRP) Seminar, 23 November 1998 (updated 3 November 2003), available at: <http://www.usgcrp.gov/usgcrp/seminars/981113FO.html>.

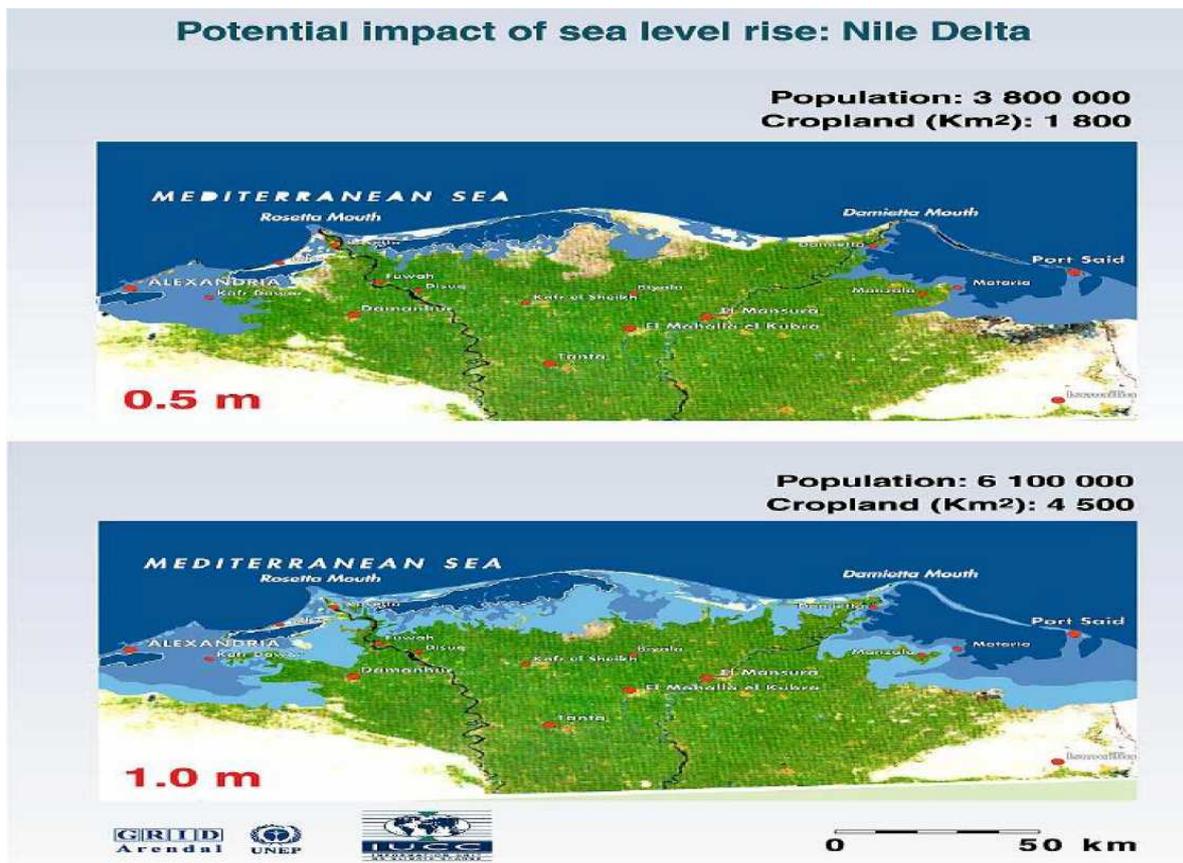
⁷⁵ Ibid.

⁷⁶ Arab Environment Monitor, “Egypt’s Nile Delta Threatened by Climate Change,” August 27, 2007, available at: www.arabenvironment.net/archive/2007/8/304072.html.

⁷⁷ CNA report, p. 6.

reverse this trend as only one of many solutions needed to address these complex inter-related problems.

In Gaza, not only agriculture, but drinking water for its 1.5 million inhabitants, is at stake. The Coastal Aquifer, Gaza’s only water supply, is already overexploited and experiencing salinity levels in some areas well above World Health Organization standards. Rising sea levels due to climate change place this Aquifer at even greater risk (i.e., less viability as a water source in the future).⁷⁸ These factors could lead to greater economic and political crises, as the supply decreases. Less water for agriculture will mean Gazans will not be able to export food to Israel and Europe for hard currency – and survival.



Potential impacts of 0.5 and 1 m sea level rise in the Nile Delta
Source: Cartographer/Designer, Otto Simonett, UNEP/GRID –Arendal

In Egypt, even without taking climate change into account, the country already is facing water supply shortages and cannot meet its agricultural, industrial and domestic needs. Water and food shortages, due to loss of agricultural production from climate-induced precipitation declines and sea level rise, will not only affect livelihoods, but also will increase competition for existing resources, which could lead to internal migration. Such mass migration “could have huge political implications,” i.e., they could increase the potential for conflict further.⁷⁹

⁷⁸ Bromberg, Gidon, Kerry Albright, and Sue Milner, “Middle East Environmental Security: The Jordan River Basin Area Case Study,” FoEME, September 2001, p. 3.

⁷⁹ Reuters AlertNet, “Climate Change to Create African Refugees – Scientists,” 22 March 2006, available at: <http://www.alertnet.org/thefacts/reliefresources/114303555233.htm>.

That is, with the projected rise of the Mediterranean Sea, the Nile River Delta, where millions of acres of farmland, is at risk of inundation.⁸⁰ The projected extent of damage could lead not only to internal migration but also to migration out of the country. People trying to cross political boundaries in the region could face problems and not be allowed to enter a neighboring state. Cross-border political tensions could mount. To elaborate, a 0.5 meter climate-induced rise in sea level, for example, could displace 2-4 million Egyptians by 2050 (see graphic).⁸¹ An anticipated one meter rise could displace six to eight million Egyptians.⁸²

Sea level rise also could result in as much as \$32.5 billion in damage to archaeological sites, land, and tourism.⁸³ The creation of large numbers of displaced people and even greater unemployment due to loss of agricultural lands, industries, and infrastructure will further erode public confidence in the Egyptian Government, with potential for political unrest and for radical fundamentalism to grow. Both the Muslim Brotherhood and the pro-reform opposition threaten the current regime's hold on power.⁸⁴ A new regime may have a different attitude towards peace with its neighbors with drastic regional security ramifications.

Conclusions and Recommendations

The current water situation in the Middle East is inadequate to address each country's internal agricultural, domestic and other needs, let alone to meet transboundary water agreements, where such commitments exist. For a region that already possesses some of the greatest political tensions in the world, combined with growing populations and water needs, the climate crisis is likely to exacerbate this cross-border political instability.

And, the political risks that could result from the potential water shortages due to projected climate changes are of such a magnitude that preventive actions must be taken now to protect the security of the region. Much of the region's population is already living in extreme poverty. As such, political, economic and physical security issues are at stake – for the region and beyond. Therefore, countries in the Middle East will have to work together over these increasingly-scarce resources to prevent such a conflict. Foreign donor agencies and International Financial Institutions will also need to play a role in providing technical and financial assistance and fostering bilateral and regional cooperative efforts.

Countries that have water-sharing agreements and/or broader “peace” agreements in place might find it easier to cooperate, provided there is the political will. Where no or only interim agreements exist, it is important to finalize such arrangements now, because, with anticipated climate changes, water-sharing arrangements will only become politically more difficult to achieve. Other factors, such as level of institutional, economic, and infrastructure development, will also play a role in

⁸⁰ NET, p. i.

⁸¹ Cartographer/Designer, Otto Simonett, UNEP/GRID –Arendal; 2 million by 2050 figure from NET, p. 16.

⁸² Ibid; 8 million figure from NET, p. 12.

⁸³ IPCC, Regional Impacts of Climate Change, Chapter 2, Africa, “African Coastal Zones,” available at: www.grida.no/climate/ipcc/regional/030.htm#2.3.4.1.1.

⁸⁴ Bensahel, N., D. L. Byman, “The Future Security Environment in the Middle East,” report prepared for the United States Air Force, Rand Corporation, Santa Monica, CA, 2004, pp. 58-59, available at: http://www.rand.org/pubs/monograph_reports/MR1640/MR1640.pdf.

determining the ease with which cooperation will occur between various Parties. It is **essential** that heightened cooperation over water resources occur, particularly as climate impacts will likely increase over time.

Each country's ability to mitigate and adapt to climate change will, of course, affect the extent to which it is affected by climate change, physically, economically, and politically. Countries will therefore have to act internally, as well as jointly, with near-term and long-term planning that consists of demand- and supply-side management policies, which will, in turn, affect the extent to which cross-border relations are secure.

Because much of the region is rich in natural resources (e.g., solar) and technologies that can contribute to domestic, regional, and international solutions to climate change, such efforts should be expanded. These types of activities will provide alternate sources of income away from traditional agriculture. And, while the Middle Eastern countries are not among the largest contributors to greenhouse gas emissions in the atmosphere, the magnitude of the problem is such that efforts in the region are needed to help address this global problem. Israel as a developed country must take on and adhere to OECD targets for greenhouse gas emissions reductions. Egypt, Jordan, and Palestine will require external assistance to fully benefit from Clean Development Mechanism (CDM) options available to developing countries.

With renewed U.S. leadership in the Middle East peace process successfully witnessed at the Annapolis meetings in November 2007, U.S. leadership is also essential at the UN Climate Change Conference in Bali, Indonesia, if we are to avoid the most severe implications that the climate crisis poses for the Middle East. The U.S. must take on concrete commitments now to reduce greenhouse gas concentrations in the atmosphere in the post-2012 period to levels agreed upon by scientists to prevent dangerous consequences. It is time for the U.S. to join the rest of the world in addressing this problem, rather than remaining the lone outsider. Europe has taken on emissions reduction commitments already, but must follow through on these. The major industrializing nations, such as China, India, and Brazil, also should recognize their role and responsibility in addressing global climate change by agreeing to concrete commitments for the post-2012 timeframe, albeit while continuing to receive assistance from Europe, the U.S., and Japan in doing so. Without the combined local and international commitment to deal with the climate crisis, climate change will become the new and real threat to Middle East security with spill-over security implications for the rest of the world.